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WELCOME TO THIS ISSUE OF THE COLLEGE'S ASIA PACIFIC JOURNAL OF HEALTH MANAGEMENT

Dr Neale Fong FCHSM

President of Australasian College of Health Service Management



The Journal stands as one of the integral pillars of our work at the College, providing a platform to share insights, reflections, and research that fuel our collective passion for continuous improvement in health leadership and management. It is a place where knowledge meets practice, where ideas spark conversation, and where those conversations shape the way we lead.

As our leadership journeys unfold, we all come to understand that change is constant. Disruption is inevitable. And from time to time, crises will test both our resolve and our resilience. Check any daily newsfeed about what is happening in health and aged care! What defines us as leaders is not whether these challenges arise, but how we respond to them. The ability to navigate uncertainty, to remain steady while encouraging innovation and courage in others, is a capability that must be continually trained, stretched, and cultivated. Easily said. Much harder to carry out.

So it is your and my College which committed to supporting you in building this capability. We do this through knowledge, insights and thorough research — shared in the pages of this Journal, in our Library Bulletin, and in a wealth of other resources and thought leadership. But we also focus on skills development, mentoring, and practical learning opportunities that translate theory into impact. Together, these help strengthen the leadership foundations upon which better health systems and healthier communities are built.

As I write, we are preparing to gather in Darwin for our first ever sold out Congress — a milestone that reflects the extraordinary interest and enthusiasm of our members and partners and the very high quality of the program and networking opportunities. For those unable to join us this time, I encourage you to mark your diaries early for the 2026 ACHSM Asia-Pacific Health Leaders Congress. These gatherings are not only inspiring and thought-provoking, but they are also one of the most powerful ways to stay energised in your leadership journey — through connection, exchange, and a shared sense of purpose.

I am also very much looking forward to welcoming new Certified Health Managers and new Fellows at our Annual General Meeting. These achievements are more than individual milestones; they are community celebrations of dedication, growth, and leadership excellence.

Finally, thank you for investing your time in engaging with this Journal. The articles you will find here represent excellent thinking and research in health leadership and management today. They are an important piece of achieving what I trust is our shared aspiration: Better Leadership. Healthier Communities.

Dr Neale Fong

President of Australasian College of Health Service Management

ADAPTIVE LEADERS BUILDING COLLECTIVE ADAPTIVE CAPACITY AND CAPABILITIES

Dr Mark Avery

Editor-in-Chief, Asia Pacific Journal of Health Management

Adaptive leadership is a relational and systemic approach to leading that emphasises continuous capacity to sense, interpret and respond to evolving challenges within complex and uncertain environments. Adaptive leading goes beyond individual flexibility by fostering a dynamic interplay between leaders, followers and within organisational contexts. It provides an opportunity for enabling collective problem solving and resilience. Adaptive leaders do not merely adjust their own behaviours; they mobilise people to confront difficult realities; experiment with new ways of working; and co-create innovative responses. This approach of leadership is grounded in principles of reflection, collaboration and shared responsibility. It can cultivate an environment where both individuals and organisations can learn, develop and perform amid ongoing change [1, 2]. Adaptive leadership is an important capability given the reactions required to the changing actions and demands on health organisations and systems.

In addition to viewing adaptive leadership as the ability for an individual leader to be responsive to change ambiguity there is significant value in equipping and enabling health organisation and system to be given to have the capacity to sense, interpret and respond to complex and unpredictable health challenges. An adaptive capability ecosystem, inherently as part of an organisation, can rely on the responsive to the operational and delivery environment given, anticipate for adaption, productive instability, cross sector engagement and resilience as well as having interest and capacity harness disruption for innovation.

The combination of adaptive leadership models or approaches supports the personal capacity of leaders and managers and their influence on organisational agility. The enabling of stronger adaptive operational ecosystems is supported by distributed and networked leaders; the collective adaptive strength and tenacity of the system; and the authentic integration of patient, community and inter—organisation imports for real-time collaborative engagement and actions.

The key to enabling this capacity and the stimulation of effective ecosystem capabilities is continuing to shift the requirement of leadership from a top-down model to a more distributed systemwide practice and engagement. Key enablers here are the nature and flow of organisational structures, resources (time) and cultural supports delivered on a strategic basis. RAND [3] recently published on the issues of innovation and implementation in highlighting key challenges of a lack of real shared vision across health organisations, insufficient resource fundings or capacity to pilot initiatives and in definition of governance, infrastructure and business procedures.

In assessing readiness for reliance on strong adaptive leadership [4] within the health organisation, critical evaluation factors can include:

- What is the degree of evidence of open dialogue and respectful disagreement?
- Is there strong and effective collaboration across professional and hierarchical boundaries?
- Are formal and informal channels used that guarantee inclusiveness in decision-making?
- Are the processes and architecture of the organisation collaborative rather than centralised?
- Is the landscape of expertise understood, shared and leveraged across teams and disciplines in the organisation?

The objectives of adaptive health organisation ecosystem, that is led adaptively, has a high degree of opportunity to deliver measurable outcomes around safety, quality and efficiency for teams and groups; the rapid uptake of innovation; enhanced cross sector collaboration; sustainable workforce engagement; and optimal patient/client outcomes.

Global Conference on Innovating for Impact: Digital Technologies for Public Administration, Engineering Application, Environmental Protection, Sustainable Business Operations, and Healthcare – Manipal Academy of Higher Education, Dubai and Online- 19th- 20th February 2025

Selected papers from this conference are included in this issue.

Guest Sub-Editors:

Prof. (Dr.) Anuj Kumar, Rushford Business School, Switzerland

Dr. Kavita Tiwari, Manipal Academy of Higher Education, Dubai Campus

Assistant Guest Sub-Editor:

Ms. Seema Shukla, Department of Management, RK University, Rajkot, Gujarat

This conference was organised by Manipal Academy of Higher Education, Dubai Campus; Confab 360 Degree, India; Rushford Business School, Switzerland; European Global Institute of Innovation and Technology, Malta, in hybrid mode. The conference explored how Artificial Intelligence (AI), Internet of Things (IoT), Big Data, and other digital innovations reshaped society. Sessions covered AI's role in public administration that boosted transparency and engagement; transformative applications in engineering that enhanced design, production, and infrastructure; digital solutions for environmental protection through monitoring and predictive analytics; sustainable business operations that drove efficiency and supply chain optimisation; and the healthcare revolution, where AI-driven diagnostics, telemedicine, wearables, and personalised medicine improved access and patient outcomes.

Mark Avery

Editor-in-Chief

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LET US RETHINK PRESCRIBING EDUCATION TOGETHER

Joon Soo Park^{1,2}

1. Centre for Optimisation of Medicines, The University of Western Australia, Crawley, Western Australia, Australia

2. International Research Collaborative - Health and Equity, The University of Western Australia, Crawley, Western Australia, Australia

Correspondence: alex.park@uwa.edu.au

ABSTRACT

Prescribing education is central to patient safety and effective clinical practice, yet it remains fragmented across health professions, often taught in disciplinary silos without sufficient interprofessional integration. Drawing on qualitative and cross-sectional studies in Australian dental prescribing education, including student interviews and national surveys, this paper highlights significant gaps between theoretical learning and clinical application, particularly in areas such as antimicrobial stewardship. These gaps reflect broader systemic issues, where limited collaboration between prescribers, pharmacists, and other healthcare professionals undermines safe prescribing practices. It is argued that prescribing should be understood as a shared, patient-centred process requiring intentional, interprofessional education. To address these challenges, internationally aligned frameworks, integrated curricula, and collaborative assessment models that reflect real-world complexity need to be designed and implemented collaboratively by educators, policymakers, and industry to ensure relevance, comparability, and adaptability across diverse contexts. Preparing students for teamwork rather than isolated competencies will foster safer, more effective prescribing decisions and improve patient outcomes globally.

KEYWORDS

Interprofessional, Prescribing, Education

FRAGMENTED PRESCRIBING EDUCATION

Prescribing education sits at the intersection of patient safety, professional responsibility, and collaborative practice [1, 2]. Across the health professions, however, this vital area remains fragmented, often taught in disciplinary silos, inconsistently applied, and insufficiently anchored in interprofessional principles. This concept emphasises prescribing as a structured, patient-centred process rather than a technical extension of clinical care [1, 3].

EVIDENCE FROM DENTAL EDUCATION

My work has shown that dental prescribing education highlights these broader problems. These included qualitative interviews exploring students' experiences, and a national cross-sectional survey assessing prescribing knowledge and attitudes [4]. Participants spoke candidly about the disconnect between theoretical learning and clinical application. Students preferred contextual, guided, and relational education over additional didactic content, seeking practical support in knowing what to prescribe and when to seek assistance. They viewed prescribing not as an isolated task but as a collaborative process within a broader professional network. These findings were echoed in a national cross-sectional

study of dental students' medication knowledge [5, 6]. While most participants answered well, few demonstrated complete mastery. Nonetheless, a majority expressed confidence in their prescribing abilities. These gaps point not only to content deficits but to a lack of contextual and interprofessional training that reflects how prescribing occurs in real practice.

CONSEQUENCES FOR PATIENT CARE

One area where these educational gaps have tangible clinical consequences is antimicrobial stewardship. A national study assessing knowledge of antibiotic prophylaxis protocols found widespread variability and misconceptions among dental students [7]. Without structured, recurrent training in antimicrobial use, the risk of perpetuating inappropriate prescribing practices remains high [7-9]. Without integrated, interprofessional training, students may carry incomplete or incorrect prescribing habits into practice, undermining global efforts to curb resistance. Internationally, the World Health Organisation's Global Action Plan on Antimicrobial Resistance highlights the importance of interdisciplinary education and collaboration, explicitly calling for integrated training across health professions to support responsible prescribing and combat antimicrobial resistance [10].

While the case for interprofessional prescribing education is clear, its implementation is not without barriers. Curriculum overcrowding within professional degrees, structural silos between faculties, and variation in accreditation requirements across disciplines all challenge reform efforts [11-13]. Acknowledging these barriers is vital to devising sustainable and context-sensitive strategies. These challenges illustrate that prescribing is a shared responsibility shaped by the broader clinical team. The consequences of fragmented education extend beyond students. It is shaped by interdisciplinary collaboration between prescribers, dispensers, educators, and policymakers [14]. When general medical practitioners [15] and pharmacists [16] report uncertainty about dental prescriptions, these professionals sometimes feel ill-equipped to manage oral health conditions or interpret dental prescriptions.

These findings reveal a fundamental insight: no single profession holds the complete picture of prescribing. Only through intentional, interprofessional collaboration, initiated early in education, can we prepare clinicians for the complexities of real-world practice [17]. This means embedding co-designed learning opportunities, shared case scenarios, and team-based simulations across health curricula. Prescribing education should be jointly owned across disciplines and grounded in educational approaches that reflect the collaborative nature of clinical care [18].

As my colleague and I highlighted in a recent editorial, the spirit of interprofessional research [13], where collaboration drives insight, should inform how we teach. When educators, researchers, and clinicians engage across disciplinary boundaries, they foster mutual respect, deeper insight, and more effective patient care. When implemented meaningfully, interprofessional education creates clinicians who understand their own roles while valuing the contributions of other professionals, ultimately contributing to cohesive, patient-centered teams.

A VISION FOR INTERPROFESSIONAL PRESCRIBING EDUCATION

Now is the time to act. To achieve sustainable reform, interprofessional prescribing education must be embedded through a set of coordinated priorities. Curricula should include mandatory interprofessional modules that bring together students from different health disciplines, particularly in critical areas such as antimicrobial stewardship [19]. Accreditation bodies across medicine, pharmacy, dentistry, and nursing should work toward establishing joint standards that reflect the shared and collaborative nature of safe prescribing [20]. In addition, assessment models must be redesigned to incorporate interdisciplinary, clinically authentic decision-making tasks that are co-developed and jointly evaluated across professions [21]. These changes will help align education with the realities of team-based healthcare and ensure that future clinicians are equipped to prescribe safely, collaboratively, and confidently [22].

International progress offers instructive models. For instance, the United Kingdom has implemented prescribing competencies through the prescribing competency framework, and Canadian institutions have piloted joint medical-pharmacy prescribing education [23]. Incorporating global insights can inform national and institutional strategies.

Ultimately, students deserve more than technical proficiency; they need preparation for collaborative, real-world decision-making. Evidence suggests that interprofessional training improves prescribing safety and confidence, particularly when applied in clinical contexts [24, 25]. Patients deserve safe, integrated prescribing decisions. Clinicians deserve the training to work confidently across boundaries. Prescribing decisions that are informed, deliberate, and situated within collaborative care. Healthcare professionals deserve an education that equips them with knowledge and the confidence to engage, collaborate, and lead.

Let this be the beginning of a broader dialogue. Let us rethink prescribing education together.

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CHALLENGES AND FUTURE DIRECTION OF MOTIVATION OF NURSES: A LITERATURE AND PERSPECTIVE VIEW

Amir Hossein Goudarzian¹, Narges Norouzkhani², Seyed Amirhossein Mazhari³, Sanaz Ghanbari⁴, Azadeh Emami^{*5}, Reza Salehi^{*5}

1. Department of Psychiatric Nursing, School of Nursing and Midwifery, Mazandaran University of Medical Sciences, Sari, Iran
2. Department of Medical Informatics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Azerbaijan Medical University, Baku, Azerbaijan.
4. Faculty of Nursing and Paramedicine, Mazandaran University of Medical Sciences, Amol, Iran
5. Department of Anesthesiology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

Correspondence: azademami@gmail.com, rsalehi45@yahoo.com

ABSTRACT

Motivation is a crucial psychological factor that significantly impacts good performance, quality of care, and job satisfaction among nurses. Despite its pivotal importance, motivation levels among nurses have unfortunately declined in recent years, attributed to various factors. This article delves into the challenges hindering nurse motivation in Iran.

The design of this paper integrated a targeted literature review with the author's expert perspectives to provide a comprehensive and actionable understanding of the subject. Based on these findings, future directions and specific recommendations have been formulated to address the identified challenges. From the novel perspective of this research, economic factors, including low salaries and limited career advancement opportunities, profoundly impact nurse motivation. Additionally, the public's perception of nursing as a technical rather than an academic field, coupled with existing issues within nursing education, further contributes to this problem.

For nursing management, human resource management, and healthcare organizations in Iran, this paper offers a comprehensive framework of actionable strategies. Key recommendations for improving motivation include recognizing and appreciating nurses' efforts, actively supporting their professional growth, empowering them in their roles, fostering effective communication, and promoting diversity and inclusion within the profession. The article further emphasizes a critical future direction: proactive engagement by nursing schools and society at large to elevate the status of nursing students and reshape public perception. These preventive measures are crucial for averting adverse outcomes such as job burnout, increased resignations, and a decrease in the quality of work life among nurses. Implementing these multifaceted approaches, tailored to individual needs, can significantly enhance nurse motivation, leading to improved job satisfaction and patient care outcomes.

KEYWORDS

motivation, challenge, nurse, Iran, profession

INTRODUCTION

In many parts of the world, nurses are the largest and most critical workforce within the healthcare system. They have consistently been at the forefront as pioneers and innovators in the field. Nurses also play a significant leadership role in advancing evidence-based practices, impacting all aspects of prevention, from promoting health to facilitating rehabilitation [1]. Psychological health is one of the most important factors in nurses. Motivation stands out as one of the paramount psychological factors that significantly shape good performance. It holds a pivotal role in areas such as learning, the delivery of quality care, and the overall job satisfaction experienced by nurses [2].

Regrettably, and observed globally, the motivation levels among nurses have witnessed a decline in recent years, owing to a multitude of factors [3]. This downturn has given rise to adverse outcomes, including burnout, job abandonment, and psychological repercussions like heightened aggression and depression [1]. Several factors contribute to the decline of motivation among Iranian nurses. These include economic issues such as low salaries that are often insufficient to meet the cost of living and a lack of comprehensive benefits [4]. Additionally, the absence of clear career progression models and limited access to professional development opportunities hinder their professional growth and sense of accomplishment [5]. The public's perception of nursing as a technical rather than an academic field also negatively impacts their motivation, as it can lead to a lack of respect and a feeling of being undervalued [6].

Understanding and addressing this decline in nurse motivation is not only crucial for individual nurse well-being and job satisfaction but also profoundly impacts the quality of patient care, the efficiency of healthcare teams, and the overall stability and effectiveness of nursing organizations [3]. A demotivated nursing workforce can lead to reduced patient safety, higher staff turnover, and increased operational costs, thereby compromising the entire healthcare system [7].

While psychological factors like motivation are paramount for nurses' performance and job satisfaction, understanding their decline necessitates a deeper theoretical lens. Among various motivational theories, Herzberg's Two-Factor Theory offers a robust framework for dissecting the elements contributing to or detracting from nurse motivation [8]. This theory differentiates between factors that cause dissatisfaction (hygiene factors) and those that lead to satisfaction and motivation (motivators), providing a valuable perspective for analyzing the challenges faced by Iranian nurses and formulating effective interventions [8].

This article delves into the unique challenges to nurse motivation in Iran and presents suggestions to address these issues within this national context. The findings provide actionable insights for nursing management, human resource departments, and healthcare policymakers seeking to bolster the nursing workforce and optimize healthcare delivery in Iran.

METHODS

This article presents a conceptual analysis and perspective view on the challenges and future directions concerning nurse motivation in Iran. The design of this paper integrated a targeted literature review with the author's expert perspectives to provide a comprehensive and actionable understanding of the subject.

A literature search was conducted across major academic databases, including PubMed, Scopus, Web of Science, and Google Scholar, using a combination of keywords including 'nurse motivation,' 'healthcare challenges,' 'nursing workforce,' 'job satisfaction,' 'burnout,' 'Iran,' and 'nursing management.' The search was limited to articles published in English and Persian from 2010 to 2024 to ensure currency and relevance to the contemporary nursing landscape, particularly within Iran.

Inclusion criteria focused on original research, review articles, and expert opinions discussing factors affecting nurse motivation, challenges faced by nurses, and strategies for improvement. Studies specific to the Iranian context were

prioritized. Articles that did not directly address nurse motivation or were purely theoretical without practical implications were excluded. The initial search yielded numerous results, which were then screened based on title and abstract for relevance, followed by a full-text review of selected articles. The identified challenges in nurse motivation were systematically extracted from this body of literature.

The author's perspectives, particularly concerning the future directions and specific recommendations for enhancing nurse motivation, are grounded in clinical experience in nursing and healthcare management within Iran, coupled with ongoing engagement in nursing education and policy discussions. This practical experience provided a contextual understanding of the multifaceted issues impacting nurse motivation that extends beyond the explicit findings of the literature. The integration of these perspectives involved a thematic synthesis of the literature-identified challenges with real-world observations and practical insights.

This allowed for a deeper interpretation of the identified problems and the formulation of realistic, context-specific, and implementable recommendations for nursing management, human resource management, and nursing organizations in Iran. The proposed future directions and recommendations were developed by critically analyzing the gaps identified in the existing literature in conjunction with the author's hands-on understanding of the Iranian healthcare system. This approach aims to bridge theoretical knowledge with practical applicability, offering a unique 'perspective view' that is both evidence-informed and experientially validated.

The authors first extracted key themes from the literature. These themes were then compared against real-world observations from clinical practice, and overlapping or complementary insights were grouped together. The expert perspectives were aligned into these thematic categories to ensure a structured integration of experiential and evidence-based knowledge. Specifically, themes identified in the literature were listed and compared with experiential insights, and categories such as organizational factors, workload, professional identity, and recognition were identified. The author's expert observations were mapped onto these categories to ensure a structured alignment between empirical evidence and practical experience.

RESULTS

CHALLENGES

Table 1 presents a framework that links the identified challenges to their underlying factors and proposed interventions.

TABLE 1. SUMMARY OF NURSE MOTIVATION CHALLENGES, FACTORS, AND INTERVENTIONS

Challenges	Underlying Factors	Recommended Interventions
Economic Factors	Low salaries and insufficient benefits, which align with Herzberg's hygiene factors.	Policy reforms to establish competitive salary benchmarks, implement robust benefit packages, and create transparent, performance-based incentive systems.
Career Advancement	Absence of clear career progression models, limited access to professional development, and the allocation of leadership roles to non-nursing professionals.	Develop and implement clear, structured career ladders and provide financial support for advanced degrees, along with mentorship and sponsorship programs.
Societal Perception	Public's view of nursing as a purely technical rather than an academic profession, which leads to a lack of recognition and value.	Launch national public awareness campaigns and integrate public relations and advocacy training into nursing curricula to elevate the profession's status.

Cultural Context and Healthcare Policies	The traditional view of nursing as a caregiving role, coupled with hierarchical healthcare structures and a lack of professional autonomy.	Empower nurses by including them in decision-making, granting greater autonomy, and providing psychological support to address unique pressures.

ECONOMICAL FACTOR

The economic factor as a systemic factor stands out as one of the most significant contributors to the declining motivation among nurses. In various countries, including Iran, nurses are often confronted with the challenge of low average salaries [4]. Moreover, the issue of salary parity with other healthcare team members, considering the demanding nature of their work, is a critical concern in the sector. This disparity has sparked numerous protests on a global scale and, ultimately, has had adverse effects on motivation and work quality [4, 9, 10].

Salaries for nurses in Iran are frequently reported as insufficient to meet the rising cost of living, leading to dissatisfaction and a search for supplementary income, which can further exacerbate fatigue [4]. For instance, a recent study reported that many of Iranian nurses felt their salaries were inadequate [11]. Beyond base salaries, the lack of comprehensive benefits, such as adequate health insurance, retirement plans, and housing allowances, further diminishes the attractiveness of the profession and reduces financial security [11]. Despite the widespread economic inflation triggered by the COVID-19 pandemic, nurses have continued to bear the brunt of professional and psychological pressures. Regrettably, there has been insufficient attention directed towards rectifying this inequality [12].

The economic factor, characterized by low salaries and insufficient benefits, aligns with Herzberg's hygiene factors. While inadequate compensation (e.g., as reported for Iranian nurses) is a primary source of dissatisfaction, merely increasing salaries might only prevent dissatisfaction rather than fostering deep, sustained motivation [4]. This suggests that while economic improvements are essential to remove dissatisfaction, they alone may not be sufficient to significantly enhance intrinsic motivation among nurses.

CAREER ADVANCEMENT

The potential for future career advancement within the nursing field is another factor that significantly impacts motivation levels. This is an important challenge that is rooted in systemic issues. It is essential for nurses to have the opportunity to progress in their job positions and career trajectories, as they are an integral part of any nation's healthcare system [13]. In Iran, there is growing concern as many hospital management positions have been allocated to physicians, sidelining nurses. The absence of well-defined career progression models can lead to stagnation and a lack of incentive for nurses to develop specialized skills or pursue advanced roles [14]. A survey found that only many of nurses perceived clear career progression opportunities within their organizations [15].

Access to ongoing education, specialized training, and opportunities for skill enhancement may be scarce or financially prohibitive, hindering nurses' ability to advance and adapt to evolving healthcare demands [16]. Many of Iranian hospitals offer consistent professional development programs for their nursing staff [5]. Experienced nurses with advanced education and specialized management training within the healthcare system, given their close patient interactions, can be exceptionally well-suited candidates for leading medical facilities in any country [17]. Failing to address this critical issue may ultimately undermine the nursing profession in any given nation.

The absence of clear career progression models and limited access to professional development opportunities directly relates to Herzberg's motivators, specifically 'advancement' and 'achievement' [18]. When nurses lack pathways for growth or opportunities to enhance their skills, their intrinsic motivation can significantly decline, as these are crucial for fostering job satisfaction and a sense of accomplishment [18].

SOCIETAL PERCEPTION

Another critical issue to address is the public's perception of the nursing profession that is rooted in cultural factors. Nursing has often been seen as a technical rather than an academic field, and although there have been numerous efforts to shift this perspective in many nations, there is still much progress to be made [19]. In Iran, nursing is often perceived by the public, and sometimes by other healthcare professionals, as a purely technical job rather than an academic or highly skilled professional discipline [6]. This can lead to a lack of respect for their complex responsibilities. Public opinion polls reveal that the general population do not view nursing as an academic profession [20].

The global emergence of COVID-19 brought about significant changes in how the public perceives nursing, primarily due to the tireless efforts of nurses. Nurses were widely praised for their altruism, and in Iran, the concept of health defenders gained prominence [21]. However, to maintain nursing's elevated status in society, it is imperative for the public to develop an academic and specialized understanding of the nursing profession [22]. This perspective will further solidify nursing as an independent and scientific field, enhancing the recognition of nurses within the community.

Based on Herzberg's Theory, when the profession lacks societal esteem, nurses may feel undervalued, which directly hinders their intrinsic motivation despite other hygiene factors being present. The emphasis on 'health defenders' during COVID-19 temporarily boosted this recognition, underscoring its importance as a motivator [21].

Nursing students, as the future pillars of this profession, should be a focal point of attention in every country [22]. Unfortunately, in certain countries, such as Iran, this issue has not received the necessary emphasis. The establishment of guidelines and regulations is crucial in any discipline, and this holds particular importance in patient-centered fields [23]. However, the consistency in implementing and monitoring these guidelines among nursing students and other medical groups, like physicians, has been lacking [24]. This inconsistency is particularly conspicuous among nursing students. It has become evident that inadequate management of nursing students has allowed misconceptions to flourish, which could potentially shape their future perspectives and, ultimately, diminish their motivation [24].

CULTURAL CONTEXT AND HEALTHCARE POLICIES

Beyond general economic and professional challenges, nurse motivation in Iran is also significantly shaped by specific cultural factors and national healthcare policies. These elements create a unique motivational landscape that must be understood for effective interventions [25]. In Iranian society, nursing has historically been viewed through a particular cultural lens, often linked to traditional caregiving roles [25]. This can sometimes influence public perception and, consequently, the professional identity and status of nurses. Societal expectations can affect how nurses are treated by patients, families, and even other healthcare professionals, influencing their sense of value [26].

Government policies and the structure of the national healthcare system can profoundly affect nurse motivation. This includes policies related to nurse-to-patient ratios, workload distribution, resource allocation, and professional autonomy (1). Additionally, policies regarding nursing scope of practice or decision-making authority can either empower nurses or limit their professional growth and job satisfaction [27]. The predominantly Islamic cultural context in Iran also brings specific ethical considerations and patient care expectations that nurses must navigate [28]. While often a source of professional pride and dedication, these can also introduce unique pressures or moral dilemmas that affect a nurse's well-being and motivation if not adequately supported by the healthcare system [28].

DISCUSSION AND FUTURE DIRECTION

Addressing the multifaceted challenges to nurse motivation requires a comprehensive and strategic approach. The following future directions and recommendations are designed to foster a more supportive and empowering environment for nurses in Iran, thereby enhancing their motivation, job satisfaction, and ultimately, the quality of patient care.

Implementing targeted initiatives is essential for meaningful improvements in nurse motivation. Policy reforms aimed at establishing competitive salary benchmarks and robust benefit packages primarily address Herzberg's hygiene factors.

While crucial for alleviating dissatisfaction, achieving sustained motivation requires simultaneous focus on motivators [26]. Healthcare organizations should conduct regular reviews to ensure compensation remains competitive and aligns with rising costs of living [15]. This necessitates a review and adjustment of existing pay scales, overtime compensation, and hazard pay for challenging work environments. Furthermore, implementing standardized, robust benefit packages, including comprehensive health insurance, attractive retirement plans, and housing assistance, is crucial, recognizing these as fundamental components of financial security and motivation [29]. Systemic changes should also include establishing transparent, performance-based incentive systems at the institutional level, providing tangible rewards for exceptional patient care, continuous learning, and leadership contributions [15].

Educational campaigns and professional image enhancement are equally vital. National public awareness campaigns, developed in collaboration with media and educational institutions, are needed to elevate the public's perception of nursing from a purely technical role to a highly skilled, academic, and indispensable profession [30]. These campaigns should strategically highlight nurses' critical thinking, leadership, and diverse contributions to healthcare. Integrating public relations and advocacy training into nursing curricula will further empower future nurses to articulate the value of their profession [24]. Moreover, educational reforms must involve reviewing and updating nursing curricula to ensure it adequately prepares graduates for clinical realities and fosters a strong sense of professional identity and pride [31].

Systemic changes for career advancement are another pillar of future directions. Healthcare organizations must develop and implement clear, structured career ladders that outline specific pathways for professional growth, specialization, and leadership roles, encompassing clinical specialization, education, research, and administration [14]. Establishing robust mentorship and sponsorship programs, pairing experienced nurses with junior colleagues, will facilitate skill development, knowledge transfer, and career navigation [16]. Policy reforms should also allocate dedicated budgets for consistent professional development, ensuring nurses have access to advanced training, workshops, and higher education opportunities without significant personal financial burden [5, 32]. The success of career advancement programs and professional development opportunities can be measured by tracking nurse participation rates and the number of individuals successfully moving into specialized or leadership roles [16].

Implementing recommendations such as recognition, professional growth, and empowerment requires proactive strategies to address potential barriers. For appreciation, strategies include implementing formal and informal programs like regular verbal appreciation, awards for excellence, and public acknowledgment from peers, supervisors, patients, and the broader community [5]. Potential barriers like time constraints and heavy workload for nursing managers can be overcome by integrating valuation practices into daily routines, empowering charge nurses and team leaders for immediate informal recognition, and developing easy-to-use digital platforms for peer-to-peer recognition, ensuring that it is meaningful and tailored to individual preferences [23].

Regarding professional growth and development, equitable access to internal and external training, conferences, and higher education should be provided, supporting nurses in obtaining certifications and advanced degrees [4]. Budget limitations and staffing shortages are common barriers; these can be mitigated by exploring blended learning approaches, advocating for external funding, implementing staggered training schedules, and investing in cross-training [4]. Empowerment strategies involve including nurses in decision-making processes for patient care, unit operations, and policy development, fostering a culture where their voices are heard. Hierarchical structures and resistance to change are barriers that can be overcome through leadership training on shared governance, establishing nurse advisory councils, and piloting empowerment initiatives [26]. Granting nurses greater autonomy in practice, supported by clear protocols, is also key.

Beyond addressing specific challenges, a holistic approach integrating psychological support and positive organizational culture aligns with both hygiene factors (e.g., supportive work environment as a working condition) and motivators (e.g., fostering a culture of recognition and belonging as 'recognition' and 'the work itself'). For psychological support, readily accessible mental health and counseling services for nurses are essential, recognizing the high stress and emotional

demands of the profession [1]. This includes programs for stress management, resilience building, and coping with compassion fatigue and burnout, alongside fostering a culture that de-stigmatizes seeking psychological help [27].

Work environment improvements entail creating safe, supportive, and well-resourced settings by ensuring adequate staffing to prevent excessive workload, providing necessary equipment and technology, and promoting teamwork and mutual respect among all healthcare professionals [25]. Regular assessments of the work environment through feedback mechanisms are vital for targeted improvements. Finally, organizational culture shifts are crucial: cultivating a culture that values nursing as a cornerstone of patient care, with leadership modeling appreciation, promoting open communication, and fostering a sense of belonging and shared purpose [12].

Establishing clear communication protocols, promoting transparent management, and encouraging interprofessional collaboration are key initiatives in this regard. By integrating these concrete initiatives, strategic implementation approaches, and a holistic focus, healthcare organizations in Iran can create a robust framework for significantly enhancing nurse motivation and ensuring a thriving nursing workforce for the future [27].

While Herzberg's Two-Factor Theory provides a solid framework for understanding nurse motivation, a critical analysis reveals its limitations, particularly within the unique cultural and socioeconomic landscape of Iran. The theory, developed in a Western context, may not fully capture the nuances of what constitutes a hygiene factor versus a motivator in a different cultural setting [8].

In the Iranian context, the public's perception of nursing as a technical rather than an academic field and the traditional view of nursing as a caregiving role can significantly influence professional identity and motivation [23]. These factors don't fit neatly into Herzberg's binary classification and can act as powerful demotivators, regardless of the presence of other hygiene or motivator factors [18].

This cultural lens is crucial for designing effective interventions. For example, while Herzberg suggests that increasing salaries (a hygiene factor) merely prevents dissatisfaction, the severe economic pressures faced by Iranian nurses, such as low salaries insufficient to meet the rising cost of living, make financial improvements a fundamental necessity for creating a viable and respected profession [11]. Addressing these economic challenges is a foundational step that must precede or accompany the implementation of other motivators.

Similarly, while career advancement is a motivator, the intervention's success depends on addressing systemic issues, such as the allocation of management positions to physicians, which is a major barrier to nurse progression in Iran [14]. Therefore, interventions cannot simply offer career paths; they must be strategic and systemic to remove existing obstacles rooted in the national context.

In essence, applying Herzberg's theory in Iran requires a nuanced approach that adapts its principles to the local culture and policies. Ignoring these contextual factors could lead to the misinterpretation of motivational drivers and the implementation of ineffective strategies (33). This understanding underscores the need for future research to be grounded in the specific cultural and policy pressures faced by nurses in Iran.

RECOMMENDATIONS FOR MANAGEMENT

Improving nurse motivation is crucial for their job satisfaction, retention, and the quality of patient care. Recognizing and appreciating nurses' efforts involves showing gratitude and acknowledging the hard work and dedication they put into their jobs. Simple verbal expressions of gratitude, such as saying "thank you" or offering words of praise, can make nurses feel valued and appreciated [34]. When supervisors and colleagues express appreciation, it boosts morale and motivation. Consider establishing an awards program where outstanding nurses are recognized and celebrated for their contributions [35]. This could include "Nurse of the Month" or "Nurse of the Year" awards. In addition to praise, providing constructive feedback is also a form of appreciation. When nurses receive feedback that helps them improve their skills, they feel valued and supported in their professional growth [35].

Professional growth is essential for keeping nurses engaged and motivated in their careers. When healthcare organizations support and facilitate the continuous development of their nursing staff, it can lead to increased job satisfaction and higher motivation levels. Offer financial support and flexible scheduling for nurses pursuing advanced degrees, certifications, or additional training in their field [36]. This could include tuition reimbursement programs, scholarships, or on-site educational opportunities. Establish a well-defined career advancement path within the organization [30]. Nurses should have a clear understanding of how they can progress in their careers, from entry-level positions to advanced roles such as nurse practitioner or nurse manager. Organize regular training sessions, workshops, and seminars to keep nurses updated on the latest healthcare practices, technologies, and guidelines [37]. These opportunities can help nurses acquire new skills and stay current in their field. Implement mentorship programs where experienced nurses can guide and mentor newer or less experienced nurses. Mentorship can provide valuable insights, support, and career advice [30]. Empowering nurses and giving them autonomy in their roles are essential strategies to improve their motivation and job satisfaction. When nurses feel empowered and have a sense of control over their work, it can lead to increased motivation and better patient care [38]. Allow nurses to have an idea in clinical decision-making processes related to patient care. Encourage them to collaborate with physicians and other healthcare professionals to make informed decisions. Define and expand the scope of practice for nurses to utilize their full range of skills and training [39]. Empower them to perform tasks and procedures within their scope, which can make their work more challenging and rewarding. Encourage nurses to identify and solve problems in their work environment. Provide opportunities for them to suggest and implement improvements in patient care processes, safety protocols, and workflow efficiency [39]. Support nurses in pursuing advanced certifications and specializations that align with their interests and career goals. This empowerment can lead to a sense of achievement and motivation. Provide regular feedback for nurses' contributions and accomplishments. Acknowledge their autonomy and decision-making abilities in patient care [38].

Effective communication involves clear and open interactions among healthcare professionals, including nurses. It plays a pivotal role in ensuring patient safety, promoting teamwork, and maintaining a positive work environment. Effective communication ensures that all members of the healthcare team, including nurses, are on the same page regarding patient care plans [38]. This reduces the risk of errors, omissions, and misunderstandings that can negatively impact patient outcomes. Nurses often work closely with physicians, therapists, pharmacists, and other healthcare professionals. Effective communication fosters teamwork and allows for seamless collaboration, leading to better patient care [40]. To implement effective communication strategies within the nursing team and healthcare organization offer communication skills training to nurses to help them improve their verbal and non-verbal communication, active listening, and conflict resolution skills [41]. Conduct regular team meetings, huddles, or shift handovers where nurses can discuss patient care plans, share important updates, and address any concerns. Utilize communication tools like secure messaging systems or mobile apps to facilitate quick and secure communication among healthcare team members [38].

Appreciating diversity and promoting inclusion within the nursing profession and healthcare organizations is crucial. A diverse nursing workforce reflects the diversity of the patient population. When patients see nurses who look like them or share similar backgrounds, they may feel more comfortable and confident in their care [42]. A diverse nursing team brings a range of experiences, perspectives, and ideas to patient care. This diversity can lead to innovative approaches to healthcare and better solutions to complex problems. Nurses who have experience with diverse patient populations are often more culturally competent [42]. They can better understand and address the unique healthcare needs and preferences of patients from different backgrounds. Implement inclusive hiring practices that actively seek a diverse pool of nursing candidates. Consider factors such as race, ethnicity, gender, sexual orientation, and socioeconomic background. Provide cultural competence training for nurses to enhance their understanding of different cultures and patient populations [31]. This training can help nurses deliver culturally sensitive care. Promote diversity in leadership positions within the healthcare organization, including nursing leadership roles. Diverse leadership teams can serve as role models and advocate for inclusive practices.

LIMITATIONS AND FUTURE RESEARCH

This perspective view on nurse motivation in Iran, while aiming for a comprehensive analysis, is limited by its reliance on a targeted literature review and the author's subjective, expert perspectives, meaning its findings are not based on primary empirical data. This approach is valuable for conceptual analysis and hypothesis generation but may not fully capture the specific nuances of individual nurse experiences across diverse settings. Therefore, future research should prioritize a mixed-methods approach to provide a more robust understanding of the issues. This would involve combining large-scale quantitative studies (such as formal surveys to quantify the correlation between low salary and nurse turnover) with in-depth qualitative research, like focus groups or interviews, to explore the specific cultural and policy-related pressures nurses face.

Furthermore, longitudinal studies are crucial to assess the long-term effectiveness of proposed interventions, such as tracking nurse career progression and job satisfaction after a new mentorship program is implemented. In addition to these methodological considerations, researchers should be aware of potential challenges in data collection within Iran's healthcare system. These challenges may include hierarchical structures and ingrained resistance to change, which could hinder access to certain data or limit the participation of nurses in research studies, as well as cultural sensitivities that necessitate culturally competent research methods to ensure honest and open responses from participants.

Another challenge is the lack of standardized data collection systems across different healthcare organizations, making it difficult to conduct large-scale, uniform studies. To address these challenges, future research should establish strong collaborative relationships with healthcare leadership and local nursing organizations to build trust and gain support for research initiatives. Researchers should also utilize and train local researchers who are familiar with the cultural context and can navigate potential barriers, and they should employ anonymous survey methods and secure data collection platforms to protect participant privacy and encourage candid responses.

Comparative studies with other regions and empirical assessments of policy impacts are also crucial to further develop actionable strategies for enhancing nurse motivation in Iran. Specific research questions could include: 'How does a standardized career ladder system affect nurse retention rates over five years?' or 'What are the most significant cultural barriers to implementing empowerment initiatives in Iranian healthcare settings?'

CONCLUSION

This article highlights that nurse motivation directly influences the quality of patient care, job satisfaction, and overall performance. By integrating a targeted literature review with expert perspectives, we have identified a range of challenges specific to the Iranian context, including economic disparities, limited career advancement opportunities, and a depreciated public perception of the nursing profession. The strategies formulated in this paper offer a comprehensive, multi-faceted, and context-specific framework for stakeholders in nursing management, human resource departments, and healthcare organizations.

The practical implications of implementing this framework are profound. By addressing economic factors through policy reforms that establish competitive salary benchmarks and transparent, performance-based incentives, healthcare systems can directly mitigate a primary source of dissatisfaction. Furthermore, the development of clear career pathways and investment in professional growth will empower nurses, fostering a sense of purpose and achievement. The expected policy impacts of these interventions include a reduction in nurse burnout and turnover rates, an increase in job satisfaction, and, most importantly, a significant improvement in the quality and safety of patient care. Ultimately, by strategically investing in and valuing the nursing workforce, the Iranian healthcare system can cultivate a motivated and resilient professional community, ensuring long-term sustainability and excellence in healthcare delivery.

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ARE CONSUMER EXPERIENCE AND SATISFACTION SURVEYS IN HEALTHCARE VALUE-ADDING?

Professor Dinesh K Arya

Tasmania's Chief Medical Officer and Deputy Secretary, Quality, Regulation and Research

Department of Health, Tasmania, Australia

Correspondence: Dinesh.Arya@health.tas.gov.au

ABSTRACT

PURPOSE

Many organisations invest huge amounts of resources in consumer experience surveys. Even though consumer experience surveys are in widespread use, several factors can affect a consumer's response, which can make results from such surveys difficult to interpret. Therefore, before making considerable investment in collecting consumer experience information, it is important to consider whether the design of consumer experience surveys is such that results will be value-adding.

DESIGN/METHODOLOGY/APPROACH

This article explores reasons why consumer experience surveys may not necessarily be as value-adding as we think. Important considerations for the interpretation of the results of consumer experience surveys are explored, and relevant literature is reviewed.

FINDINGS

Using standard consumer experience surveys that do not contextualise local information is not value-adding. Comparison of results of consumer satisfaction surveys to rate service quality across systems and borders is also difficult as a consumer experience is significantly influenced by local context and consumers often express satisfaction, or dissatisfaction based on what is acceptable and expected to be delivered in their local environment.

ORIGINALITY

Several influential publications exist on the benefits of undertaking consumer experience surveys, however, ~~it is important that~~ why consumer experience surveys may not necessarily be value-adding is also important to explore.

KEYWORDS

satisfaction; experience; quality; measurement

INTRODUCTION

Almost all healthcare organisations undertake consumer experience surveys. Implicit in conducting consumer experience surveys is a desire to understand a consumer's experience and find opportunities to improve the quality of care delivered to a healthcare consumer [1]. It is suggested that there is a strong correlation between high overall patient experience

and improved patient outcomes as well as profitability [2-4]. There is also a suggestion that there is a strong association between low consumer satisfaction and the frequency of consumer complaints and lawsuits [5].

This article explores findings from studies on consumer experience surveys to understand the reasons why organisations invest in consumer experience surveys, outputs, complexities in interpretation of those outputs, whether the results of consumer experience surveys are value-adding and if not, what can be done to ensure the investment in consumer experience surveys is value adding.

The reasons for undertaking consumer experience surveys are many and varied. These include a desire to improve the product or service delivered, meet requirements and policy expectations, and as a marketing tool to maintain or expand potential customers. Satisfied and happy consumers are more likely to engage in their treatment and are more likely to encourage health professionals to do their best, which facilitates the achievement of good outcomes [6]. Extrinsic reasons for undertaking consumer experience surveys include the requirement for compliance against the standards, finding an efficient way to ensure that consumers can have a say. Having access to consumer experience information can also be used to inform funding, planning and future development [7].

For the private health sector, the need to retain consumers and attract new ones can also be a matter of survival, profitability and minimising complaints and lawsuits [8, 9]. Organisations need to know whether consumers are satisfied with the service delivered for payment and whether they remain an organisation of choice as a healthcare provider for repeat business and recommendations to other healthcare consumers. Many providers not only strive to meet expectations and therefore try and achieve a high level of satisfaction but also endeavour to ensure that their scores are useful for marketing purposes [10, 11].

HOW MEANINGFUL ARE RESPONSES TO CONSUMER SATISFACTION SURVEYS?

The interpretation of the results of customer experience surveys is complex. Responses received are dependent upon how, and when consumer experience survey information is collected and what questions are asked [1, 12]. For example, the point at which questions are asked often influences the responses of consumers. High consumer satisfaction in exit surveys is known due to a possible 'courtesy bias.' Consumers are also reluctant to provide negative opinions at the point of exit if it is likely that they need to return to the same provider for ongoing care. There are also many other environmental factors, including those very specific to the respondents, that are always important to consider. The perceived urgency of intervention, the state of mind of the consumer (including the perception of pain), access to the specialised nature of healthcare needed within a geographical area, and the expertise of healthcare professionals, are all important determinants of how the healthcare consumer may respond to questions about their experience and perceived quality of care.

When it comes to publicly delivered health services at no direct or minimal cost to the healthcare consumer, perceived excellence in service provision and quality of care must always be further contextualised. Consumer experiences and satisfaction have to be understood in the context of public policy expectations, agreed public service provision values, resource investment decisions of the government and the reality of waiting, prioritisation and healthcare as a public good. In a welfare economy, expectations about public service provision are completely different to those of a market-driven economy. Consumers tend to have different expectations about the timeliness, quality, access and responsiveness of service when they are paying from their own pocket as compared to when services are paid from the public purse. This is also true for healthcare provision [13-15]. To access public healthcare, consumers do not really choose services based on 'quality and satisfaction scores.' A public hospital or health service catchment may determine which services a consumer can access or can access. Resource allocation and prioritisation may determine how long a consumer must wait to receive care.

The above also makes it very difficult to benchmark consumer experience scores across countries. Clearly, the political and economic context determines to what extent public health services are accessible and available, and even which services are considered a public good. Public service expectations do differ across borders, even in similar democracies.

WHAT DOES A CONSUMER EXPERIENCE OR SATISFACTION SURVEY ACTUALLY MEASURE?

A survey can only consider whether the expectations of consumers are being met [1]. It may not necessarily be an indicator of the quality of service [16]. These surveys measure consumers' perceptions of whether the service is delivering what they believe the service should provide. There is considerable subjectivity involved depending upon whether the consumer is paying a fee for service, whether it is a publicly funded service, the consumer's understanding of the commitments about service provision and many other individual-specific factors.

Satisfaction with the service may also not necessarily inform whether expected outputs were achieved. Indeed, many consumers experience surveys are undertaken soon after the care episode ends (e.g. at the time of discharge from the hospital), and it is too early to determine whether the treatment provided has been effective.

It is even more difficult to use consumer experience surveys to compare services, as different sets of consumers may have different expectations for service providers and services in their respective geographical areas [17]. Moreover, expectations change as a result of the situation in which healthcare consumers find themselves. For example, expectations about cleanliness and disinfection were very different before COVID-19 [18, 19]. Care expectations from the healthcare providers of a fit, healthy young male who has arrived for day surgery to remove a mole are very different from those of a frail and elderly woman with hearing impairment, pain and multiple co-morbidities. A survey that combines information about these diverse healthcare consumers with extremely different needs and expectations may not provide useful information to make improvements.

Unless consumer experience surveys contain specific questions about a patient's experience set against their individual-specific expectations, it may not be possible to differentiate how an individual consumer perceived care delivered to them. Responses to a question about the cleanliness or quality of food of a homeless person who received short-term care because of an unfortunate accidental injury are likely to be very different to perceptions of a financially stable, retired, cognitively alert person receiving long-term rehabilitation following undifferentiated chronic pain in some part of their body.

HOW IMPORTANT IS IT TO CUSTOMISE CONSUMER EXPERIENCE SURVEYS TO ACCOMMODATE THE LOCAL CONTEXT?

The questions about reliability and validity are always important considerations when undertaking any survey. For this reason, it is understandable why healthcare services seek an established, reliable, and valid survey or questionnaire to measure consumer experience. However, complexities in interpreting results arise if questions are not informed by the local context. Decisions about resource allocation, prioritisation, acceptance of waitlists, as well as individual factors (including the type of care accessed from a particular facility) are important determinants that may render a standard survey somewhat meaningless. By using a standard questionnaire or survey that is not customised to the local situation, it is also difficult to ascertain the reasons for satisfaction or dissatisfaction. This also makes it difficult to consider what improvements are necessary. The whole process of obtaining information about consumer experience can become meaningless from a quality improvement perspective [20].

Then some questions in standard surveys may not even need to be asked. For example, if clear and objective information about wait times is available, why ask the consumer a question about whether they had to wait? Such an answer may help formulate a political policy position regarding the amount of wait time people are prepared to tolerate, but it does not significantly add value to the care delivery or quality of care. Waiting time is a difficult concept to understand anyway.

Would a consumer be satisfied to wait in the waiting room of an overworked and highly competent physician who is the only one who specialises in the treatment that the consumer needs, as compared to another health-literate consumer with a minor ailment, who is busier than the physician and has the choice of going to another General Practitioner next door who can provide the same service at the same cost?

HOW SHOULD INFORMATION FROM CONSUMER EXPERIENCE SURVEYS BE USED?

To achieve compliance with health service quality standards, a demonstration that the service uses consumer feedback to improve services is an expectation. Undertaking a consumer experience survey can go some way in establishing compliance with this standard. However, if this information is then not used to make service improvements, the intent of the standard is not achieved.

The information on consumer experience and feedback is only useful if it affects decisions about the provision of health care. More importantly, it is essential that there is a demonstrable link between feedback received from the consumer experience survey and decision-making. If this link cannot be demonstrated, obtaining feedback on consumer experience cannot be considered a value-adding exercise. For a consumer experience survey to be a useful tool, it has to be a mechanism that enables improvement in the delivery of care and health service quality. This is not always the case and a lack of consistency in measurement and variation in the way in which data is used across healthcare settings is frequently cited as a reason.

Information from consumer experience surveys is sometimes viewed as a valuable indicator of a health service's performance. However, this has to be considered a secondary benefit. If this is the primary consideration, this needs to be made explicit when undertaking a consumer experience survey.

CONCLUSIONS

Considerable literature exists on the reasons why organisations undertake consumer experience surveys. However, this review explores complexities in the interpretation of consumer experience surveys and explores whether these complexities can sometimes render well-meaning consumer experience surveys non-value-adding. Off-the-shelf consumer experience surveys are particularly low value as these cannot accommodate the local context, which often makes a considerable investment in consumer experience surveys, non-value-adding.

Even though the use of consumer experience surveys by healthcare services is quite common and most health services achieve high satisfaction scores, the reason for undertaking consumer experience surveys should not just be to 'demonstrate' the level of satisfaction but to identify opportunities for improvement. To be able to use a consumer experience or satisfaction survey for improvement, it is important to be cognizant of many individual and environmental factors that may interfere with the ability of a health service to extrapolate this information. Comparisons of consumer experience surveys to monitor performance and rating service quality are even more difficult as a consumer's experience is significantly influenced by local contexts, which makes comparisons across systems and borders almost impossible.

There is a need to develop an evidence base to ascertain whether both the use of consumer experience surveys and how findings are then used to make improvements, deliver good value. It is important that this evidence identifies relationship between the questions of the survey and effectiveness, appropriateness, efficiency and value-adding considerations as well as the importance of contextual factors that may influence the findings of a consumer experience survey.

IMPLICATIONS

Healthcare organisations currently invest huge amounts of time and resources in undertaking consumer experience surveys, which may not be value-adding. It is important for healthcare organisations to carefully consider whether this investment is wise, appropriate and serves a useful purpose. Further investment is needed to undertake research specifically exploring what aspects of the development, rollout, interpretation and use of consumer experience surveys require further development to ensure that organisations get value from the significant investment made in surveying consumer expectations.

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ENVIRONMENTAL SUSTAINABILITY COMPETITIONS: ENGAGING HEALTHCARE STAFF IN SUSTAINABLE AND FINANCIALLY BENEFICIAL INITIATIVES

Sonia Chanchlani^{*1}, Jenny Shi¹, Jacqueline Allman², Monika Page², Gily Purushothaman³, Vanessa O'Shaughnessy³, Rajesh Manihar⁴, Eugenie Kayak¹, Ben Dunne^{1,2,3}

1. Department of Critical Care, University of Melbourne, Melbourne, Australia

2. Royal Melbourne Hospital, Melbourne, Australia

3. Peter MacCallum Cancer Centre, Melbourne, Australia

4. Royal Women's Hospital, Melbourne, Australia

Correspondence: soniachanchlani@gmail.com

ABSTRACT

Clinical care is a major source of healthcare's greenhouse gases. Health service professionals have a role in reducing this impact through adopting low-carbon models of care and addressing low-value care. This study demonstrated the effectiveness of an environmental sustainability competition in engaging staff to lead sustainable and financially beneficial quality improvement projects.

In 2022, the Royal Melbourne Hospital launched an environmental sustainability competition open to all staff. In 2023, it expanded to include Melbourne's Peter MacCallum Cancer Centre and the Royal Women's Hospital, with resources and support from the University of Melbourne. Participant surveys provided feedback and assessed the value of provided resources.

In 2022, 13 projects prevented 2.5 million kg CO₂ equivalent emissions (CO₂e) and diverted 250,000 items from landfill, with an added financial benefit of approximately \$500,000. In 2023, 17 projects resulted in preventing 140,000 kg CO₂e, emissions and 3,000 kg of waste, while saving \$160,000. Sustained 2022 projects resulted in a cumulative savings of \$800,000. Participants valued the resources and were motivated to continue initiatives but suggested formal sustainability education to enhance future projects.

Competitions effectively engaged staff in sustainable healthcare, yielding significant environmental and financial savings. Enhanced resources and education may further improve engagement and outcomes.

KEYWORDS

sustainability, environmental sustainability, healthcare, management, engagement, SusQI, sustainable practice, quality improvement, green initiatives, Australian

INTRODUCTION

In Australia, the healthcare sector has been estimated to contribute to 7% of national greenhouse gas (GHG) emissions (exceeding the global average of 5.3%) with hospitals responsible for greater than 44% [1, 2]. Up to 40% of the GHG emissions from clinical care are estimated to be from low-value care, which includes unnecessary testing and procedures that offer minimal benefits to patients and contribute to waste and emissions [3]. However, healthcare workers face barriers to engaging with sustainability efforts, such as competing priorities, lack of training, and absence of incentives to incorporate environmental sustainability into their work [4]. Thus, innovative approaches are necessary to overcome these barriers and foster a culture of sustainability within healthcare institutions.

AIM AND PURPOSE

The Royal Melbourne Hospital (RMH) Sustainability Team aimed to increase staff engagement in sustainable healthcare projects by piloting an environmental sustainability competition in 2022. This initiative sought to incentivise staff to develop and implement projects that reduced unnecessary testing, GHG emissions, waste and financial costs, whilst aligning with RMH's strategic goal of 'Strive for Sustainability' [5].

The decision to adopt a competition-based approach was based on similar projects that have demonstrated effectiveness in other healthcare settings. For example, the Centre for Sustainable Healthcare (UK), successfully used 'Green Team' Sustainability competitions to overcome barriers to staff engagement, foster interdisciplinary collaboration and measurable outcomes [6]. Recognising this success and contextual similarities in staff enthusiasm – RMH adapted this model to harness staff interests, centralise guidance and amplify engagement and scale organically occurring sustainability efforts.

This competition provided a platform for staff to submit their project proposal, ensuring early involvement of the Sustainability Team to offer resources, mentorship and integration with broader organisational goals. Building on the pilot's success, the 2023 competition expanded to include Melbourne's Peter MacCallum Cancer Centre and the Royal Women's Hospital. The University of Melbourne's Sustainable Healthcare team provided additional support and resources to competition entrants, including locally adapted Sustainability in Quality Improvement (SusQI) project management resources [7] to help staff design initiatives that improve patient care, reduce low-value practice, and advance environmental and financial sustainability.

METHODS

The sustainability competition involved two iterations from 2022 to 2023 with a third iteration launched on 5 June 2024. Each iteration is built upon the previous, to enhance effectiveness and impact. Stakeholders including green champions, executives, sustainability officers, quality improvement leads, communications representatives, and education teams were engaged in the competition's development and implementation. Participants, including clinical and non-clinical staff, were informed of the guidelines through multiple communication channels, including the website, emails, posters and newsletters within each organisation.

The 2022 pilot at RMH served as a proof-of-concept. Although minimal formal guidance was provided to participants, the RMH Sustainability Team took a hands-on approach to support all entrants in planning, conducting, and analysing their projects. Projects were evaluated with a score of 1-5 based on their potential scalability as well as quantifiable metrics including reductions in GHG emissions, waste, or cost while maintaining quality patient outcomes. Informal qualitative evaluation included discussions with entrants on improving support and internal reflections within the RMH Sustainability team on refining processes. Five projects were named winners in distinct categories including Best Clinical Change Project, Best Facilities Project, Best Waste Reduction Project, Best Ward Project, and Best Emissions Reduction Project.

The competition expanded to include Royal Women's Hospital and the Peter MacCallum Cancer Centre in 2023. Competition resources were also updated with expert input from the University of Melbourne Sustainable Healthcare team. These resources included a registration form, a competition guide with participant information, marking criteria, key dates, project management tools and resources including a QI project planning template and carbon footprinting references. Additional support was provided by the organisational sustainability teams in the form of drop-in sessions, QI workshops, and email check ins.

Quantitative metrics such as reductions in GHG emissions, waste, or cost, were used to evaluate the 2023 competition entries. All participants were surveyed to assess their satisfaction with the support and resources provided, suggest areas for improvement, and determine whether their experience would encourage them to engage in future sustainable healthcare projects and competitions. An audit of the clinical projects from 2022 was conducted to determine if outcomes were maintained. This information was used to expand and refine the support in place for the 2024 competition which was launched on World Environment Day - Wednesday 5 June. The competition participants continue to be supported by sustainability officers at each of the 3 participating sites, a clinical sustainability lead based at RMH and a senior fellow in sustainability, climate and health based at the University of Melbourne. Operational details are outlined in table 1. Figure 1 illustrates the 2023 competition timeline.

TABLE 1: SUMMARY OF SUSTAINABILITY COMPETITION PROGRAM EVOLUTION AND OPERATIONAL IMPLICATIONS

Category	2022 Pilot (RMH Only)	2023 Expansion (Multi-Site)
Participating Sites	Royal Melbourne Hospital (RMH)	RMH, Peter MacCallum Cancer Centre, Royal Women's Hospital
Number of Projects	13 projects	17 projects
Staff Involved	1 Sustainability officer, 1 clinical lead	3 sustainability officers, 1 clinical lead, 1 senior fellow
Duration	9 months	9 months
Key Focus Areas	Engagement, Waste reduction, GHG emissions,	Added focus on financial sustainability, low-value care, patient outcomes
Support Resources	RMH Sustainability Team	University of Melbourne's SusQI resources
Barriers Identified	Limited project visibility, limited project management skills among healthcare staff	Varied institutional cultures, communication channels and resource disparities, limited project management skills among healthcare staff
Outcomes Measured	GHG reduction, Cost savings, waste diversion	Added staff engagement surveys
Cost to Implement	Very Low (existing staff time)	Low (increased coordination, token prizes)

FIGURE 1: TIMELINE FOR 2023 PARKVILLE HEALTH SERVICE ENVIRONMENTAL SUSTAINABILITY COMPETITION



OUTCOMES

In 2022, 13 clinical and non-clinical projects resulted in savings of 2.5 million kg CO₂e and kept 250,000 single-use items out of landfill. Financial savings of \$500,000 were realised. One project from the Emergency Department reduced unnecessary blood gas (BG) and coagulation tests by 37% and 22% respectively, saving 900kg of CO₂e/yr and \$240,000. Another project from the Cardiothoracic Surgery team reduced unnecessary imaging and blood tests by 2000 tests/yr, resulting in 90kg CO₂e and \$40,000 saved. The Telehealth team estimated that patients using telehealth appointments rather than coming into the RMH outpatient services saved 103,434 N95 masks, the equivalent of 1.1 tonnes of clinical waste. Meanwhile, a shift to an all-electric vehicle fleet reduced the RMH's CO₂e emissions by 305 tonnes a year.

FIGURE 2: EXAMPLES OF PROJECTS SUBMITTED TO THE 2022 COMPETITION WITH ASSOCIATED FINANCIAL, CARBON, AND CARBON SAVINGS EXPRESSED IN TERMS OF KM DRIVEN

Clinical Practice Change: Choosing Wisely

Reducing unnecessary blood test in the ED



- CO₂ 900Kg CO₂ e/year
- \$240,000/year
- Driving 6,164km

Paperless Revenue Services Project

Going paperless in the Revenue Services Office



- CO₂ 342 Kg of eCO₂/year
- \$630/year
- Driving 2,342 km

RMH Telehealth Program

Reduction in patient travel and N95 masks for clinic visits



- CO₂ 2.4 million Kg eCO₂ /year
- \$150,000/year
- Driving 16,438,356 km

Choosing Wisely in CTS PAC

Reducing pathology and CXR orders in preadmissions clinic



- CO₂ 90Kg eCO₂/year
- \$40,000/year
- Driving 616 km

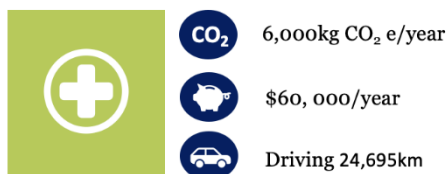
In 2023, 17 projects, conducted in less than 12 months, resulted in savings of 140,000 kg CO₂e, 3000 kg of waste and \$160,000. The RMH Emergency Dept saved a total of 6000kg CO₂e/yr and \$60,000 by reducing unnecessary intravenous (IV) cannulation and CT Kidney-Ureter-Bladder (CT-KUB) imaging through education and posters outlining clear order indications. Food services used patient feedback to tailor their supplements, reducing food waste and saving 658kg CO₂e/yr. The Orthopaedic Surgery Dept instituted a Virtual Spine Fracture Clinic saving 13,000kg CO₂e/yr and \$37,000.

The Peter MacCallum Operating Theatres eliminated nitrous oxide from their practice and saved 116,000 kg CO₂e/yr. A pilot project to introduce reusable gowns and drapes in theatres demonstrated the ongoing viability of this practice, which if annualised could reduce clinical waste by 10,000kg and reduce GHG emissions by 11,780kg CO₂e. A project to eliminate single-use drug trays in theatre and anaesthesia prevented 27,400 of these items from going to landfill, reducing waste by 2000kgs.

FIGURE 3: EXAMPLES OF PROJECTS SUBMITTED TO THE 2023 COMPETITION WITH ASSOCIATED FINANCIAL, CARBON, AND CARBON SAVINGS EXPRESSED IN TERMS OF KM DRIVEN

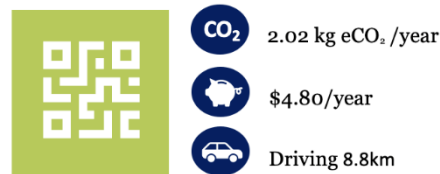
Choosing Wisely in ED: IVC & CT KUBs

Reducing unnecessary IVC and CT KUBs in ED



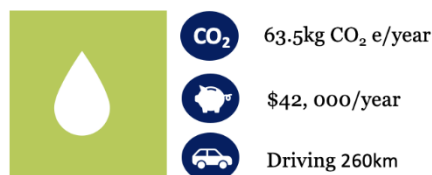
Going Digital with QR codes

Patient brochures on QR codes instead of paper



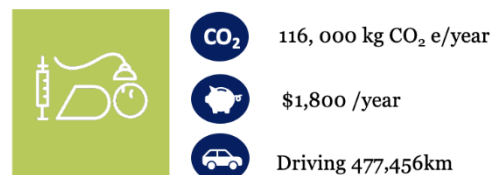
Choosing Wisely in PAC: Coag Orders

Reducing unnecessary coagulation tests



Eliminating Nitrous Oxide

Eliminated the use of NO in theaters



The 2022 clinical change projects were audited, and the outcomes were maintained resulting in cumulative savings of \$800,000 from entries in the 2022 and 2023 competitions. There was no reported adverse patient outcomes associated with any of these projects.

Feedback through qualitative surveys noted that participants believed the competition support resources were helpful, they were motivated to continue working on sustainable healthcare projects and would enter future competitions. However, participants requested didactic sustainability focused QI education sessions. This feedback was incorporated into the 2024 competition.

An Australian first, the Health Service Environmental Sustainability Competition, has successfully harnessed the motivation of healthcare staff to reduce the environmental impact of healthcare delivery, engaging and encouraging them to innovate and drive change. We empowered healthcare staff to improve models of care by reducing unnecessary tests and interventions, reducing waste, lowering GHG emissions and reducing costs. The competitions increased engagement with local sustainable healthcare initiatives, delivered sustained success, and increased high-value, low-carbon care with no adverse patient outcomes. It provided the clinical and non-clinical workforce with an opportunity to develop leadership skills to drive change, which has been shown to have a positive impact on staff wellbeing and productivity (8).

Effectively communicating the opportunity to all staff across multiple organisations was a significant barrier to uptake and participation and early engagement with the organisation's communication teams as key stakeholders has been an essential mitigation tactic. Additionally, supporting participants to deliver high quality projects was a challenge that was mitigated by providing sustainability focused quality improvement resources and upskilling opportunities. The initiative continues to develop with increasing support from the University of Melbourne Sustainable Healthcare team. Education and training are now delivered through the University of Melbourne as a recognised Sustainability in Quality Improvement (SusQI) Beacon site [9]. There are plans to expand the competition in 2025 to include 6 additional health services.

DISCUSSION

Implementing a sustainability competition has several potential benefits for any health service. The environmental benefits are clear from our demonstrated results. In addition, the competition can drive significant cost savings by reducing waste, energy consumption, and unnecessary tests or interventions. Clinicians' involvement in systems improvement initiatives has been linked to improved workforce retention, organisational culture, and sustainable, cost-effective clinical outcomes [10]. Patient safety and quality of care are often improved by eliminating unnecessary tests and procedures resulting in direct benefits for patients and the larger community [3].

Successfully delivering these competitions requires appropriately adapted organisational governance structures as well as targeted resource allocation. Effective governance structures are critical to maintain visibility and align projects with organisational goals [11]. Engaging key stakeholders including executives, sustainability teams, as well as the education, communications and safety and quality improvement teams fosters a collaborative approach for success [12]. Adequate sustainability focused quality improvement training and resources are crucial to help staff lead high-quality projects that deliver measurable outcomes [13, 14]. Robust project evaluation is necessary to assess the impact of sustainability initiatives, enabling continuous improvement and scalability of successful projects [15]. Effective communication of the competition's benefits, opportunities, and successes maximises ongoing participation and impact. Transparent judging criteria and celebrating achievements publicly can motivate broader participation and sustain momentum [16].

The Health Service Environmental Sustainability Competition has engaged staff across Royal Melbourne Hospital, Peter MacCallum Cancer Centre, and the Royal Women's Hospital to design and implement innovative solutions to reduce unnecessary testing, low-value care, GHG emissions, and waste. SusQI resource support and training from the University of Melbourne Sustainable Healthcare Team has enabled these projects to deliver sustained GHG savings of 2.6 million kg, 3,000 kg of waste, and keep 250,000 single-use items out of landfill, while saving a cumulative total of \$800,000 over 2022 and 2023.

CONCLUSION

This collaborative effort across Royal Melbourne Hospital, Peter MacCallum Cancer Centre, the Royal Women's Hospital, and the University of Melbourne recognised that strategic alignment, governance structures, and investment were critical for success and strived to ensure they were embedded as part of the competition process. The outcomes demonstrate robust engagement and a commitment to environmental sustainability. The application of this approach elsewhere would require similar attention to project detail to ensure successful outcomes for the benefit of the workforce, the organisation, and patients.

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ADDING VALUE TO THE RECRUITMENT OF SENIOR HEALTH SERVICE MANAGERS: A PARTICIPATORY ACTION RESEARCH STUDY

Kathryn Gregory^{*1}, Pieter Van Dam¹, Lindsay Smith²

1. School of Nursing, University of Tasmania, Hobart, Tasmania, Australia.

2. School of Nursing, Paramedicine and Healthcare Sciences, Charles Sturt University, Bathurst, New South Wales, Australia

Correspondence: kathryn.gregory@utas.edu.au

ABSTRACT

OBJECTIVE

As healthcare services evolve, effective management is essential to ensure they remain contemporary, function effectively, deliver client-centred care, foster a positive culture, support staff, drive strategic direction and promote continuous quality improvement. Health managers strongly influence and drive the services they are responsible for, therefore appointing the right person is essential. This qualitative Participatory Action Research (PAR) study explores the values prioritised by health services in recruiting senior managers and collaboratively develops actionable solutions to enhance these crucial recruitment processes.

DESIGN

A Participatory Action Research (PAR) methodology has been used to enable the researchers to work collaboratively with participants to develop an understanding of the values of senior managers and explore possible solutions to improve recruitment processes. PAR is a dynamic and iterative process, and data is collected over several cycles with the same focus group participants. This paper shares the findings of the first two cycles.

RESULTS

The findings from PAR cycle one demonstrated that the values of senior managers are represented by a central organising concept of 'leadership'. The second PAR cycle identified values-based recruitment (VBR) as a central organising concept for improving recruitment, leading to concrete solutions such as enhanced communication strategies, leadership capability frameworks and 'growing your own' initiatives.

CONCLUSION

This study highlights the need to explore the values of an individual in addition to their skills, knowledge and experience during the recruitment process for a senior health service manager. This study underscores the critical importance of integrating individual values, particularly leadership attributes, alongside traditional skills and experience in senior health services manager recruitment, offering a clear pathway for more effective and sustainable talent acquisition strategies within healthcare.

KEYWORDS

values; health service manager; values-based recruitment; leadership, participatory action research; thematic analysis

INTRODUCTION

In an era of dynamic healthcare landscapes, marked by increasing complexity, resource constraints, and an imperative for person-centred care, the strategic recruitment of senior health service managers (HSMs) is paramount. HSMs have a responsibility to deliver the best possible services to their community. Therefore, developing purposeful and strategically focused ways of recruiting is essential in getting the right person into a role [1, 2]. HSMs are appointed for various reasons such as qualifications, experience, clinical expertise, a vacancy, service longevity or for their values [1, 3, 4]. There are covert strategies to recruiting documented such as a vested interest (e.g.: someone that will not outperform the hiring manager), being indebted (e.g.: helping the applicant i.e. friend) and a particular bias (e.g.: gender, religion, like-minded) [4]. Diverse methods of recruitment lead to varied outcomes; some managers may be the right fit and align with organisational values whilst others may not. HSMs are integral to effective service delivery which supports the premise that poor management might be a contributing factor to sub-optimal consumer outcomes. [5, 6]. Furthermore, misaligned recruitment could undermine the organisations' ability to adapt to change, while escalating human and financial costs through increased staff turnover. Moreover, these challenges have the potential to erode staff morale and damage the organisations' reputation, ultimately compromising service quality and workforce stability [7, 8]. Therefore, purposeful recruitment that gives an organisation the best chance of getting the right people is key.

There are studies exploring recruitment, succession planning, transition into management and characteristics of leaders [9-11]. Many studies define effective managers as influential leaders who shape culture, impact consumer outcomes, and drive service planning [12, 13]. HSMs should drive strategy, build relationships, model integrity, communicate effectively, prioritise consumers and deliver results [14, 15]. Historically, HSMs had excellent clinical skills or were the most experienced staff. They were adept in patient care; understood how the organisation functioned, were familiar with staff and knew how to get things done [16]. Modern managers should be strategic, people-focused, financially aware, risk conscious, quality-driven and clinically informed [17]. Importantly, HSMs are people-focused roles that guide staff behaviour [18] enabled by emotional intelligence and effective communication [19]. Recruiting the right manager is critical to support health organisations thrive in today's challenging world. One approach to ensuring the right people are appointed to management positions is by using Values-Based Recruitment (VBR). This helps identify people whose values align with the organisation in addition to having the right skills and experience to be successful in the role. VBR encompasses behavioural assessments to explore values, in addition to assessing competence and technical skills. Rooted in the principles of person-organisation fit theory, VBR posits that aligning an individual's personal values with an organisations' culture and mission leads to greater job satisfaction, reduced turnover and improved performance, which ultimately leads to improved outcomes for consumers [20]. VBR enables a values-based and appropriately skilled workforce to deliver excellent care, promote teamwork and foster a positive culture [21]. This study aims to identify the values health services prioritise when recruiting senior managers.

METHOD

This study used a Participatory Action Research (PAR) methodology. PAR was chosen for its capacity to not only explore complex organisational phenomena but also to empower participants as co-researchers, enabling the iterative development of contextually relevant and actionable solutions directly applicable to health service recruitment challenges. PAR brings researchers and participants together to collaboratively develop knowledge and analyse solutions with the goal of taking action to solve a problem – 'it is not research followed by action, it is action that is researched' [22]. This dynamic and collaborative process empowers participants to engage in research through a series of action cycles comprised of plan, act, observe and reflect [23]. This study includes several PAR cycles involving the same focus group participants, there were 18 participants in total. To reduce bias, researchers engaged in reflexive practice by articulating their assumptions prior to data collection and maintained ongoing reflexive dialogue throughout the research project [24]. Furthermore, the participant voice was prioritised by ensuring that data remained grounded in the themes which were inductively developed and collaboratively reviewed with the participants at each subsequent focus group. The first PAR cycle focused on the values of HSMs. The second cycle explored possible values-based solutions to recruiting

senior managers. In total four one-hour focus groups were conducted from November 2022 till July 2023 with an average of 9 participants per group. The focus group data was transcribed verbatim, and the focus groups were facilitated by the research team.

DATA ANALYSIS

This study used thematic analysis (TA), developed by Braun and Clarke (2006) [25]. This method is underpinned by a flexible and reflexive approach to analysing qualitative data [26]. TA is used as an inductive method for identifying, analysing and reporting patterns within the data. TA assists the researcher to organise and describe data in rich detail, particularly in applied (action) research [27]. Broadly, the six phases of TA include: familiarisation with data including identifying items of interest, generating codes, generating themes, reviewing initial themes, refining and naming themes and producing a report. More specifically, the research team adopted Braun and Clarke's later work on Reflexive Thematic Analysis as the coding approach, emphasising the active role of the researcher in theme development. This method, characterised by its collaborative and reflexive nature, enabled the development of rich and nuanced analysis of the data, prioritising depth over consensus [26].

ETHICS APPROVAL

Ethics approval was obtained from the University of Tasmania, Human Research Ethics Committee and the Tasmanian Department of Health, Research Governance Office.

PARTICIPANT RECRUITMENT

In accordance with ethics approval, an 'Expression of Interest' (EOI) was published on the Tasmanian Health Service (THS) intranet. The EOI outlined the study, the commitment needed from participants and benefits of the study. Consent was obtained for all participants. The focus groups were held virtually to enable participation across the state of Tasmania, Australia. Purposive sampling [28] was utilised to recruit research participants who were knowledgeable about the topic being explored, were senior managers who have undertaken recruitment and are employed at a minimum level of:

- Nurse Unit Manager
- Senior medical practitioner – administrator
- Senior general administrator
- Senior Allied Health Professional

Additionally, a health consumer was invited to participate in this study. When included as research participants, consumers can strengthen research by sharing their lived experience which can shape strategic direction and enhance service quality by supporting policy and practice to reflect real world needs. Fundamentally, including consumers in this research project was essential as their insights help ensure that recruitment strategies align with the values and expectations of those receiving care, rather than solely reflecting the perspectives of those delivering it. This approach genuinely promotes person-centred partnerships with consumers and enables more meaningful policy development [29, 30]. Authentic consumer engagement embodies the principle of 'nothing about us without us' [31] ensuring that consumers are meaningfully involved in all stages of decision making in policy development and service design.

RESULTS

A total of 20 people applied to participate in this study, 19 applicants met the eligibility criteria whereas one person did not. However, only 18 people chose to proceed. Overall, Registered Nurses represented the largest number of participants, whilst six different specialists comprised the Allied Health Professionals group. There was one consumer, two medical doctors and three senior administrators. There were two focus groups in each of the two PAR cycles. Research participants represented all major regions of Tasmania, Australia and were from diverse specialty areas including mental health, critical care, child and parenting health, primary health, radiology, pathology, medical administration, education, recruitment, reform, clinical quality regulation and quality and safety.

TABLE 1. TOTAL PARTICIPANTS FOR PAR CYCLE ONE AND TWO

Domains	Total number (percentage)
Classification	
Registered Nurse	5 (27.8%)
Consumer	1 (5.6%)
Administrator	3 (16.7%)
Medical Practitioner	2 (11.1%)
Allied Health Professional total	7 (38.9%)
Psychologist	1 (5.6%)
Physiotherapist	2 (11.1%)
Social Worker	1 (5.6%)
Scientist	1 (5.6%)
Occupational Therapist	1 (5.6%)
Specialist Therapist	1 (5.6%)
Region of management	
South	10 (55.6%)
North	5 (27.8%)
Northwest	1 (5.6%)
Statewide	2 (11.1%)

PAR CYCLE ONE

The first focus group of PAR cycle one had a dominant storyline where values of health service managers (HSM) were reflected by an organising concept of 'leadership'. The second focus group did not introduce new data but reinforced the existing findings by contributing to a coherent narrative, further enriching and strengthening the developing themes. Data sufficiency was reached as no new data was identified. This was determined through ongoing iterative coding, ongoing reflexivity, consensus of the research team and participant checking and validation at the beginning of each focus group. Codes generated from the data were grouped into themes that included 'leadership in action', recruitment and retention', 'a strong organisation' and 'a change in the way we do things.'

TABLE 2. THEMES AND CODES FROM PAR CYCLE 1

Themes	Codes
Leadership in action	Emotional intelligence
	Inspire and influence
	Excellent interpersonal and communication skills
	A decent dose of courage
	Open, honest, transparent, and trustworthy
	Authentic, accountable and credible
	Resilient
	Humility and humanity
	Integrity and vulnerability
	Hope and optimism
	Innovate and initiate – look outside the box
	Build capacity within your team
	Critical thinking and quick decision making

	Strategic and logical
	Independent, consistent, fairness and equity
Recruitment and retention	Fit for purpose recruitment system
	Effective, timely and respectful recruitment
	Values-based recruitment (VBR)
	Behaviourally based interviews
	Meaningful Statement of Duties (SoDs)
	Organisational values in every SoD
	Leadership qualities in every health service manager SoD
	Management skills can be taught, leadership skills are innate
	Emotional intelligence outweighs technical skills
	Be brave – get recruitment right
	Opportunities for existing staff – nurture people
	Competitive pay and conditions
A strong organisation	Strong governance, systems and processes
	Embed the lived experience
	Psychologically safe place to work
	Support, appreciate and value the staff
	Shared understanding of 'why' what we do matters
	Positive culture: feel pride and joy in our workplace
	Clear strategic direction, priorities, and vision
	Meaningful, visible, integrated, and embedded values
	Empower managers to manage
	Tell our own story: who are we and what we offer
	Clear, effective, and inclusive communication
	Build a solid foundation and the rest will follow
A change in the way we do things	People want to feel valued for their energy, effort and creativity
	New generation: question if their values align with the organisation
	A generation driven by purpose: what can I add
	People want to make a difference: altruism beyond a normal citizen
	Cultural shifts: no longer a job for life
	Staff want to be understood, encouraged and valued
	Give people a reason to work with the organisation
	Visible values: embed them in everything, including language
	COVID: barrier and enabler
	Changing media: hero to villain
	Flexible, manageable, and meaningful roles

THEME: LEADERSHIP IN ACTION

The theme 'leadership in action' was developed from codes that focused on values; participants consistently referred to values as leadership. When explored further, leadership included excellent interpersonal and communication skills, courage, honesty, trustworthiness, optimism and the ability to inspire. Additionally, leadership included the ability to acknowledge failings and the ability to create psychological safety. A distinction was made between leaders and managers, emphasising that while the two roles are not mutually exclusive, not all managers demonstrate leadership qualities. Management was described as 'hard skills' such as managing budgets and rosters whilst leadership was described as 'soft skills' such as emotional intelligence, the ability to bring people along with you and bravery. 'Leaders

need a decent dose of courage ... to always have the best interests of the team and organisation at heart ...' (Participant L).

THEME: RECRUITMENT AND RETENTION

'Recruitment and retention' identified the importance of not having a singular focus on recruiting new people. Nurturing and promoting existing staff were identified as critical. Other features include having a contemporary recruitment system that is fit for purpose, effective and timely. *'Recruiting managers needs to be 2-fold ... acquiring people from the outside ... [and] nurturing the existing people'* (Participant I). 'Growing your own' was identified as an important strategy.

THEME: A STRONG ORGANISATION

'A strong organisation' emphasised the importance of building a strong foundation and looking after staff. There was consensus that organisational values, vision, and strategic priorities are critical. The reason they exist is so that people can work together with a shared understanding of 'why' the organisation matters. However, organisational values and priorities are not known by all staff. *'They sit nicely on shelves, they're not front and center in the Statement of Duties, nor often are they front and center in the discussion around recruitment'* (Participant B). It was found that having clear and well socialised values that support teams to work cohesively and with purpose is critical to a strong organisation.

THEME: A CHANGE IN THE WAY WE DO THINGS

Another theme was based on change. Participants identified that a new generation of managers may question whether their own values align with the organisation, reflecting a cultural shift where many no longer view their roles as a job for life. People leave if they don't feel valued and supported. *'We are dealing with a generation of young people ...a gig economy ... willing to give up permanent contracts to go seek novel and interesting adventures and experiences ...'* (Participant S). A consistent feature throughout both focus groups of PAR cycle one was that although 'values' of senior managers can be broadly identified as leadership, this is influenced by recruitment, retention, the organisation and change.

The themes of Leadership in Action, Recruitment and Retention, A Strong Organisation, and A Change in the Way We Do Things form an overarching understanding of leadership in the context of recruitment. Leadership has emerged as a dynamic and relational concept embedded within organisational culture and systems. The values and behaviours associated with leadership—such as emotional intelligence, courage, and the ability to inspire are strongly connected with how organisations can recruit, retain, and support their staff. An organisation with clearly articulated and widely understood values, enables leaders to foster psychological safety and promote value-based recruitment.

PAR CYCLE TWO

Aligned with PAR cycle one, there were two focus groups in the second PAR cycle. Member checking ensured a summary of data analysis from PAR cycle one was presented. Participants fed back that the analysis resonated with them and was reflective of previous focus groups, their voice was well represented. PAR cycle two focused on exploring values-based ways to recruit managers. The central organising concept generated from this cycle was 'values-based recruitment'. The concept was influenced by leadership capability, strengthening the organisation, a communication strategy and 'growing your own' managers. The themes and codes from PAR cycle two are shown in Table 3.

TABLE 3. THEMES AND CODES FROM PAR CYCLE 2

Themes	Codes
Values-Based Recruitment (VBR)	Contemporary recruitment strategy
	Values-based recruitment protocol
	Dedicated recruitment navigator role
	Purposeful, inclusive and clear information
	Statement of Duties include values and leadership capabilities

	Independent, consistent, well-informed recruitment panel
	Objective and unbiased recruitment processes
	Values-based interview: demonstrate leadership in action
	360-degree values-based references
Leadership Capability Framework	Don't reinvent the wheel: many existing leadership frameworks
	Framework is a standard to work toward
	Framework to pitch application at
	Framework to recognise future leaders
	Framework to align with performance appraisals
	Leadership continuum: novice to expert
	Values-based leadership
Strengthen the organisation	Clearly articulated and embedded values
	Values-based policies and procedures
	Current leaders expected to demonstrate values in all they do
	Recognise good leaders: reward, celebrate and promote
	Be an employer of choice: give people a reason to work here
	Comprehensive orientation and onboarding program
	A hierarchy of needs for a values-based workplace
	Be brave: do things differently to create positive change
	Flexible and solution focused workplace
	Right resources to do the job properly: i.e.: time and people
Name it up: communication strategy	Formal marketing and communication strategy
	Work with Brand Tasmania to promote working in health
	Tell our own story: excellent research, initiatives, and care
	Testimonials: meaningful stories by credible and relatable people
	Promote values to attract the right people
	Increase visibility of service projects and initiatives
	Share and connect all initiatives across health services
	An easy to navigate and informative website
Grow your own: nurture and support existing staff	Recruitment and retention strategy
	Provide opportunities to existing staff
	Champion those with leadership values
	Embed a formal leadership program
	Training and development opportunities
	Informal leadership opportunities
	Clinical supervision
	Values-based performance appraisal process

	Management pathway
	Intentional and transparent succession planning
	'Leadership in training'
	Mentor programs

THEME: VALUES-BASED RECRUITMENT (VBR)

It was determined that values-based recruitment (VBR) (20) supports the employment of a workforce with the right skills, knowledge, values and emotional intelligence to deliver a high quality service. *'I think nowadays we need [managers] who have high level emotional intelligence, aren't easily intimidated during stressful situations, who value the workforce and wellbeing of staff'* (Participant D). The data highlighted the importance of contemporary recruitment strategies that were respectful, timely and innovative. One participant identified the possible addition of Artificial Intelligence (AI) as a way of 'shortlisting' in the recruitment process; *'the benefits would include using contemporary technology to assist and reduce unconscious bias of recruiting those that are only like you'* (Participant F). AI could assist in improving efficiency and reducing unconscious bias in VBR. Its capacity to analyse large sets of data can streamline processes and support fairer decision making. However, assessment of values is complex and needs human judgement, empathy and ethical insight. A hybrid approach that integrates AI tools with human judgement offers a balanced and effective strategy worthy of further research. The data from PAR cycle two suggested that once shortlisting had occurred, an independent and well-informed panel could undertake values-based interviews. *'I think that's really important, to think about the use of independence in the recruitment process so that you ensure that you're getting multiple viewpoints ...'* (Participant J).

THEME: LEADERSHIP CAPABILITY FRAMEWORK

The theme of VBR was connected to the need for a values-based leadership capability framework, this consistently featured in the data. A capability framework would include organisational values and more importantly candidates would need demonstrate that their values align with the organisation. *'The expectations of what [values] you have to display against the value set of the organisation ...'* (Participant F). A capability framework was also described as an objectively guiding recruitment tool and participants expressed that a framework would reduce unconscious bias.

THEME: STRENGTHEN THE ORGANISATION

Strengthening the organisation was another theme from PAR cycle two. The data indicated that it was important to have clearly articulated and embedded values that shape how the organisation is managed and led. *'Our current leaders need to demonstrate those values otherwise you'll get people that are hesitant to actually step up into management roles if you have a poor example above you'* (Participant H). Managers are more likely to be effective when their values align with those of the organisation, a synergy that is more likely achievable in a values-based organisation.

THEME: NAME IT UP: COMMUNICATION STRATEGY

Another theme focused on the need for a comprehensive communication strategy to increase service visibility and promote organisational values by setting expectations to attract the right people. *'You need to say what you want up front ... what the expectations are ... and if there's something [important] ... it needs to be in the recruitment campaign ...'* (Participant Q). Additionally, authentic communication pieces such as testimonials from relatable people should be included as part of promoting a service.

THEME: GROW YOUR OWN: NURTURE AND SUPPORT EXISTING STAFF

Recruitment should not imply that you are only bringing new people into an organisation. As robustly explored with participants, recruiting managers should include 'growing your own'. Fostering a supportive environment where values are embedded promotes a positive culture, which is important to developing values-based leaders and supports staff retention. *'... organisations are really struggling to retain people ... where there is a disconnect with values ... or that organisations values are [not] very clear'* Participant J. Integrating an organisation's values into every aspect of its system, fosters a sense of connection, provides clarity and purpose and creates opportunities for growth. Developing purposeful pathways into management could include championing those with leadership values.

DISCUSSION

This study focused on exploring the values of health service managers (HSM) and finding potential solutions to strengthening recruitment. The ultimate goal is focused on getting the right person for the job whose values align with the organisation. Congruent with PAR, the focus of this study evolved from exploring the individual values of senior health service managers, to the collective features of leadership. Leadership is central to the organising concept of values-based recruitment (VBR). These features align with other leadership studies including one [32] that explored Florence Nightingale's leadership style. Nightingale was said to have set the expectations for the modern leader which were quiet determination, humility, and political strategy. These qualities were translated to the contemporary leader of today, these being clarity of purpose, mindfulness, reverence for human life, collaboration, keeping up with a changing world and making meaning of what we do. This finding aligns with the concept of servant leadership, with characteristics that include authenticity, humility, integrity, listening, compassion, accountability, courage and altruism [33]. It is evident that the significance of identifying leadership values when recruiting people into HSM positions cannot be understated. The findings indicate that a 'leadership capability framework' would be useful to support senior HSM recruitment. However, the research participants identified that there are many existing leadership frameworks. Therefore, focusing on the development of another leadership framework was not the preferred outcome for this study.

This study identified that recruiting the right manager, with values that align with the organisation, is essential. This is consistent with the premise that managers directly influence behaviour, staff retention and workplace culture [34]. A changing world and organisational values broadly influence recruitment and retention. Furthermore, the research highlighted the need for organisational values to be clearly articulated and authentically embedded into the health service. This is consistent with studies [35] exploring the next generation of leaders, VBR and the importance of health organisations being flexible to promote work-life balance.

This study found that some organisational values are ambiguous but could be strengthened by having clearer definitions. The data identified the importance of having a contemporary and well-defined recruitment strategy that is values-based, purposeful, clear and intentional. The findings suggested a 'Statement of Duties' (SoD) that includes values-based leadership capabilities is critical and would benefit potential applicants and those doing the recruitment. This is consistent with the notion that VBR identifies the values of applicants, in addition to their skills, knowledge and experience, which helps in determining whether they are the right fit for the organisation [20]. The participants explored the importance of objective, fair and unbiased recruitment, which is supported by having a recruitment panel comprised of independent members and a consumer where possible. The importance of consumer engagement in recruitment was acknowledged and supported by other research that proposed it increases humanness which substantiates values [29]. Another focus was the importance of promotion and providing opportunities for existing staff with leadership qualities rather than just focusing on new people. 'Growing your own managers' was viewed as important and often missing in recruitment strategies. Leadership development, both formal and informal, was seen as critical in recruitment. Additionally, offering professional development to support succession planning fosters a positive culture where staff feel valued and recognised for their effort. Embracing a broader recruitment strategy that includes championing and promoting those with leadership values, as well as recruiting new people, has the potential to positively impact culture and address some of an organisation's workforce challenges.

DIAGRAM 1. RECRUITING THE RIGHT MANAGER WITH THE RIGHT VALUES



A values-based organisation attracts the right managers through values-based recruitment, ensuring that there is alignment beyond skills, knowledge and experience. Values-based leadership drives a positive culture, adaptability, consumer focus and builds an effective organisation.

WE RECOMMEND THAT

1. organisations should adopt a specific recruitment framework, such as VBR, that includes organisational values, 'role and behaviour' values map, values-based assessment tools, interview guides, panel support strategy and candidate support strategy.
2. organisations should actively involve consumers in VBR processes, to foster meaningful and impactful recruitment.
3. organisations should adopt explicit leadership competency frameworks that integrate values and provide benchmarking to inform 'statement of duties', training and education frameworks and performance appraisals.
4. organisations should adopt a values-based approach that demonstrates values in their recruitment, communication and engagement strategies, systems and processes, education, culture, monitoring and evaluation.
5. organisations should implement structured mentorship and sponsorship programs for existing staff identified with leadership potential to facilitate 'growing your own' managers.

LIMITATIONS

The limitation of this study includes the narrow scope in which this research was undertaken, i.e.: location and cohort. It is acknowledged that having a more diverse participant group from different locations may be beneficial as it could give a more robust view on the values of health service managers. To enrich the diversity of perspectives, participants could include managers from the private sector, managers from other Australian states and international contexts, as well as individuals who report to managers, such as clinicians, to gain insight into the values they associate with effective leadership. The strengths of PAR, particularly its capacity to generate deep contextual understanding and actionable insights, may help address some of the limitations identified in this study.

FUTURE RESEARCH

Further recommendations for future research include exploring the most appropriate approach to consumer participation in HSM recruitment processes and evaluating and comparing the outcomes of VBR to other recruitment processes. This could take shape in the development of a structured reference tool designed to support VBR by systematically evaluating candidates' alignment with organisational values through feedback from professionals the candidates have previously worked with.

CONCLUSIONS

This study compellingly demonstrates that implementing values-based recruitment (VBR) is crucial for securing senior health services managers whose values align with organisational objectives, thereby fostering a positive culture and effective service delivery. VBR is not merely a recruitment tool but a strategic imperative, underpinned by a commitment to nurturing values-based leadership and embracing internal talent development. Fundamentally, embedding VBR in healthcare organisations has the potential to strengthen the workforce, support retention, improve quality, positively influence workplace culture and ultimately improve consumer outcomes through a more effective, compassionate and values aligned team and system.

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ORGANISATIONAL COMMITMENT AMONG NURSES: A QUALITATIVE STUDY

Ana Luiza Ferreira Aydogdu

Faculty of Health Sciences, Department of Nursing, Istanbul Health and Technology University, Istanbul, Türkiye.

Correspondence: luizafl@gmail.com, ana.luiza@istun.edu.tr

ABSTRACT

OBJECTIVE:

To describe the perceptions and experiences related to the organisational commitment of nurses working in healthcare institutions across different regions of Brazil.

DESIGN:

Descriptive qualitative study.

SETTING:

Registered nurses working in Brazilian healthcare institutions.

METHODS:

An online data collection tool was used. A total of 55 registered nurses participated in the study. Data were collected from July 15, 2023, to September 20, 2023. A thematic analysis was conducted.

RESULTS:

Data were organised into four themes: reasons to stay in the organisation, feelings towards the organisation, factors that promote organisational commitment, and factors that hinder organisational commitment. A total of 14 subthemes were identified.

CONCLUSIONS:

The study sheds light on the indispensable significance of leadership styles and strategic formulations in improving working conditions, thus driving organisational commitment among nurses. Healthcare institutions could implement pilot projects to strengthen the leadership skills of nurse managers, systematically assessing their influence on workplace satisfaction and commitment.

KEYWORDS

Brazilian nurses, health facilities, job satisfaction, qualitative research, nurses, work engagement, workplace

INTRODUCTION

Organisational commitment is a widely debated topic across various sectors, including private companies, non-profit organisations, and governmental institutions. It plays a crucial role in boosting productivity and retaining talent. This aspect proves to be crucial for boosting productivity and retaining talent within organisations. Committed employees not only show greater dedication to their tasks but also contribute innovative ideas. They build a valuable connection with the company's goals. In addition, commitment helps inspire colleagues and supports the effective communication of the organisation's vision and mission. [1-3].

Organisational commitment becomes even more relevant for healthcare institutions, which rely on professionals with different levels of education and expertise in various fields [4, 5]. The focus on Brazil is particularly significant due to its diverse healthcare system and regional disparities. These factors provide a comprehensive and representative context for examining organisational commitment among healthcare workers. Brazil's healthcare system comprises the public and private sectors, with significant variations in resources, infrastructure, and management practices across different regions [6]. Moreover, the country is undergoing an economic crisis and has high unemployment rates [7]. These factors may influence employees' organisational commitment.

Promoting organisational commitment involves transparent communication, continuous professional development, and performance recognition. Regardless of the sector, these strategies are crucial for increasing efficiency and effectiveness in service delivery. They also help establish a solid foundation for lasting organisational commitment [3, 8].

Organisational commitment refers to employees' dedication toward the organisation itself, including its mission, values, and goals. This can encompass factors such as employee loyalty, willingness to contribute to the organisation's objectives, and alignment with the organisational culture. In essence, organisational commitment focuses on the relationship between the worker and the organisation as a whole [8, 9]. Thus, emotional commitment contributes to general organisational commitment. Emotional commitment refers to the affective bond an employee feels toward the organisation. In contrast, organisational commitment encompasses the employee's overall dedication to the organisation's goals and objectives [3].

According to Meyer and Allen [9], three types of bonds can exist in the worker-organisation relationship. The first is the emotional bond, where workers remain in the institution because they want to. The second bond pertains to the awareness of the costs associated with leaving the organisation, so workers stay because they need to. The third bond relates to the obligation to stay with the company, meaning workers remain because they feel obligated to do so. Therefore, organisational commitment can be influenced by a variety of factors, reflecting the complexity of the relationships between workers and organisations.

ORGANISATIONAL COMMITMENT IN THE HEALTHCARE SECTOR

As the average life expectancy of the global population increases, so do the healthcare needs and the urgency to address the shortage of healthcare workers in various countries [10]. In this context, organisational commitment in the healthcare sector is gaining prominence and is widely discussed within the scientific community [10, 11].

In the healthcare sector, organisational commitment is crucial for optimal performance and quality service delivery [1, 2, 4]. Effective communication, continuous professional development, and recognition of staff efforts contribute to a positive work environment. Inspiring a shared commitment to the institution's mission enhances employee motivation. These strategies not only benefit healthcare workers but also directly impact patient outcomes by promoting compassionate patient-centred care [4, 12].

The commitment of healthcare workers influences productivity, thus impacting the efficiency of healthcare institutions, which in turn is a significant indicator of a country's level of development [1, 2]. When it comes to productivity in the

healthcare sector, particularly the organisational commitment of nursing staff plays a crucial role, as the way the members of the nursing team carry out their functions directly affects the sector's performance [13].

ORGANISATIONAL COMMITMENT AMONG NURSES

The organisational commitment of nursing team members is vital for ensuring high-quality patient care and a positive work environment. At the helm of the nursing team is the registered nurse, whose various roles are essential for the quality of care. It is understood, therefore, that the organisational commitment of nurses is vital for the success of healthcare institutions. Studies conducted to assess the organisational commitment of nurses indicate medium to high levels [5, 14]. These facts are important since it was identified a negative correlation between organisational commitment and turnover among nurses [14].

Various factors such as organisational order, fair salary, job security, and learning environment, among others, are seen to exert influence on the levels of organisational commitment demonstrated by nurses in their workplace [15, 16]. While this array of factors is comprehensive, the prominent role played by health administrators and nurse managers in establishing conducive contexts for consolidating organisational commitment among nurses is undeniable [16, 17].

Nurses' organisational commitment was not discussed enough in the Brazilian scenario [18]. By exploring nurses' organisational commitment within a complex healthcare system like Brazil's, which encompasses both the public and private sectors and faces the challenge of serving a vast territory with significant regional disparities, insights can be gained into how these factors may influence commitment levels and how strategies can be tailored to meet specific needs. Additionally, the growing importance of improving healthcare delivery in Brazil, coupled with the need to retain skilled nursing professionals, underscores the relevance of this study in contributing to the broader discourse on healthcare management and policy [6]. The current economic crisis in Brazil and the high unemployment rates experienced by Brazilians also affect the nursing field [7]. This may lead nurses to remain in organisations out of reluctance—not out of personal desire or a sense of obligation, but due to financial necessity and fear of not finding other employment.

Although the organisational commitment of Brazilian nurses has been explored to a limited extent in the scientific literature, issues such as professional devaluation and the need for multiple jobs have been widely discussed [18, 19], and these factors can influence nurses' organisational commitment. Furthermore, one of the few studies that addressed the topic in the Brazilian context was limited to the public sector in a specific region, emphasising the need for a broader exploration of the topic, covering other regions and the private sector [18]. The current study aimed to describe the perceptions and experiences related to the organisational commitment of nurses working in healthcare institutions across different regions of Brazil.

METHODS

DESIGN

This is a descriptive, qualitative study guided by the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist [20]. The study used a phenomenological approach to explore participants' experiences and perceptions.

SAMPLE

The participants were recruited through social networks among those who identified themselves as registered nurses in their profiles. Efforts were made to invite nurses from various regions of Brazil, both from public and private institutions. Additionally, the recruitment was not directed toward specific nursing organisations or groups, aiming to ensure a broader and more representative sample. Only registered nurses who have worked at their current institution for at least one year were included. The recruitment process took place between July 15, 2023, and September 20, 2023, through individual messages that included an invitation to participate, general information about the study, the Informed Consent Form (ICF), and the data collection instrument. A total of 55 registered nurses working in healthcare institutions from different regions of Brazil took part in the study. Data were continuously analysed as participants' responses were received, which allowed for the evaluation that theoretical sufficiency was achieved with 55 participants.

DATA COLLECTION

The collection of data was overseen by a female individual holding the titles of Registered Nurse and Assistant Professor, possessing a Doctorate in Nursing Management. While the author holds a cultural background comparable to that of the participants, no association exists between her and the participants recruited via social media channels. The researcher has completed a course on qualitative research methodologies and has extensive experience applying qualitative approaches.

The data was collected using online Google Forms; thus, the study consists of written responses from 55 registered nurses to eight open-ended questions. This method, widely used in quantitative studies, is increasingly being employed in qualitative research as well, as this approach possesses adaptable characteristics, allowing participants to complete the data collection instrument at their convenience and location. Furthermore, it effectively captures unfiltered written reactions, uninfluenced by the interplay between interviewer and interviewee dynamics [21]. The data collection process was conducted in Portuguese. Before responding, participants were informed about the study and agreed to participate by indicating their acceptance through the ICF.

DATA COLLECTION TOOL

The first part of the research instrument consisted of questions regarding participants' personal characteristics, such as age, gender, marital status, and education level, and professional characteristics, such as work shifts, working hours, and work sector, among others. The second part consisted of eight open-ended questions related to organisational commitment. These questions were formulated based on the findings from previous studies [5, 14, 22-24]: (1) What is the main reason for you to continue working at your current healthcare institution? (2) In what ways do you consider yourself an essential part of the organisation where you work? Please justify your response. (3) Which feelings best define your relationship with the institution you currently work for? (4) What would change in your life if you resigned or were dismissed today? (5) How do you feel about your emotional connection to the institution you work for? Please explain your response in detail. (6) What are the positive aspects of working at your current institution? (7) What are the negative aspects of working at your current institution? (8) In what ways does your current institution deserve your loyalty? Please explain your response. The data collection tool also included a section at the end where participants could provide additional comments or insights not covered in the previous questions. In addition, the tool included a closed-ended question asking participants about their intention to leave their current job.

It is estimated that the time required to complete the research instrument varied between 15 and 20 minutes. A pilot test was conducted with five participants to evaluate the data collection instrument's effectiveness. No modifications were made following these tests. The data from these five participants were included in the final analysis.

DATA ANALYSIS

A thematic analysis approach was utilized in the data analysis, following the method outlined by Braun and Clarke [25]. The researcher conducted data transcription and coding to ensure accuracy and consistency, drawing on her experience in qualitative data analysis. Written responses from all participants were compiled into a single Word document, which was reviewed meticulously. The researcher identified themes and organised related codes into subthemes. The evaluation of the chosen codes focused on identifying connections among them. In the familiarization with the data phase, the written responses were read multiple times, and initial notes were taken. Coding was performed manually, and the approach to generating codes phase was inductive (data-driven). The codes were grouped into potential themes based on their scope during the search for themes phase. In the fourth phase, the themes were reviewed to ensure coherence. In the fifth phase, the final themes were defined and named, with examples of participant quotes provided to illustrate the themes. The report was produced based on a thematic narrative, with the participant quotes integrated and the themes contextualized according to existing literature. The collected data were presented using the assigned codes and verbatim quotations reflecting the participants' opinions. Rigorous checks were performed, and adjustments were made when necessary. Special attention was given to ensuring that the quotations used to enhance internal validity were directly relevant to the established codes and themes.

To enhance the reliability of this qualitative study, various strategies were implemented, encompassing aspects such as credibility, dependability, confirmability, and transferability, as proposed by Lincoln and Guba [26]. The researcher applied reflexivity throughout the data analysis process, aiming to minimize her own experiences' influence on the data interpretation. The subthemes and themes were reviewed multiple times based on the participants' narratives to ensure consistency in coding. The step-by-step process of data collection and analysis was thoroughly documented. The participants' quotes were included in the results section without any alterations.

ETHICAL CONSIDERATIONS

Before the study was conducted, the Research Ethics Committee of the Anna Nery School of Nursing – São Francisco de Assis School Hospital of the Federal University of Rio de Janeiro approved it through the Brazil Platform (approval date: July 11, 2023; decision number: 6.175.563). The study's purposes and methodology were explained to the participants, and their informed consent was obtained before their involvement. The participants' anonymity was maintained, safeguarding their identities and personal information. The ethical principles established by the Declaration of Helsinki were followed.

RESULTS

Out of the total participating nurses, 43 (78.2%) were female. A total of 25 (45.5%) participants fell in the age group of 26 to 35 years; 23 (41.8%) were single, and 44 (80%) were specialist nurses. In terms of location, 15 (27.3%) participants worked in the Northeastern region. Regarding work settings, 41 (74.5%) participants had a single job, 27 (49.1%) participants exclusively worked in private institutions, 15 (23.4%) nurses worked in wards, 30 (54.6%) worked between 40 and 48 hours per week, the same number (54.6 %) were on day shifts, and 27 participants (49.1%) had 1-5 years of experience. Furthermore, 23 participants (41.8%) expressed they had intentions to leave their current institutions 1 to 3 times in the last year (Table 1).

Data were categorized into four themes: (1) reasons to stay in the organisation, (2) feelings towards the organisation, (3) factors that promote organisational commitment, and (4) factors that hinder organisational commitment. A total of 14 subthemes were identified. Five subthemes were organised under the first theme: job security, opportunity for professional development, financial reasons, satisfaction with the management, and affection for the institution. The participants' quotes in these subthemes revealed emotional ties between the nurses and their institutions; however, they more strongly demonstrated a bond based on the need to remain in the current organisation due to financial and/or professional benefits. In the second theme, similar connections were presented, as some participants considered themselves essential parts of the organisation, while others reported that their ties were merely material. The third theme is divided into three subthemes: good working conditions, team spirit, and autonomy, indicating that work environment, interpersonal relationships, and independence in performing their duties as nurses are essential for strengthening organisational commitment. Contrarily, the fourth and final theme subthemes referred to factors undermining nurses' commitment to their organisations: workload overload, low wages, profession devaluation, and a toxic work environment. In the last two themes, with an emphasis on the final one, the influence of management on the organisational commitment of the participants could be clearly observed. The themes, subthemes, the frequency with which they were identified, and examples of participants' quotes are presented in Table 2.

TABLE 1. CHARACTERISTICS OF NURSE PARTICIPANTS (N = 55)

Variable		n	%
Gender	Female	43	78.2
	Male	12	21.8
Age	25 or less	2	3.6
	26-35	25	45.5
	36-45	23	41.8
	46-55	4	7.3
	56-65	1	1.8
Marital Status	Divorced	2	3.6
	Married	21	38.2
	Single	23	41.8
	Stable Union	9	16.4
Highest Educational Level	Bachelor's Degree	7	12.7
	Postgraduate (Specialization)	44	80
	Master's Degree	4	7.3
Region of Working	Central-Western	7	12.7
	Northern	12	21.8
	Northeastern	15	27.3
	Southern	8	14.6
	Southeastern	13	23.6
Having more than one Job	No	41	74.5
	Yes	14	25.5
Type of Organisation	Private	27	49.1
	Public	20	36.3
	Public and Private*	8	14.6
Unity of Work*	Administration	10	15.6
	Emergency Room	13	20.3
	Imaging Department	1	1.6
	Intensive Care Unit	9	14
	Laboratory	1	1.6
	Operation Room	1	1.6
	Outpatient	4	6.3
	Primary Health Care	10	15.6
	Ward	15	23.4
Hours Worked per Week	20-28	2	3.6
	30-36	14	25.5
	40-48	30	54.6
	50+	9	16.4
Work shifts	Day	30	54.6
	Night	7	12.7
	Mixed	18	32.7
Work Experience	1-5 years	27	49.1
	6-10 years	6	11
	11-15 years	14	25.5
	16-20 years	5	9.2
	21-25 years	1	1.6
	26+	2	3.6

Intention to Leave the Current Job in the Last one Year	None	17	31
	1-3 times	23	41.8
	Almost every day	13	23.6
	Every day	2	3.6

*Some participants stated that they have more than one job.

TABLE 2. THEMES, SUBTHEMES AND QUOTES OBTAINED FROM THE VIEWS OF NURSE PARTICIPANTS

Themes	Subthemes	Participant	Frequency	Examples of Quotes
Reasons to stay in the organisation	Job security	P4, P5, P11, P17, P21, P22, P47, P48	8	"I am a government employee, which provides me with a certain level of stability." (Participant 17) "I still don't want to resign because I have municipal statutory status, and I value the stability it offers." (Participant 22)
	Opportunity for professional development	P1, P3, P5, P24, P28, P32, P43, P46	8	"The complexity level of patients requires continuous study; it is my motivation." (Participant 5) "I work in my field of specialization and I have opportunities for professional growth." (Participant 46)
	Financial reasons	P1, P3, P9, P10, P15, P17, P25, P30, P33, P34, P38, P40, P41, P49, P54	15	"If I left this institution, I wouldn't have the money to support myself until I found another job." (Participant 1) "What motivates me is paying the bills." (Participant 10)
	Satisfaction with the management	P6, P29, P33, P34, P41	5	"We have an efficient team management." (Participant 6) "I have access to nursing leaders and hospital administrators when I need it. I can switch shifts and departments if necessary." (Participant 29)
	Affection for the institution	P7, P9, P19, P26, P27, P33, P34, P45	8	"I work here because of its excellent structure and pleasant working environment." (Participant 19) "My connection with my job is 100%. I love my workplace, I love what I do, and how I do it." (Participant 34)
Feelings towards the organisation	I am an important piece of the organisation	P2, P3, P4, P6, P7, P9, P10, P11, P12, P13, P14, P15, P18, P19, P20, P21, P22, P26, P27, P28, P30, P32, P33, P34, P35, P36, P38, P39, P41, P42, P43, P44, P45, P46,	39	"There are strong bonds. I believe I contribute to problem-solving and the organisation's achievements." (Participant 3) "I perceive that my work makes a difference. I am very attached to the place, the type of work, and the teams I work with." (Participant 11) "My role is very important for achieving the intended outcomes." (Participant 20) "Without a doubt, I am extremely valuable in my work because of my professionalism and passion for what I do. I put my heart into it, and that makes me stand out." (Participant 34)

		P47, P48, P51, P52, P55		
	I am just a 'number' to the organisation	P5, P17, P25, P31, P37	5	"I can easily be replaced. I'm just a number! I'm just another employee among many others." (Participant 5) "I see my relationship with the institution purely as an exchange of work. It's only labour in exchange for money." (Participant 17)
Factors that promote organisational commitment	Good working conditions	P1, P12, P13, P19, P24, P25, P26, P27, P29, P31, P32, P33, P34, P38, P39, P43, P44, P47, P51	19	"Peace of mind and working hours are important in a workplace." (Participant 1) "We have quality materials and excellent infrastructure, which are positive aspects of the institution." (Participant 12)
	Team spirit	P7, P9, P13, P14, P18, P20, P23, P30, P32, P35, P41, P42, P46, P49	14	"Organisation, teamwork, and team responsibility favour commitment." (Participant 7) "The friendship and camaraderie I have in the institution are very significant." (Participant 9)
	Autonomy	P6, P24	2	"I believe that the freedom to practice my profession autonomously enhances commitment." (Participant 6) "Being able to apply my specific knowledge and provide care are important factors for commitment" (Participant 24)
Factors that hinder organisational commitment	Workload overload	P11, P20, P30, P36, P41, P47, P51	7	"Workload overload is a negative factor." (Participant 11) "There are many tasks for few nursing staff. We work with the minimum number of employees. So, commitment is difficult." (Participant 41)
	Low wages	P2, P9, P14, P21, P34, P49, P51, P52	8	"The salary does not value us for the way we work and what we do in our day-to-day." (Participant 34) "I feel drained and exploited due to the salary I earn and it is a negative factor for commitment." (Participant 51)
	Profession devaluation	P10, P27, P32, P36	4	"The devaluation of nursing by managers and some doctors hinders commitment." (Participant 10) "Professional devaluation and lack of autonomy make commitment difficult." (Participant 27)
	Toxic work environment	P1, P4, P18, P19, P22, P29, P31, P37, P51, P54	10	"Poor relationships with other healthcare workers. A toxic environment. These are very negative aspects." (Participant 1) "Abusive working relationships and a poor organisational climate are barriers to commitment." (Participant 31)

DISCUSSION

This study aimed to describe the perceptions and experiences related to the organisational commitment of nurses working in healthcare institutions across different regions of Brazil. Notably, organisational commitment, which refers to an employee's emotional attachment and loyalty to an organisation, enhances nurses' intention to stay in their jobs [11]. The nursing shortage is a significant issue faced by the healthcare sector in many countries. According to a report from the

Organisation for Economic Co-operation and Development (OECD), Brazil's average number of nurses is below the average for OECD member countries [27]. It is known that the productivity and efficiency of the nursing team influence the quality of care and, consequently, the success of healthcare institutions. Therefore, retaining nurses in their jobs is a goal for many healthcare administrators [13].

It is important to highlight that although 17 nurses who participated in this study reported not having the intention to leave their present jobs, 15 of them expressed having had strong intentions to leave their current organisations in the last year. Another relevant observation is that 14 nurses reported having more than one job. Therefore, it was expected that many nurses would work more than 40 hours per week and have mixed work shifts. Nurses holding multiple job positions due to low salaries are common in Brazil [19]. This situation hinders nurses' organisational commitment, and they may feel exhausted and undervalued.

On the other hand, elements such as stability, potential for professional growth, competitive salaries, competent administration, and a general empathy towards the institution are among nurse participants' reasons to remain in their current workplace. These findings are similar to previous studies conducted in different countries [22, 23]. A study conducted in China identified that job satisfaction and organisational support, such as superiors' approaches, adequate working conditions, fair salary, opportunities for promotion, and psychological support, play important roles in nurses' intention to stay [22]. A survey conducted in Taiwan observed that working conditions, the leadership style of superiors, and the safety climate influence nurses' intentions to remain in their jobs [23]. The results, therefore, highlight that nurses need to feel valued through good working conditions to motivate them to remain in their positions.

Participants also conveyed their feelings regarding the institution, with some nurses feeling like an integral part of the organisation, while others deemed themselves easily replaceable. These findings are highly relevant, as for organisational commitment to occur, employees need to achieve job satisfaction and feel valued within the institution [22]. When employees are emotionally connected to the organisation, they take pride in being a part of it and work towards achieving the organisation's objectives [5]. Thus, promoting a sense of value and belonging among nurses is important to enhance organisational commitment and job satisfaction.

Factors such as favourable working conditions, teamwork, and autonomy in practicing the profession were identified by participating nurses as important facilitators of organisational commitment. In contrast, workload burden, low salaries, professional devaluation, and a toxic work environment were presented as detrimental factors. These results align with previous studies [15, 16, 24]. According to an integrative literature review, factors such as job satisfaction, trust in management, organisational support, organisational trust, job security, monetary benefits, a learning workplace, and adequate working conditions determine nurses' organisational commitment [16]. One of the few Brazilian studies on the topic also emphasised the importance of organisational support and the relationship with nursing leaders for the organisational commitment of other nursing team members [18]. A study conducted in Iran identified that official rules and regulations, unfavourable working conditions such as workload burden and inflexible shifts, and administrators' attitudes significantly influence nurses' organisational commitment [15]. However, a study conducted in Saudi Arabia pointed out that although adequate working conditions significantly influenced nurses' organisational commitment, salary did not represent a significant influence among the participating nurses [5].

Feeling valued as professionals and having autonomy in performing their duties can increase nurses' job satisfaction, leading to greater motivation in their nursing practice and ultimately enhancing care quality. Nursing representation, self-fulfilment, nursing leadership, and positive interprofessional relationships were identified as important factors for increasing organisational commitment among Turkish nurses [24]. Similarly, a study conducted in Egypt emphasised that campaigns to enhance professional recognition can increase organisational commitment among nurses [28].

On the other hand, a toxic work environment represents a significant impediment to organisational commitment. A toxic workplace is characterized by the presence of behaviours, attitudes, and conditions that harm employees' emotional, mental, and even physical well-being. Among these factors are conflicts with colleagues and superiors [29]. Previous

studies have determined that the attitudes of nurse managers directly influence the level of organisational commitment among nurses [17, 24]. In addition, a survey conducted in the United States identified that interpersonal conflicts in the workplace are significant factors that undermine nurses' organisational commitment [30].

According to the results of this study, among the three types of bonds between workers and organisations proposed by Meyer and Allen [9], the emotional bond and the bond related to the costs of leaving the organisation were the most frequently mentioned, with an emphasis on the latter one. Several participants associated their decision to stay with financial needs, opportunities for professional growth, and job security. However, the third bond, which refers to the obligation to remain with the institution, was not identified in the narratives of the participating nurses. These findings align with studies conducted in various contexts [5, 16, 24]. A study in Saudi Arabia found that nurses' continuous and emotional organisational commitment scores were higher than their normative commitment scores [5]. Similarly, a survey of Turkish nurses highlighted the importance of emotional factors in organisational commitment, emphasising that strategies to enhance job satisfaction and create a positive work environment can strengthen this commitment [24]. These findings are further supported by an integrative literature review on the determinants of nurses' organisational commitment in hospital settings, which identified affective commitment as the most significant type, driven by emotional and psychological factors, workplace relationships, and engagement [16].

While the factors influencing nurses' organisational commitment are inherently varied, the unquestionable significance of management's impact, whether directly or indirectly, emerges as a fundamental element within this intricate process. Consequently, meticulous attention is imperative, particularly regarding the adopted leadership style in healthcare institutions and the strategic formulation designed to nurture aspects encompassing the dynamics of shift schedules, nurse-to-shift ratios, remuneration structures, and the broader landscape of professional prestige. Indeed, creating an environment where nurses not only seamlessly integrate into the organisational structure but also internalize this sense of belonging assumes paramount importance.

The attitudes of nursing managers are essential for fostering a positive work environment with adequate conditions. When nursing leaders empower their teams, nurses tend to demonstrate greater organisational commitment, which enhances the quality of care. Therefore, those responsible for managing nursing teams should have a solid education combined with experience in both nursing and management. These leaders must also have an active voice in advocating for the profession's rights, creating a work environment that promotes organisational commitment and nurses' well-being. Healthcare institutions could implement pilot projects to strengthen the leadership skills of nurse managers, systematically assessing their influence on workplace satisfaction and commitment.

LIMITATIONS

The study has some limitations. Data was gathered through self-report instruments, which restricted the thoroughness of the investigation. The study involved 55 registered nurses from a population of approximately 700,000 registered nurses in the country. Another limitation that should be mentioned is that only one researcher conducted the data analysis.

CONCLUSIONS

In this study, which delved into the intricate landscape of organisational commitment among nurses within healthcare institutions across diverse regions of Brazil, factors such as stability, professional growth opportunities, competitive compensation, competent management, and a sense of organisational empathy emerged as significant contributors to nurses' decision to remain in their current workplaces. Feeling themselves as an important part of the organisation was determined to be crucial for nurses. Factors such as adequate working conditions, teamwork, and autonomy in practicing the profession were identified by participating nurses as important facilitators of organisational commitment. At the same time, workload burden, low salaries, professional devaluation, and a toxic work environment were presented as detrimental factors.

A comprehensive analysis of nurses' perceptions and experiences made the multifaceted nature of factors influencing organisational commitment evident. Notably, the essential role of management, both directly and indirectly, in shaping nurses' commitment to their organisations was underscored. The study sheds light on the indispensable significance of leadership styles and strategic formulations in improving working conditions, thus driving nurses' organisational commitment. Institutions should prioritize the education and selection of nursing leaders based on their competencies, as participatory leadership—one that gives voice to the team, values its members through adequate working conditions, and fosters a non-toxic environment—is essential for nurses' commitment.

To enhance the practical applicability of these findings, future research could explore intervention strategies that reinforce organisational commitment among nurses. For instance, experimental or longitudinal studies could assess the impact of leadership training programs, mentorship initiatives, or policy adjustments in shift scheduling and workload distribution on nurses' sense of belonging and retention rates.

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COMPETENCY MODEL FOR ALLIED HEALTH MANAGER – AN INTERCONNECTED NATURE

Ka Hi (May) Mak^{*1}, Louise Kippist², Kathy Eljiz³

1. Department of Dietetics, Liverpool Hospital, NSW, Australia

2. School of Business, Western Sydney University, NSW, Australia

3. School of Population Health, University of New South Wales, NSW, Australia

Correspondence: may.mak@health.nsw.gov.au

ABSTRACT

OBJECTIVE:

This paper presents management competencies required for Allied Health Managers (AHMs).

METHODS:

An exploratory mixed-method study using a quantitative survey questionnaire followed by a series of qualitative semi-structured interviews was employed for this research. Descriptive statistics were used to analyse the quantitative data, and thematic analysis was used to extract relevant data from the transcripts.

SETTINGS:

The study was undertaken in five acute hospitals within one of the largest metropolitan Local Health Districts in New South Wales, Australia. A total of 29 surveys were completed and sixteen AHMs and deputy AHMs were interviewed.

RESULTS:

Thirty-one competencies were identified as essential for AHMs and they were categorised into core, meta and managerial competencies. There is a layered, hierarchical and interconnected relationship between the three categories. The core and meta competencies form the foundation for the mobilisation and application of those managerial skills and knowledge. This relationship forms the key features of the "Interconnected Nature of Allied Health Manager Competency Model" (The Model).

CONCLUSION:

This paper presents the competencies required for AHMs and their interconnected relationship. This resulted in the creation of the Model. These findings address a knowledge gap in succession and development planning for AHMs. At a practice level, this research finding can be used in mentoring and coaching AHMs in the workplace. At an educational level, this can be used as a tool in teaching at the postgraduate level for AHMs.

KEYWORDS

competency, managers, allied health, health professionals

INTRODUCTION

Allied Health (AH) professionals are university trained and professionally or scientifically qualified in the AH field [1]. Some common AH professionals (AHPs) employed in acute hospitals are dietitians, physiotherapists and social workers. AHPs have been identified as a critical component in strengthening the health care provision in Australia [2]. The AH workforce has grown significantly in the last few decades. In Australia, AH workers showed a 67% growth between 2013 to 2022 and the highest growth in full-time equivalent rate compared to medical, nursing and dental workforces [3]. This growth is contributed to by various factors. First, health workforce shortages have been identified as an ongoing challenge for healthcare organisations internationally [4]. To address this shortage, there is a shift involving multidisciplinary teams (MDT) where various components of the patient care journey are shared between doctors, nurses and AH. For example, social workers focus on the welfare aspect of the care; whereas doctors focus on medical intervention. This is similar to how various AH professions were initially introduced; their roles were created to take over the tasks that were traditionally completed by doctors and nurses to address the workforce shortage [1]. Second, AH is being used to address increasing healthcare costs as there is strong evidence that AH interventions are cost-saving, effective and patient-centred, such as in the area of cancer [5]. Third, there is a shift in focus to chronic disease management, which leads to the increased demand for professionals specialising in lifestyle and behavioural changes, such as dietitians and exercise physiologists [1]. Lastly, due to the advancements in medical technology, new professions are being created, e.g. sonographers [1]. However, despite significant growth in workforce numbers and an increased awareness of the AH role, there is relatively little research on the management of the AH workforce. The purpose of this paper is to present a unique competency model for managers of the AH group within an acute Australian healthcare setting.

Two contexts influence how Allied Health Managers (AHMs) work within a hospital setting. First, AHPs often work within an environment of medical [6] and nursing [7] dominance. This dominance may impact AHMs' ability to exercise power in such an environment to ensure their department is adequately resourced [8]. Second, AHMs carry a hybrid role where they have both professional (clinician) and managerial responsibilities [9]. This hybrid-professional-manager (HPM) role provides several benefits to healthcare organisations as compared with a generic health service manager (HSM). Their ability to navigate between the clinical and managerial world, using their clinical knowledge to facilitate decision-making impacting on both clinical safety, financial performance and obtaining buy-in from clinicians [10]. However, there are challenges to the role where HPMs need to balance prioritising organisational goals with the care of their patients [11]. AHMs share similar ethical dilemmas as doctor managers [12], such as managing the complex relationships between their managerial and clinical patient care decisions. However, due to their perceived lower hierarchical position within the healthcare system, it appears AHMs adapt to the HPM role with a positive, realistic and flexible perspective [9]. This highlights the question of what competencies they possess to manage the challenges of working within medical and nursing dominance, but also to develop a positive sense of being an HPM.

Competency is an outcome-based measure of skills, knowledge and attitudes, and is important for assessing an individual's performance [13]. It continues to be a relevant tool to measure HSMs' performance [14]. Competent HSMs play an important role in ensuring their services run effectively in this rapidly and continually changing health care system [15]. Competency is a viable tool for organisations to identify and develop staff capabilities and measure their performance [16]. Therefore, identifying what constitutes a competent HSM is essential. Common HSM competencies include knowledge of the healthcare system, communication skills and interpersonal/relationship management [17].

Since health care is dynamic and AH continues to evolve as a recognised professional group, a more contemporary investigation of the AHM-specific competency model is warranted to reflect the uniqueness of their role. Current competency models for AHMs are discipline-specific [18] rather than AHMs as a collective group. This impacts on health services' ability to provide consistent training and succession planning for AHMs. This paper aims to fill the gap of what those effective leadership attributes are, especially for those working at the frontline managerial positions, rather than

those at the strategic leadership positions. The purpose of this paper is to address this critical question for managers in AH – what competencies are required for AHMs?

METHOD

This paper reports findings from an exploratory mixed-method study using a quantitative survey questionnaire followed by a series of qualitative semi-structured interviews [19]. The study was conducted in a large local health district (LHD) in New South Wales, Australia. The study LHD has more than one million residents and 48% of the population speaks a language other than English at home and is serviced by approximately 1900 AH staff [20, 21]. The AHMs this research focused on are those who worked in the five acute hospitals in this LHD, led and managed their professional discipline group and operated under the Director of the AH organisational structure [22]. The AH disciplines included in this study were Dietetics, Speech Pathology, Physiotherapy, Occupational Therapy and Social Work. The study population consisted of senior AH clinicians, AH managers and AH directors. The Directors of AH assisted with circulating the information about the study to relevant managers.

QUANTITATIVE COMPONENT

The quantitative component consisted of a survey purposely designed for this research. To create this survey, existing publications on management and leadership competencies models were reviewed and mapped. One hundred and eighty-one individual competency statements were identified [19]. Key knowledge, skills, abilities and personal characteristics were selected based on relevancy to the tasks and roles of AHMs and consensus among the research team. Wordings with situational meanings were chosen for each characteristic to increase readability. A total of 38 competency items have been identified and categorised under three domains: self-awareness and self-management (n=13), social awareness and relationship building (n=18) and technical knowledge and skill (n=7). The participants were asked to rate the importance of the competency to the success of AHMs based on the rating of essential, beneficial, useful and not required. To obtain feedback from both the supervisor and staff of the AHMs, AH Directors and senior AH team leaders were also invited to complete the survey. Twenty-nine surveys were completed and there was representation from all disciplines and hospitals. There is no published data on the number of AH senior clinicians employed in this LHD; hence the total population size and response rate cannot be identified for this exploratory study. Table 1 presents the roles and primary workplace of the participants in the quantitative study. Descriptive statistics were used to analyse the data using IBM SPSS Data Access Pack (version 23). Statistically significant difference was categorised when two-sided p-value was <0.05. The result of the survey questionnaire was used to develop the question guide for the semi-structured interviews.

TABLE 1 ROLES AND PRIMARY WORKPLACE DEMOGRAPHICS OF THE PARTICIPANTS IN THE QUANTITATIVE STUDY.

	Hospital 1	Hospital 2	Hospital 3	Hospital 4	Hospital 5	Total
AH Director	1	0	2	0	4	7
AHM/ Deputy AHM	2	2	4	1	1	10
AH Team Leader	0	0	1	0	6	7
AH Senior Clinician	0	0	2	0	3	5
Total	3	2	9	1	14	29

QUALITATIVE COMPONENT

Semi-structured interviews were used to confirm, reject and further explore the competency list created from the quantitative study. To elicit unidentified themes, the interviewees were asked to reflect on their own experiences or observations of an excellent AHM and describe the attributes that made them outstanding. The qualitative study population consisted of 35 AHMs and deputy AHMs employed across five hospitals within the five disciplines. Sixteen (16)

AHMs and deputy AHMs participated in the semi-structured interviews and there were representations from all AH disciplines and hospitals. Table 2 shows the demographic characteristics of the participants in the qualitative study. Concept saturation was reached at interview number 14. Thematic analysis was used to analyse the data from semi-structured interviews using NVivo version 11.4 (QSR International, Melbourne, Vic., Australia, 2016). The transcripts were examined, followed by codes being identified and finally grouped under themes [23].

TABLE 2 DEMOGRAPHICS OF THE PARTICIPANTS IN THE QUALITATIVE STUDY.

Disciplines	Sex		Years in management*			Role		Total
	Male	Female	< 2 years	3-5 years	>10 years	Manager	Deputy	
Dietetics		4	2	1	1	3	1	4
Occupational Therapy	2	1	2		1	3		3
Physiotherapy	3	1	2	2		4		4
Speech Pathology		3	2		1	3		3
Social Work	1	1	1		1	1	1	2
Total	6	10	9	3	4	14	2	16

* None of the respondents had management experience between 6-10 years

The research was approved by the Human Research and Ethics Committee of the Human Research and Ethics Committee of the South Western Sydney Local Health District (LNR/16/LPOOL/203) and endorsed by Western Sydney University (RH 11762).

RESULTS

QUANTITATIVE RESULTS

Table 3 shows the essential competencies rated by the respondents in the survey questionnaire. Of the 38 competencies, 15 were rated by more than 80% of the participants as essential. The results showed there was a higher percentage of self-awareness and self-management competencies (77%) rated as essential. None of the technical skills and knowledge competencies were rated as essential by more than 80% of the respondents.

TABLE 3 ESSENTIAL COMPETENCIES RATED BY PARTICIPANTS IN QUANTITATIVE SURVEYS

Domain	Competencies	Number	Percentage
Self-awareness and self-management skills (n=13)	Be flexible to overcome obstacles	26	89.7%
	Communicate honestly with all staff	29	100%
	Display integrity despite being criticized	28	96.6%
	Obtain feedback from staff	23	79.3%
	Take responsibility and accountability of own performance	27	93.1%
	Take responsibility and accountability of department performance	25	86.2%
	Contribute to debates without being emotional	22	75.9%
	Aware of own emotions and the impact on others	24	82.8%

	Aware of own limitations	24	82.8%
	Seek assistance for own limitations	24	82.8%
Social awareness and relationship-building skills (n=18)	Create a supportive workplace environment	26	89.7%
	Being visible to the team	24	82.8%
	Communicate clearly at all levels	27	93.1%
	Provide clear expectations and boundaries to staff	26	89.7%
	Manage poor performance	26	89.7%

QUALITATIVE RESULTS

Table 4 presents the 31 competencies and the associated quotes generated from the semi-structured interviews. They are then further categorised as core competency, meta-competency and managerial skills competency.

TABLE 4 COMPETENCIES FOR ALLIED HEALTH MANAGERS

Domains	Competencies	Quote summary points
Core Competency	Practice Ethically	"Working with integrity important for interaction" (Participant 2)
	Courage	"Courage is probably a word that I would put it in (the competency list)" (Participant 12)
	Genuine & Authentic	"Good leadership is being genuine with [everyone]....." (Participant 8)
Meta-Competency	Visionary	"You look for opportunities to make a bigger community wide change." (Participant 15)
	Influential	She creates rapport and creates influence." (Participant 13)
	Passionate	"Passionate... about what we do" (Participant 7)
	Adaptable	"She finds a way that she can work with people." (Participant 9)
	Action-focused	"They crosscheck everything before making the decision." (Participant 14)
	Self-awareness	"They try to keep [their emotions] in check." (Participant 9)
	Reflective	"Self-reflection was really valuable in identifying the blind spot you have." (Participant 14)
	Self-management (including Resilience)	"If there's something that bothers me, I [just] move on" (Participant 9)
	Realistic and Objective	"[When faced with too much work], ... I don't resent it that much anymore." (Participant 12)

	Persona	Various individual characteristics were described by the respondents, including • "To remain calm and you can look at a [big] picture." (<i>Participant 2</i>) • "You need to have an above average smile and, an above average handshake." (<i>Participant 16</i>) • "Empathy and compassion are essential qualities for a leader." (<i>Participant 4</i>)
	Assertive	"You should listen to everyone with respect and advocate for your staff and for your service." (<i>Participant 14</i>)
	Confident	"Different scenarios, ... helps to build your confidence and be able to deal with [different situations]." (<i>Participant 9</i>)
Managerial Skill Competency	Leadership	"You need to be clear as to where you want to go. Lead the way." (<i>Participant 4</i>)
	Change management	"Change is actually handed down and [our role is to] make the implementation work for my department." (<i>Participant 8</i>)
	Communication	"The ability to modify our communication according to the medical priority" (<i>Participant 2</i>)
	Buffering	"Middle managers who survive the pressure, ... they become a buffer between the organisational pressures and their department service." (<i>Participant 14</i>)
	Consultative	"It's part of our training to work collaboratively." (<i>Participant 2</i>)
	Collaboration and negotiation	"You're facing the prospect or the need to negotiate, discuss and explain some of the different decisions." (<i>Participant 1</i>)
	Coaching	"A manager taking ownership and wanting to develop, train and mentor your staff is really important." (<i>Participant 1</i>)
	Delegation	"Obviously we need to delegate work and jobs" (<i>Participant 6</i>)
	Talent management	"It's important for leaders to identify talent and to nurture those talents for future leadership capacity." (<i>Participant 4</i>)

	Lead positive workplace culture	"A culture where everyone treats everybody with respect, ...it's created by and filtered through the manager." (Participant 6)
	Operational, including financial management	"If you can't manage your budget, you can't use it to argue for your [service]..... This is important in allied health." (Participant 9)
	Complaint/Conflict management	"Confident with saying what people didn't want to hear (managing conflict), and ... without being offended that would probably be important" (Participant 3)
	Analytical	"Part of the skill set is to be analytical." (Participant 15)
	Prioritisations	"You have to prioritise keeps changing depending on what the urgency is." (Participant 1)
	Organisation	"As a manager it's very important to stay organised." (Participant 16)
	Knowledgeable	"You are coming with that broader knowledge of the organisation how the broader system works." (Participant 15)

These 31 competencies were categorised into three groups based on their relationship with each other. Core competency (Core) refers to those innate characteristics that are essential but may not be learnt. Meta-competency (Meta) refers to those characteristics that are ambiguous and difficult to measure and observe. Managerial skills competency (Managerial) refers to those observable skills and behaviours. The Core and Meta are categorised as those person-centric characteristics that are not related to a measurable skillset or knowledge. However, they form the foundation for the mobilisation and application of skills and knowledge (Managerial). Table 5 presents examples of quotes that reflect the relationship between individual competencies.

TABLE 5 RELATIONSHIP BETWEEN COMPETENCIES

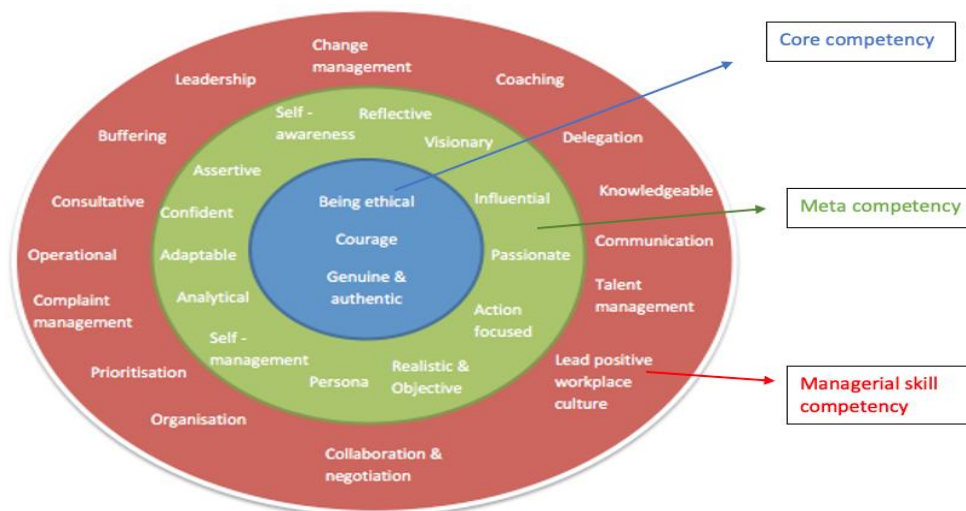
Quotes	Competencies relationship
Being able to talk in language to the next level up (Participant 7)	Meta: Adaptable Managerial: Communication Managers need to be adaptable in their communication approach with all levels in the organisation
Comes down to empathy and trying to understand the other, ... being simple but straight forward (Participant 4)	Meta: Empathy Managerial: Communication Managers need to be empathetic to understand others' situation when communicating and interacting with them

Having the courage and the resilience, being confident and having the strategies and experience to do some of these (managing complaint of poor staff performance). So, it is not just one element. (Participant 1)	Core: Courage + Practice Ethically Meta: Confident + Analytical Managerial: Complaint/Conflict Management When managing conflict, managers need to have courage and resilience to confront the situation; and at the same time, they need to have analytical skills to identify the best strategy to address the conflict, find a solution that is ethically best for patients and department and have the confidence to execute.
Sometimes people are not going to like you and you're going to be the bearer of bad news you have to have a certain amount of courage. (Participant 12)	Core: Courage Managerial: Collaboration/ Negotiation A Manager needs to have courage to share the bad news, listen to others' opinions openly and work through a mutually agreed solution
Leadership ... you look for opportunity to make changes something you can do with you own organisation. (Participant 15)	Meta: Visionary + Action-focused Managerial: Leadership To lead, managers need to have vision to see opportunity and the ability to implement any changes.
Part of the skill set (for performance management) is analytical and be able to really look at what is the issue and how you are going to attack (the issue). (Participant 15)	Meta: Analytical Managerial: Talent Management To support staff growth and manage poor performance, managers need to have good analytical skill to identify strengths and weaknesses of a staff. So they can support their staff in the productive way.

DISCUSSION

This paper identifies competencies required for AHMs. Thirty-one individual competencies were identified and are presented in the Interconnect Nature of Allied Health Manager Competency Model below (Figure 1). Some of the competencies identified align with existing competency models for HSMs, such as leadership, communication and change management [24, 25]. However, the model presents the unique hierarchical relationship between the competencies as shown in Table 5. Instead of viewing competencies as isolated characteristics, this paper highlights the complex layered relationship between competencies.

FIGURE 1. INTERCONNECTED NATURE OF ALLIED HEALTH MANAGER COMPETENCY MODEL



A key part of the Model is illustrated by three layers of competency: core competency, meta-competency and managerial skill competency. The understanding of core competency is of particular importance. Attributes, including 'practice ethically', being 'courageous' and 'genuine and authentic', are essential in ensuring an ethical service is being delivered. These three qualities form the basis of the development of the rest of the competencies. In health, resource allocation is often where ethical dilemmas occur. For example, when facing financial constraints, HSMs are required to make difficult decisions to cut services. A recent study conducted in Australia explored doctors' values and ethical commitments in macro-allocation. Their participants identified that personal ethics, including taking responsibility, persistence, patience and loyalty to a cause, were the foundation of their decision-making in resource allocation [26].

Building on this concept is a hierarchy of importance of meta-competency and managerial skills competency, as these individual competencies are interrelated. Extending Mintzberg's theory [27] core competency does not just influence approaches to work. They form the foundation on how someone utilises their skills and knowledge and ultimately performs tasks. Courage, part of core competency, is the linkage path from thought to action, which can be broken down into five stages [28]. Harris suggested that courage is required to transition through the different stages/steps of the decision-making model, i.e. values, commitment, interpretation, intention and action. Having the courage to act is particularly important when facing role conflicts and ethical dilemmas. For example, when AHMs face a budget-deciding dilemma impacting patient care, especially in situations where the organisational goal (for example, containing cost by reducing staffing) does not align with their professional values (for example, providing patient care based on evidence-based guidelines). AHMs require courage to apply their values (i.e. ensuring the highest quality of patient care being provided and adequate staffing) with the responsibility and commitment to the organisation (i.e., hospital priority of reducing overall length of stay and containing budget) in managing the situation. Courage is also needed to analyse the situation (for example, the impact of cutting or not cutting services) based on all the available information. Courage enables AHMs to rationalise their decision for the intended solution. Finally, the AHM draws on their courage to execute the solution/action despite possible push-back from executives, staff or community. Therefore, courage is an important competency for AHMs throughout the decision-making and task execution process when facing ethical dilemmas and challenges, especially under new situations and contexts.

Boyatzis proposed that unconscious disposition influences an individual's values and subsequently impacts the application of their soft and hard skills [29]. This paper suggests that core competency is similar to unconscious disposition. Meta-competency and managerial skills competency are similar to soft and hard skills. This research expands and explains the complex relationship between individual competencies. Although it is important to understand individual competency, the Model shows the interconnected relationship between individual competencies. Therefore, it is critical for AHMs to have the skill to know when and how to apply these competencies under different situations.

The critical point for AHMs is applying those skills in an environment where they have limited power or control. Due to their perceived low hierarchical status in the health care system, certain competencies, such as persona and action-focused, are particularly important. First, 'persona' is a competency worth mentioning. It has been described as "a social role played by the user when interacting in a specific context", which "may be a set of expectations that the society places on the user" [30]. The ability to "act" in this social role is essential in building allies, especially with doctors or nurses. Hence, it may be helpful for AHMs to have the ability to draw on a 'persona' that is appropriate for the context and people they interact with, especially when lobbying for resources or negotiating with dominant counterparts. Second, 'action-focused' is categorised as a meta-competency related to one's approach to work. AHPs and their managers constantly compete for resources and need to act on opportunities when they occur [1]. Therefore, being able to respond quickly, act fast and seize opportunities is essential. In addition, AHMs need to be 'action-focused' as they are the "go-between", i.e. playing a bridging role linking staff and senior management, daily operations and organisational strategic directions [10]. Therefore, the ability to act promptly in following up with feedback and requests from both the executives and staff is critical for their knowledge broker role.

The Model provides a framework for understanding the role of AHMs and the competencies required. The Model highlights core competencies, such as courage, being an essential competency for AHMs. Courage is required from the time presented with a challenge to the moment of executing an action. It is important for AHMs to be aware of the critical nature of this competency, and effort should be invested in building that courage. This model also demonstrates the intricate relationship between individual competencies. It is imperative for AHMs to understand that possessing the skill, knowledge and attributes does not necessarily lead them to master the role. The critical component is to be able to combine those competencies based on the context of the situation. By highlighting this complexity, this encourages AHMs to reflect deeply on each encounter and view competency as a dynamic concept rather than a fixed behaviour. This ultimately helps them to gain insight into the best way in developing those competencies. The Model is also built on the context where AHMs perceive their role as being in a lower hierarchical position within the healthcare system. This provides a unique enquiry into the impact of medical and nursing dominance on the competency of other health professions. This leads to the identification of a rather unique competency, that is persona. Being in a less powerful position, AHMs require support from the doctors and nurses to build their influence. This is an exceptionally important finding as AHMs, especially newly appointed managers, may not be aware of the importance of acting in a certain "persona" to gain buy-in from the doctors and nurses they work with. This buy-in may support them in lobbying for their department resources.

CONCLUSION

This paper presents a competency model for AHMs as a collective group in acute hospital settings, named Interconnected Nature of Allied Health Manager Competency Model (the Model). It advocates that competencies are not just isolated characteristics; they have an interconnected relationship with hierarchical importance. The strength of this paper is the visual presentation of the interconnected relationship between each competency required for AHMs. This model provides AHMs and their managers with insight into what such competencies are and the complexity of their development. This leads to the proposition that implementing competency training and assessment for AHMs is a complex process.

This model addresses an important gap in research specific to AH management competencies. A strength of this paper is the comprehensive presentation of the competencies required for AHMs to manage challenges within the healthcare system. Additionally, by providing an understanding of competencies for this collective group, the Model provides a resource for succession and development planning for a growing AH workforce. It provides insight into understanding competencies for AHMs and their interconnected relationship. This will assist in assessing and developing AHMs.

Future research efforts should focus on how to further develop these competencies, including identifying their behavioural descriptors; this will assist in operationalising the competency model. At a practice level, this research finding can be used

in mentoring and coaching for AHMs in the workplace. At an educational level, it can be used in teaching AHMs at a postgraduate level. In addition, this paper highlights how hierarchical status within an organisation impacts the competencies required for AHMs. This relationship, therefore, could be applied to other HSMs in similar positions, where dominance and hierarchical relationships exist between professional groups.

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DIFFERENCES IN THE MANAGEMENT AND USE OF HEALTH SERVICES IN AUSTRALIA USING PUBLICLY AVAILABLE DATA: COMPARISONS BETWEEN NEW SOUTH WALES AND VICTORIA

Jo. M. Martins¹, Godfrey Isouard^{*2}

1. Centre for Health Policy and Management, NSW, Australia

2. Faculty of Medicine and Health, University of New England, NSW, Australia

Correspondence: gisouard@optusnet.com.au

ABSTRACT

INTRODUCTION:

Differences in health service utilisation between States are noted in publicly reported data. The national averages for health service usage and health related actions in Australia may mask differences in the management and provision of health services among the states and territories. Although the utilisation of health services tends to rise with age, the extent of this and other factors has not been determined at the state level. This study will analyse these differences for the two largest states in Australia, New South Wales (NSW) and Victoria.

OBJECTIVES:

The purpose of the study is to examine specific features of health service provision and its management in New South Wales and Victoria. Using publicly available data the study analysed differences in the organisation, management, and expenditures of health services.

DESIGN:

The study uses data from the Australian Bureau of Statistics (ABS) and the Australian Institute of Health and Welfare (AIHW), focusing on the 2021 census.

FINDINGS:

The study highlights differences in health service utilisation and management between New South Wales (NSW) and Victoria. Victoria had higher hospital service use and more health service employees. Victoria also had higher health service expenditure per capita. The findings underscore the need for tailored strategies in policy development, resource allocation, and health service planning to address the unique needs of each state.

IMPLICATIONS:

The study highlights differences in health service management and utilisation between NSW and Victoria. These findings are relevant for policy development, resource allocation, and planning of health services. The study provides a basis for further research, particularly of a qualitative nature, to explore the identified differences in more detail.

KEYWORDS

Health service managers, health service use, health service employees, health service expenditure.

INTRODUCTION

Australia reports health data through the Australian Bureau of Statistics (ABS) and other agencies. These organisations collect, verify, and publish data on various health indicators, ensuring accuracy and reliability for public and policy use. This data can explain trends in public health, expenditures, the effectiveness of health policies, and areas needing improvement in healthcare services.

The literature widely reports the importance and usage of health data across the globe [1] [2]. In particular it's influence on the allocation of scarce resources and evidence-based decision making [3] [4] [5]. This type of data sets the foundation for the planning and management of health services and is pivotal to the effective delivery of health services [6].

Availability of health service utilisation data has been reported as important to health service managers for identifying disparities, resource allocation, policy development, quality improvement, and research and innovation [7]. Senior health managers in Alberta, Canada found timely and accurate health service utilisation data particularly critical when assessing outcomes, implementing changes, reviewing solutions and decision making [8].

One important issue is that the use of health services such as hospitals and General Practitioners tends to rise with age, especially at older ages, and may have a major influence on the use of health services [9] [10].

Some of the differences may be due to varying proportions of older people in individual states and territories. Accordingly, it might be expected that the use of health services and related expenditures, might be higher in South Australia with 20.0% of the population over the age of 64, and especially in Tasmania with 20.9%, than in other states and territories. While the Australian Capital and Northern territories with respectively 15.0% and 8.9% in this age bracket would be expected to have lower use. In contrast, the proportion of older people over the age of 64 years in NSW and Victoria are more closely related, respectively 17.6% and 16.8% in 2021 (Appendix A).

Therefore, other things being equal, it might be expected that the relative use of services, associated expenditures and the related number of health service managers to be similar in these two states. As these two states have more than half of the Australian population (respectively 31.8% and 25.6% at the time of 2021 Census) (Appendix A), they have a major but possible different influence on the Australian average.

However, a comprehensive review of the international literature confirmed that information on health service utilisation was never examined in the context of the health manager's role, and particular to the organisation and management of health services, and related expenditures. This identified gap in the research became a focal point for the current research investigation by the authors, and in particular targeting the two largest states, NSW and Victoria.

Although the data on health service utilisation for each state and territory in Australia provides important insights, it does not reveal information on the organisation of health services, their management and related expenditures. The responsibility for the latter tasks is with the health managers, who are concerned with the improvement of the health status of people in Australia.

It is in this context, the differences between NSW and Victoria for a subset of health services using publicly available data was examined. The examination was limited in scope by the data available for analysis and as a result of a special request for 2021 census data about health managers from the ABS, other items of data on health service characteristics from the ABS and the Australian Institute of Health and Welfare (AIHW). Whilst the analysis was limited by the characteristics of the data it provides valuable and new information and a basis for research by others of a more substantive nature.

This study provides an important contribution to the evaluation of health services management using publicly available information. The findings are relevant to policy development aimed at improving the health status of the population. As well there were implications to health managers, the planning of health services, the accompanying expenditure, and to the provision of senior management and other employees. Although the analysis is limited by the nature of the data, it does provide a basis for research by others of a more qualitative nature.

DATA SPECIFICATIONS AND RELIABILITY

Based on questions posed in the 2021 Population Census, the ABS provided data on the number and characteristics of health service managers following ABS' Australian occupation and industry classifications. Detailed specifications are described in Appendix B. The ABS also conducted post-enumeration surveys to ensure accuracy and reliability. Data covered managers in hospitals and primary care health services in both the public and private sectors. However, private sector pharmacists were excluded due to the difficulty in separating their pharmaceutical activities and expenditures from those related to non-healthcare services (e.g. toiletries, cosmetics, and other products).

Following the ABS occupation and industry standards, managers were divided into four groups: undefined managers, chief executive officers and general managers, specialist managers, and service managers. The data matched ABS' coding for people's characteristics.

ABS' concerns with confidentiality led to small differences in some instances that the authors amended without material impact. Whenever relevant, the authors followed ABS' definitions of sex and gender. Sex is defined as the biological characteristics of males and females. Gender refers to psychological and social characteristics that culturally determined from belief systems of what masculine and feminine behaviour is or ought to be [11]

Other data used regarding health services and related personnel are from ABS and AIHW sources, as indicated, and followed their definitions.

RESULTS

This section shows the findings in the health service management and use of health services in NSW and Victoria. These features include an analysis of the differences found in the organisation of health services, their management and related expenditures.

HEALTH SERVICE USE

NSW had a lower use of hospital services (415/1,000) than Victoria (455/1,000). Both had lower average use than other states and territories (500/1,000). While NSW had a slightly higher use of Medicare services (18 per person) than Victoria (17 per person). Both states were slightly higher than the average for other states and territories (16 per person). It should be stated that the averages for other states and territories mask considerable differences among them, such as in the cases of the Northern Territory and the Australian Capital Territory. However, as stated, the authors' focus in this paper is on the comparison between NSW and Victoria, that showed somewhat higher use of hospitals per head of population in Victoria than in NSW, while Victorian use of Medicare services per head of population was slightly lower (Table 1).

TABLE 1. HOSPITAL AND MEDICARE SERVICES, NEW SOUTH WALES, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, 2020/21

Service	NSW	Victoria	Other	Australia
Hospital separations per 1,000 people	415	455	500	462
Medicare services per person	18	17	16	17
People per km ²	10	29	2	3

Note: Population as at December 2020. (NSW) New South Wales. (Other) Queensland, South Australia, Western Australia, Tasmania, Australian Capital Territory, Northern Territory.

Sources: References [12] [13] [14] [15]. Computations made by the authors.

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HEALTH SERVICE EMPLOYEES

Generally, most health service employees in Australia are females. At the time of 2021 census of population, females constituted 74.9% of health services employees in NSW and 76.6% in Victoria. The average proportion in other states and territories was 76.5%, and the Australian average 76.1%. The number of health service employees per thousand people was lower in NSW (37.2/1,000) than in Victoria (41.4/1,000) that was closer to the average for other states and territories (41.7/1,000) and the Australian average (40.2/1,000). The difference was particularly larger in the case of hospital employees: 19.2/1,000 in NSW in comparison with that of 22.7/1,000 in Victoria. The latter was close to the average for other states and territories of 22.8/1000. The averages for employees of medical and other health services were closer to the average for Australia of 18.6/1,000, but still lower in the case of NSW (18.0/1,000) than that of Victoria (18.7/1,000) (Table 2).

TABLE 2. HEALTH SERVICE EMPLOYEES, NEW SOUTH WALES, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, 2021 CENSUS

Service	NSW	Victoria	Other	Australia
Number of health service employees 000s				
Hospitals	155.0	147.8	247.0	549.8
Medical & other health	145.2	121.5	205.2	471.9
All health services	300.2	269.3	452.2	1,021.7
Percentage female employees				
Hospitals	76.0	78.7	77.2	77.3
Medical & other health	73.7	74.3	75.6	74.7
All health services	74.9	76.6	76.5	76.1
Employees per 1,000 people				
Hospitals	19.2	22.7	22.8	21.6
Medical & other health	18.0	18.7	18.9	18.6
All health services	37.2	41.4	41.7	40.2

Note: Population as per the 2021 Census. NSW. (Other) Queensland, South Australia, Western Australia, Tasmania, Australian Capital Territory, Northern Territory.

Sources: References [14] [16]. Computations made by the authors.

HEALTH SERVICE MANAGERS AND POPULATION

Most health managers like most health employees in Australia are females. However, while they constituted 76.1% of health service employees in 2021, their proportion of health managers was 63.6%. The proportion of female managers was only 62.6% in NSW and 63.8% in Victoria, compared with 74.9% and 76.6% respectively in the case of health service employees. The number of health managers per thousand population was lower in NSW (165.8/100,000) than in Victoria (175.2/100,000) but closer to the average in other states and territories (164.2/100,000). Thus, as in the case of the relative number of employees, Victoria also had a larger ratio of managers per population than NSW and the average for other states and territories (Table 3).

TABLE 3. HEALTH SERVICE MANAGERS, NSW, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, 2021 CENSUS

Service	NSW	Victoria	Other	Australia
Number of health service managers 000s				
Hospitals	6.5	5.6	9.2	21.2
Medical & other health	6.9	5.8	8.6	21.4
All health services	13.4	11.4	17.8	42.6
Percentage female managers				
Hospitals	65.4	66.9	65.0	65.6
Medical & other health	59.9	60.8	63.3	61.7
All health services	62.6	63.8	64.3	63.6
Number health service managers per 100,000 people				
Hospitals	80.4	85.5	86.6	83.3
Medical & other health	85.3	89.4	82.0	83.9
All health services	165.7	175.0	168.6	167.3

Note: Population as per the 2021 Census. (NSW) New South Wales. (Other) Queensland, South Australia, Western Australia, Tasmania, Australian Capital Territory, Northern Territory.

Sources: References14] [17]. Computations made by the authors.

HEALTH SERVICE MANAGERS AND EMPLOYEES

As is the case in the relationship between employees and population, the average number of health service employees per manager was lower in NSW (22.4 employees/manager) than in Victoria (23.6 employees/manager). However, these ratios were lower than those for the average of other states and territories (25.4 employees/manager). The differences were particularly so in the case of hospital services with less variation in medical and other health services. However, in hospitals the number of employees per manager was lower in NSW (23.9 employees per manager) than in Victoria (26.5 employees per manager) and the average for other states and territories (27.0 employees per manager) (Table 4).

TABLE 4. HEALTH SERVICE EMPLOYEES PER MANAGER, NSW, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, 2021 CENSUS

Service	NSW	Victoria	Other	Australia
Number of health service employees per manager				
Hospitals	23.9	26.5	27.0	25.9
Medical & other health	21.1	20.9	23.7	22.1
All health services	22.4	23.6	25.4	24.1

Note: (NSW) New South Wales. (Other) Queensland, South Australia, Western Australia, Tasmania, Australian Capital Territory, Northern Territory.

Sources: References [16] [17]. Computations made by the authors.

HEALTH SERVICE MANAGERS BY EXECUTIVE LEVEL

As indicated earlier, at the time of the 2021 Census, the proportion of female health service managers was lower than that of female employees, and that of chief executive officers/general managers (CEOs/GMs) was even below that on

average. In the case of hospital services, the proportion of female CEOs/GMs was lower in NSW (60.8%) than in Victoria (64.5%), and that for other states and territories (62.4%) and Australia (62.7%) (Table 5).

TABLE 5. HEALTH SERVICE MANAGERS BY EXECUTIVE LEVEL PROPORTION OF FEMALE MANAGERS, NSW, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, 2021 CENSUS

Service	NSW	Victoria	Other	Australia
Hospitals				
CEO/GM % female	60.8	64.5	62.4	62.7
Other managers % female	65.8	67.3	65.2	65.9
All hospital managers 000s	6.5	5.6	9.2	21.2
Medical & other health				
CEO/GM % female	46.5	48.8	56.1	51.0
Other managers % female	62.3	62.8	65.0	63.5
All med. & other managers 000s	6.9	5.8	8.6	21.4
All health services				
CEO/GM % female	51.1	55.9	58.5	55.6
Other managers % female	64.1	65.0	65.1	64.8
All health service managers 000s	13.4	11.4	17.8	42.6

Note: (NSW) New South Wales. (Other) Queensland, South Australia, Western Australia, Tasmania, Australian Capital Territory, Northern Territory.

Sources: Reference [17]. Computations made by the authors.

The proportion of female CEOs/GMs was even lower in the case of medical and other health services, in NSW was 46.5%, 48.8% in Victoria, 56.1% in other states and territories for an average of 51.0% in Australia (Table 5).

TABLE 6. HEALTH SERVICE MANAGERS BY EXECUTIVE LEVEL PER THOUSAND PEOPLE, NSW, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, 2021 CENSUS

Service	NSW	Victoria	Other	Australia
Managers per 100,000 people				
Hospitals				
CEO/GM	6.5	10.6	7.7	8.0
Other managers	73.9	75.0	79.0	75.4
All hospital managers	80.4	85.5	86.6	83.3
Medical & other health				
CEO/GM	12.5	12.7	12.8	12.5
Other managers	72.8	76.7	69.0	71.4
All medical & other managers	85.3	89.4	82.0	83.9
All health services				
CEO/GM	19.1	23.3	20.5	20.5
Other managers	146.7	115.7	148.1	146.8
All health service managers	165.7	175.0	168.6	167.3

Note: NSW) New South Wales. (Other) Queensland, South Australia, Western Australia, Tasmania, Australian Capital Territory, Northern Territory.

Sources: References [14] [17]. (Computations made by the authors.

Although there were differences in the number of CEOs/GMs per head of population among the states and territories at the time of the 2021 Census, the largest differences were in the case of hospital CEOs/GMs. Accordingly, while there were 6.5 CEOs/GMs per hundred thousand people in NSW, there were 10.6/100,000 in Victoria, and an average of 7.7/100,000 in other states and territories, and 8.0/100,000 on average for Australia. On average, there were 20.5 CEOs/GMs for all health services per hundred thousand people in Australia, and 146.8/100,000 for other health service managers (Table 6).

TABLE 7. CHIEF EXECUTIVE OFFICERS, OTHER MANAGERS AND EMPLOYEES, NEW SOUTH WALES, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, 2021 CENSUS

Service	NSW	Victoria	Other	Australia
	Average number of employees & other managers per CEO/GM			
Hospitals				
Employees	294	170	305	272
Other managers	11	5	10	9
Medical & other health				
Employees	144	147	152	148
Other managers	6	6	5	6
Health services				
Employees	195	152	7	196
Other managers	8	5	210	7

Note: (NSW) New South Wales. (Other) Queensland, South Australia, Western Australia, Tasmania, Australian Capital Territory, Northern Territory. Computations made by the authors.

Sources: References [16] [17].

The estimation of the number of employees and other managers per CEO/GM from the 2021 Census indicates that differences between the states and territories were relatively small in the case of medical and other health services around the average for Australia of 148 employees per CEO/GM, with a ratio of 144 in NSW and 147 in Victoria. However, there were considerable differences in the case of hospital services with an average of 170 employees per CEO/GM in Victoria compared with 294 employees per CEO/GM in NSW and 305 in other states and territories. The large number of CEOs/GMs in Victoria also affected the ratio of other managers per CEO/GM of 5 compared with that of NSW of 11 and other states and territories of 10 (Table 7). The differences between Victoria and NSW as well as with other states and territories were notable and in line with previous observations of the higher ratio of hospital employees per thousand people in Victoria than NSW (Table 2) and also the ratio of health service managers per population (Table 3).

HEALTH SERVICE EXPENDITURE

Health service expenditure in Australia was estimated to have been \$220,893 million in 2020-21, or 10.7% of Gross National Product [9]. This was the equivalent of \$8,617 per head of population. However, this average masks large differences between the states and territories. Accordingly, Victoria spent on average \$8,616 per head of population while NSW spent a lower average of \$8,339 per head of population. Nevertheless, Victoria's average was lower than the average for other states and territories (excluding NSW) of \$8,823. Thus, the mentioned higher use of hospital services in Victoria and the higher number of people employed than in NSW was associated with a higher average health expenditure per head of population in Victoria than NSW, but not in other states and territories (Table 8).

TABLE 8. HEALTH SERVICE EXPENDITURE, AUSTRALIA, 2020-21

State/Territory	Total health expenditure \$ millions	Total health expenditure per capita \$
NSW	67,415	8,339
Victoria	56,850	8,616
Other states & territories	96,928	8,823
Australia	220,893	8,617

Source: References [14] [18]. Computations made by the authors.

Differences in the Management and Use of Health Services in Australia Using Publicly Available Data: Comparisons between New South Wales and Victoria

The analysis of health expenditure per main type of service for 2020-21 showed the larger relative importance of hospital services in Victoria compared with NSW. Accordingly, while in NSW hospital expenditure comprised 38.4% of total health expenditure, Victorian expenditure amounted to 43.8% of the total. This was particularly higher in the case of public hospitals that constituted 35.7% of the total in Victoria and 30.7% in NSW. This compared with an average of 40.2% for all hospitals in other states and territories and 40.6% for the whole of Australia. However, NSW expenditure in health services outside hospitals made up 51.4% of the total expenditure compared with 48.3% in Victoria. The NSW average was closer to the average for all other states and territories (52.3%), and about the same as the Australian average of 51.0%. In this context, it is relevant to point out that these percentages relate and influence the mentioned higher average health expenditure per head of population in Victoria than NSW (Table 9).

TABLE 9. HEALTH SERVICE EXPENDITURE, NSW, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, MAIN SERVICES, 2020-21

Expenditure item	NSW	Victoria	Other states & territories	Australia
	Percentage of total expenditure			
Public hospitals	30.7	35.7	30.6	31.9
Private hospitals	7.7	8.1	9.7	8.7
<i>Total hospitals</i>	38.4	43.8	40.2	40.6
Primary health care	33.5	31.6	34.0	33.2
Medical referrals	12.3	10.3	10.2	10.9
Other health	5.7	6.4	8.0	6.9
<i>Total other</i>	51.4	48.3	52.3	51.0
<i>Research</i>	3.6	3.3	2.7	3.1
<i>Total operational</i>	93.4	95.4	95.2	94.7
<i>Capital</i>	6.6	4.6	4.8	5.3
Total average health expenditure per head of population	\$			
	8,339	8,616	8,823	8,617

Source: Reference [14] [18]. Computations made by the authors.

SURVIVAL

An important issue is the life expectancy of Australians that at 83.3 years was among the highest among developed countries in 2021 [10]. In this context, the life expectancy at birth in Victoria (83.6 years) was slightly above that for NSW (83.3 years) in the period 2020-2022, both of which had a somewhat higher life expectancy than the average for other states and territories (83.0 years). These are small differences, but the average for other states and territories (than Victoria and NSW) mask substantial differences between them, such as the Northern Territory (78.4 years) and the Australian Capital Territory (84.1 years) (Table 10). Some might consider that life expectancy at 65 years of age might be more relevant to the importance of the provision of health services to survival. At 65 years of age, the difference in life expectancy between Victoria and NSW was relatively small at about one tenth of one year (Victoria 21.7 years and NSW 21.6 years) (Table 10).

TABLE 10. LIFE EXPECTANCY AT BIRTH, NSW, VICTORIA, OTHER STATES AND TERRITORIES, AUSTRALIA, 2020-2022

State/territory	Average life expectancy at birth (years)		
	Males	Females	People
NSW Victoria	81.3	85.3	83.3
Other states and territories	81.6	85.5	83.6
	80.9	85.1	83.0
Australia	81.2	85.3	83.3
NSW Victoria Other states and territories	Average life expectancy at 65 years of age (years)		
	20.2	22.8	21.6
	20.3	22.9	21.7
	20.2	22.8	21.6
Australia	20.2	22.8	21.6

Note: The average life expectancy at birth for people is the weighted average of male and female life expectancies at birth. The average for (Other states and territories) is also the weighted average for Queensland, South Australia, Western Australia, Tasmania, Australian Capital Territory and Northern Territory. This average masks large differences between the Northern Territory with the lowest average life expectancy (78.4 years) and the Australian Capital Territory with highest life expectancy in Australia (84.1 years).

Sources: References [14] [20]. Computations made by the authors.

DISCUSSION

The purpose of the analytical work carried out is to examine some features of health service provision and its management in NSW and Victoria, with more than half of the Australian population, at the time of the 2021 population census. The analysis shows substantial contrasts in the emphasis placed on different types of major health services in the two largest states in Australia.

At that time, NSW had the largest population of all Australian states and territories with about 8.1 million people compared with Victoria's second highest of 6.5 million. The population densities were the highest in Australia among states and territories, with the exception of the Australian Capital Territory. Therefore, in this respect, NSW and Victoria were more alike than other states and territories.

In the context of health services provision, a major difference between the two states was the higher use of hospital services per head of population, human resources involved and related expenditures in 2021. The number of hospital employees in Victoria was 22.7/1,000 people compared with 19.2/1,000 in NSW. In turn, the related number of hospital managers in Victoria was also substantially higher at 85.5/1,000 people than the ratio of 80.4/1,000 in NSW.

To a lesser extent, differences persisted between the two states in the number of employees in medical and other health services. The numbers in Victoria were slightly higher at 18.7/1,000 people than in NSW at 18.1/1,000. While the number of managers in these services continued to be higher in Victoria at 89.4/100,000 people than in NSW at 85.3/100,000.

The higher ratio of health service managers in the population in Victoria prevailed in the case of CEOs/GMs of hospital services. Thus, Victoria had a ratio 10.6 hospital CEOs/GMs per 100,000 people while NSW had a much lower average of 6.5 CEOs/GMs/100,000. This was reflected in the lower number of 170 employees per CEO/GM in Victoria compared with 294 employees per CEO/GM in NSW.

The ratios were much closer in the case of medical and other health services at 12.7 employees per 100,000 people in Victoria and almost the same ratio of 12.5/100,000 in New South Wales. The ratios were also close in the cases of Victoria's 147 employees per CEO/GM and 144 in NSW.

The differences in service use, especially of hospital services, between the two states and the higher ratios of employees and managers in Victoria were associated with differences in the average health service expenditures per head of population in 2020/21, that at \$8,616 was higher in Victoria than at \$8,339 in NSW. The substantially higher average expenditure on hospital services in Victoria was only partly compensated by the somewhat higher average expenditure on medical and other health services in NSW.

The notable difference in service use, people employed, and expenditure of hospitals and medical and other health services between Victoria and NSW was associated with a difference in average life expectancy at birth of 3 tenths of one year between them (average 2020-2022): Victoria 83.6 years and NSW 83.3 years. However, at 65 years of age life expectancy in Victoria was 21.7 years and close at 21.6 years in NSW.

LIMITATIONS

The analysis is limited by the data available from the 2021 census and other official sources. There is a lack of data on private hospitals and their bed capacity.

CONCLUSION AND AGENDA FOR FURTHER RESEARCH

The analysis in this paper shows considerable differences in the organisation of health services in NSW and Victoria, the provision of services, their management and related expenditures. This is especially remarkable in the case of hospital services and their management. This analysis raises important issues that the limited data used by the authors does not provides answers for. Accordingly, the limitations of this work should encourage further research of a more qualitative nature to give additional insights into the nature of the important differences identified and documented in this paper. In conclusion, the study provides an important and significant contribution to the evaluation of health services management and for planning towards improving the health status of the population. The findings have been shown to be relevant to health managers, policy development, the planning of health services and to the accompanying expenditure, and to the provision of senior management and other employees. Although the analysis is limited by the nature of the data, it does provide a basis for research by others of a more qualitative nature.

The study contributes to the evaluation of health services management and planning in Australia. It underscores the need for further research to address the limitations and provide deeper insights into health service management.

ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACRS	Aged Care Residential Services
ANZCO	Australian and New Zealand Standard Classification of Occupations
CEO/GM	Chief Executive Officer/General manager
DH	Commonwealth Department of Health
M(nfd)	Managers no further defined
NSW	New South Wales
\$	Australian dollars

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APPENDIX A

POPULATION CHARACTERISTICS OF STATES AND TERRITORIES, AUSTRALIA, 2021

	NSW	Vic	Qld	SA	WA	Tas	ACT	NT	Other	Australia
Population										
Census 2021 000s	8,072.2	6,503.5	5,156.1	1,781.5	2,660.0	557.6	454.5	232.6	0.5	25,422.8
Population % total	31.8	25.6	20.3	7.0	10.5	2.2	1.8	0.9	...	100.0
Population per Km2	10.1	28.8	3.0	1.8	1.1	8.3	191.9	0.2	19.0	3.3
Female %	50.6	50.8	50.7	50.7	50.3	50.9	50.9	49.5	47.4	50.7
Male %	49.4	49.2	49.3	49.3	49.7	49.1	49.1	50.5	52.6	49.3
Median age (years)	39	38	38	41	38	42	35	33	43	38
Population										
65 years & over %	17.6	16.8	17.0	20.0	16.1	20.9	15.0	8.9	19.0	17.2
Median										
weekly income \$	813	803	787	734	848	701	1,203	936	1,497	805

Sources: References [14] [15].

APPENDIX B

MANAGERS CLASSIFICATION

The classification of managers in this paper is in accordance with ABS's adopted ANZCO: Australian and New Zealand Standard Classification of Occupations. According to it, managers are engaged in the planning, organisation, direction, control, coordination and review of organisations and/or departments. In other words, managers set the overall direction and objectives of organisations and/or their departments to make certain that set objectives are met. They are concerned with the allocation of assets and resources. They direct, control and/or coordinate the activities of organisations and/or their departments, either personally or through subordinates. They are concerned with monitoring and evaluating the overall or departmental performance of the organisation and changing policies and processes to make certain that set objectives are met. They are also engaged in the representation and/or negotiation of the interests of their organisations and/or departments.

Chief executive officers and general managers are engaged and responsible for the planning, organisation, direction, control, coordination and review of the overall operations of organisations, their major activities and representation of and negotiation on behalf of their organisations. Their tasks include the setting of the overall direction and goals of their organisations. They are concerned with the overall setting of the operations of their organisations. In addition, they are responsible for the performance of their organisation in line with set objectives. Further, they represent their organisations in public relations and negotiations with other organisations and regulatory authorities.

Specialist managers have more direct duties in the planning, organisation, control and coordination of given functions within the overall organisational setting, such in the production and distribution of services, the management of human and financial resources and other ancillary functions. Thus, their tasks include development and implementation of strategies concerned with monitoring and ensuring that policies and plans are followed and evaluation of their outcome, in terms of work progress, performance, and adjustment of processes and resources to achieve set goals. They control budget planning and report on performance and control of expenditure in their area of responsibility. They are involved in personnel planning and training and their performance. They may be involved in the representation of their organisation at given levels and also negotiations with other departments and other outside organisations, such as suppliers of good and services.

Hospitality and service managers are concerned with the organisation and operation of accommodation, cleaning, transport and provisions such as food. They are concerned with the selection, training and supervision of related staff.

Source: Reference [21].

FACTORS INFLUENCING ATTRITION AND RETENTION OF AN ALLIED HEALTH WORKFORCE

*Paula A Harding*¹, Doug McCaskie^{1,2}, Ellen Gunn³, Emma Schneider^{1,4,5}, Hank Kim¹, Angela T Burge^{1,6}, Cassie McDonald^{1,7}*

1. Allied Health, Alfred Health, Melbourne, Australia
2. Ambulatory Services, Royal Children's Hospital, Melbourne, Australia
3. People and Culture, Alfred Health, Melbourne, Australia
4. Department of Neuroscience, Monash University, Melbourne, Victoria, Australia
5. Department of Nursing and Allied Health, Swinburne University of Technology, Melbourne, Victoria, Australia
6. School of Translational Medicine, Monash University, Melbourne, VIC Australia
7. Department of Critical Care, The University of Melbourne, Parkville, Australia

Correspondence: p.harding@alfred.org.au

ABSTRACT

OBJECTIVES:

Like many countries across Asia Pacific, Australia is facing significant allied health workforce shortages. This study aims to examine factors influencing attrition and retention in an allied health workforce (Nutrition and Dietetics, Orthoptics, Orthotics, Occupational Therapy, Physiotherapy, Podiatry, Psychology, Speech Pathology, Spiritual Care and Social Work) in an Australian public health service.

METHODS:

A mixed methods study was conducted at a metropolitan, quaternary public healthcare service in Melbourne, Australia. Quantitative and qualitative data was collected and analysed from two online surveys from allied health staff: 1) resigned and completed a voluntary exit survey (group 1); and 2) employed and consented to participate in a workforce survey (group 2).

RESULTS:

Eighty-three respondents (group 1, response rate 27%) completed the resignation exit survey and 136 respondents (group 2, response rate 20%) completed the workforce survey. Reasons for resigning included dissatisfaction with the level of involvement in decision making (45%), systems and process (41%) and performance review processes (41%). Respondents currently employed described a positive job satisfaction attributed to enjoyable and interesting work (89%) and feeling valued by others in their profession (80%). Nearly a quarter (23%) were planning to leave their current position in the next six months. Intertwining themes identified job satisfaction, team environment, job flexibility, security and stability, the culture and reputation of the organisation could influence attrition and retention.

CONCLUSIONS:

The findings from this study adds to the limited but growing understanding of factors influencing attrition and retention of allied health professionals. An allied health professional's experience of working in public health underpins their desire to

stay or leave. Healthcare leaders and managers implementing targeted interventions that focus on improving job satisfaction with greater recognition, professional support, opportunities for career progression, meaningful workload allocation, optimisation of job security and work environments may improve allied health attrition and retention.

KEYWORDS

allied health, workforce, attrition, retention, public health

INTRODUCTION

Significant allied health workforce shortages are emerging in health care sectors across Australia [1]. The 2023 Australian Government's Top 20 Occupations in demand include physiotherapists, occupational therapists and social workers [2]. Similar shortages are reflected across the Asia-Pacific region with New Zealand also listing a range of allied health professions in their 'green list' which contains highly skilled roles identified as being in high demand globally and in ongoing shortage in New Zealand [3]. Current and projected allied health workforce shortages across the region pose risk to the provision of holistic, safe, effective, and timely healthcare.

Over the next decade, allied health professionals (AHPs) are projected to be the second largest employment growth group in Australia in the care and support workforce, with forecasting estimating that tens of thousands of AHPs will be needed within two years [2] [4]. There are likely two key reasons why so many additional AHPs are needed: 1) With an aging population, the demand for care provided by AHPs is growing, and 2) the supply of AHPs is not meeting the growing demand, particularly due to workforce attrition. First, the number of people aged 75 and over in Australia is growing faster than the population as a whole [5]. Older Australians (over 65 years) are utilising significantly more allied health services compared to younger Australians which demonstrates the increasing need for AHPs [6]. Second, the supply of nationally registered, practising AHPs (Occupational Therapists, Physiotherapists, Podiatrists and Psychologists) from 2015 to 2020 has increased by 40%, yet demand has continued to outstrip growth in the public health sector [7]. This may be due to AHPs working for a shorter duration in their profession and/or choosing to work in private practice. For example, in the past decade, 57% of physiotherapists who let their registration lapse did so within 10 years of their initial registration [8]. Over the past five years the proportion of occupational therapy graduates working in private practice increased by 11% while decreasing by 4.5% in public health [9]. These examples highlight that attrition from professions and retention in public health are both factors contributing to these workforce shortages.

A paucity of research and workforce data means it is difficult to ascertain the reasons for AHP attrition from public health [10]. A rapid review of the literature for five of the larger allied health professions categorised 17 factors influencing attrition as organisational (career opportunities, work environment, caseload type / volume), psychological (burnout, satisfaction, professional identity), team and management (leadership, recognition), and job characteristics (remuneration, work location) [11]. Other research suggests gender may impact workforce attrition as female-dominated professions have a greater proportion of part time workers and primary caregivers who take career breaks for family reasons [12]. This may be relevant for allied health with more women than men employed in nine of the 11 registered professions [13]. However, further research is needed to clearly identify factors contributing to attrition and retention in public health.

Understanding the factors that are influencing attrition and retention could inform the development and implementation of local, targeted strategies by allied health leaders and managers. The aim of this study was to identify and describe factors contributing to attrition and retention in an allied health workforce.

METHODS

A mixed methods study was conducted across three hospital sites (an acute, sub-acute rehabilitation and community site) of a quaternary public healthcare organisation in Melbourne, Australia. Data were collected from two online surveys

from allied health staff: 1) resigned and completed the standardised exit survey offered by the Human Resources Department (group 1); and 2) employed and consented to participate in an allied health workforce survey (group 2).

Ethics approval was obtained prior to study commencement (Alfred Health Human Research Ethics Committee, project no 443/22).

RESPONDENTS

Allied Health staff (from the 11 professional groups reporting to the Allied Health Director at this health service: Nutrition and Dietetics, Orthoptics, Orthotics, Occupational Therapy, Physiotherapy, Podiatry, Psychology, Speech Pathology, Spiritual Care and Social Work) were invited to respond to the surveys. Demographic data were collected.

OUTCOME MEASURES

Mixed survey questions were designed to produce a 'yes' or 'no' response, a forced selection from a list of options, a rating of agreement on a five-point Likert scale, or an open text response.

1. Exit Survey: Deidentified data were collected from exit surveys of AHPs who resigned between November 2021 and March 2023 (group 1). The voluntary exit survey is offered to all staff who resign during the offboarding process.
2. Workforce Survey: AHPs employed between December 2022 to April 2023 were invited by email to voluntarily participate in an anonymous workforce survey (group 2). A link to survey hosted in REDCap was distributed, with three reminder emails to optimise participation.

ANALYSIS

Quantitative results were analysed descriptively using SPSS (v.28), presented as frequencies or proportions or differences between groups (χ^2). Qualitative results were analysed using an iterative, inductive approach to thematic analysis, with five phases adapted from the method described by Braun and Clarke (2006) [14]: Co-analysts (author 1, author 7) met regularly to review and discuss their analytical process as well as their developing codes and themes.

RESULTS

RESPONDENTS

Eighty-three respondents (response rate 27%) completed the exit survey (group 1). Majority of respondents were 28-42 years (34%) or <28 years (31%), employed for <5 years (77%) and worked at the acute hospital site (55%) (Table 1).

TABLE 1. PARTICIPANT CHARACTERISTICS OF THE EXIT SURVEY AND THE WORKFORCE SURVEY

Exit Survey: staff who have left the organisation (n=83)			
	Descriptor	n	%
Age Range			
	<28 years	26	31
	28-42 years	28	34
	43-61 years	9	11
	>61 years	4	5
	blank	16	19
Profession			
	Allied Health Assistant	13	16
	Art Therapist	1	1

	Dietitian	4	5
	Occupational Therapist	12	14
	Orthotist	2	2
	Physiotherapist	12	14
	Podiatrist	1	1
	Psychologist	5	6
	Social Worker	5	6
	Speech Pathologist	1	1
Length of Employment			
	<12 Months	24	29
	1-2 years	23	28
	2-5 years	17	20
	5-10 years	5	6
	>10 years	11	13
	blank	3	4
Campus			
	Site 1 (Acute tertiary hospital)	46	55
	Site 2 (Rehabilitation hospital)	28	34
	Site 3 (Community hospital)	4	5
	Other (e.g. Community health)	5	6
2. Workforce Survey: current staff (n=136)			
	Descriptor	Value n	%
Profession			
	Allied Health Assistant	7	5
	Dietitian	4	3
	Exercise Physiologist	0	0
	Occupational Therapist	40	29
	Orthotist	2	1
	Orthoptist	2	1
	Physiotherapist	42	31
	Podiatrist	1	1
	Social Worker	9	7
	Speech Pathologist	4	3
	Spiritual Care	0	0

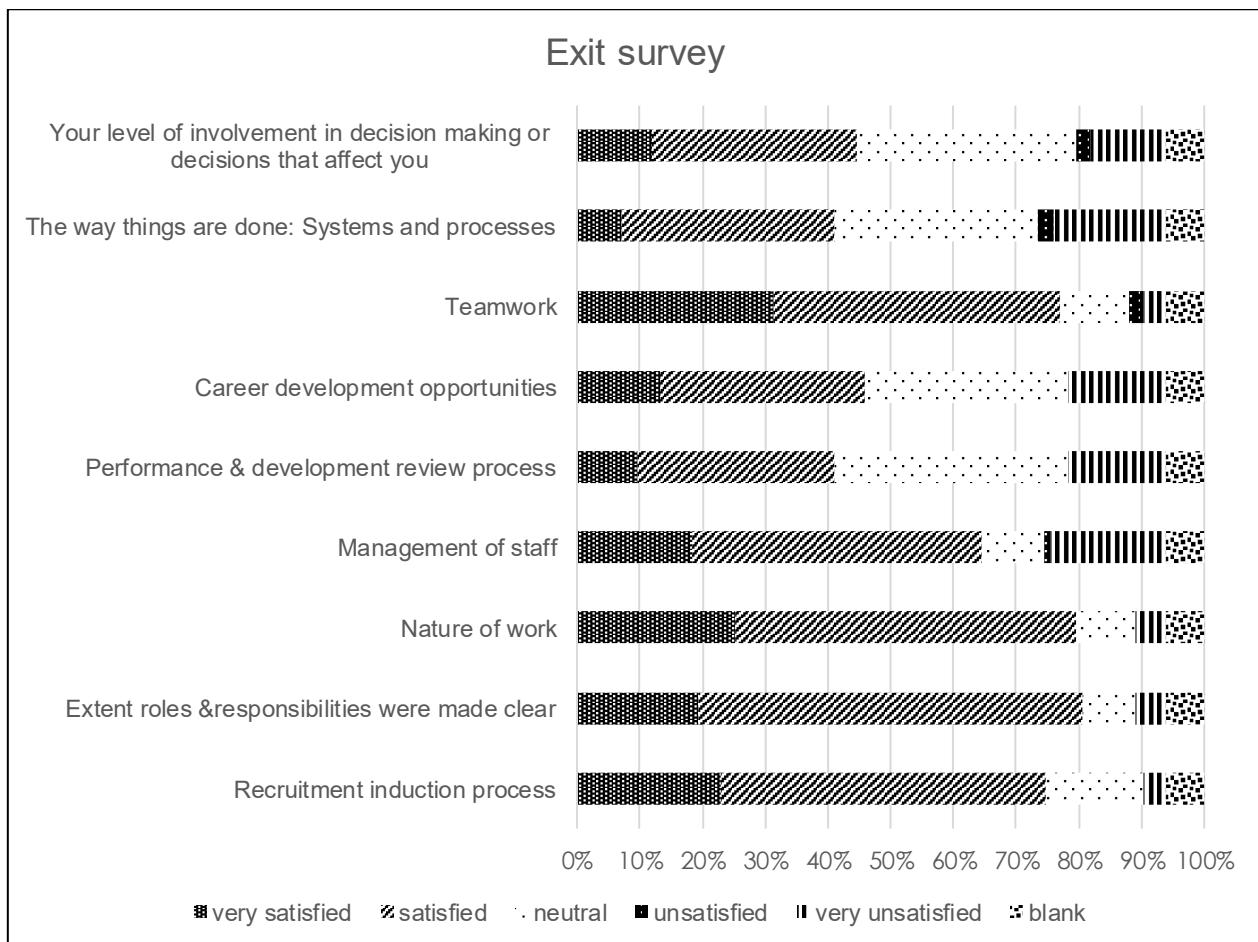
	Other (Psychologist)	23	17
	Prefer not to say	2	1
How long have you worked at the health service?			
	<2 years	36	26
	2-5 years	31	23
	6-10 years	34	25
	11-15 years	14	10
	16-20 years	7	5
	20+ years	10	7
	Prefer not to say	4	3
How are you employed?			
	Full time permanent	64	47
	Full time fixed term	14	10
	Part time permanent	54	40
	Part time fixed term	4	3
	Casual	0	0
Are you happy with the hours?			
	Not happy	13	10
	Happy	123	90
If no, n=13 (10%)			
	I would prefer to work more	5	38.5
	I would prefer to work less	8	61.5
What is your role?			
	Allied Health Assistant	4	3
	Junior AHP	20	15
	Mid-career AHP	38	28
	Senior AHP - clinical	41	30
	Senior AHP non-clinical	6	4
	Senior (>10 years) AHP - clinical	5	4
	Grade (>10 years) AHP – non-clinical	7	5
	Manager/Director	3	2
	Prefer not to say	9	7
	Other	3	2

The workforce survey was completed by 136 respondents (response rate 20%) (group 2). Majority of respondents were senior staff (34%) from physiotherapy (31%) and occupational therapy (29%) employed in permanent fulltime (47%) or part-time (40%) positions.

FACTORS REPORTED BY RESPONDENTS WHO HAVE RESIGNED

The top three factors group 1 respondents were either very satisfied or satisfied with were: (1) the extent to which their roles and responsibilities were made clear (80%); (2) the nature of the work (79%), and (3) recruitment and induction processes (75%). Factors with lowest satisfaction were: (1) 'the way things were done' referring to local operational processes (41%); (2) performance development review processes (41%); and (3) their level of involvement in decision making (45%) (Figure 1).

FIGURE 1: EXIT SURVEY RESULTS (GROUP 1, N=83)



Group 1 respondents aged >43 years were more likely to be dissatisfied or very dissatisfied with recruitment and induction ($p=0.038$), career development ($p=0.036$), and involvement in decision making ($p=0.040$). There was no relationship between satisfaction and primary site of employment.

FACTORS REPORTED BY RESPONDENTS WITH CURRENT EMPLOYMENT

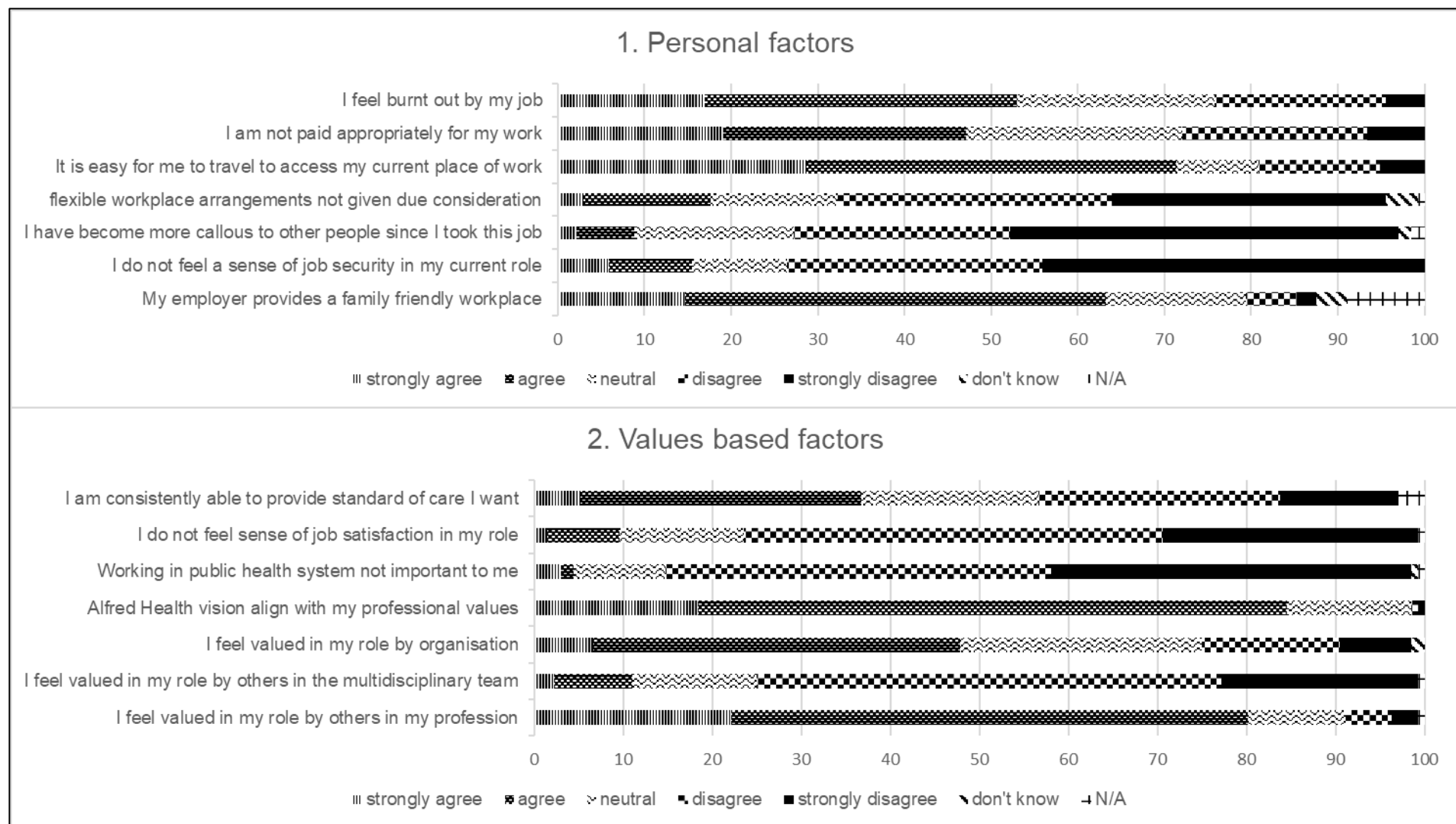
Nearly a quarter of group 2 respondents (23%) were looking to leave their position within six months. The majority (61%) were intending to seek a clinical role with another public health service.

Behaviours influencing attrition and retention results are presented in Figure 2. A sub-group analysis according to years of employment indicated respondents employed for <5 years were more likely to 'feel valued in my role by the organisation' ($p=0.011$) and strongly agree that the vision of the organisation aligned with their professional values ($p=0.045$) compared to those employed >5 years. There were no other differences according to years of employment.

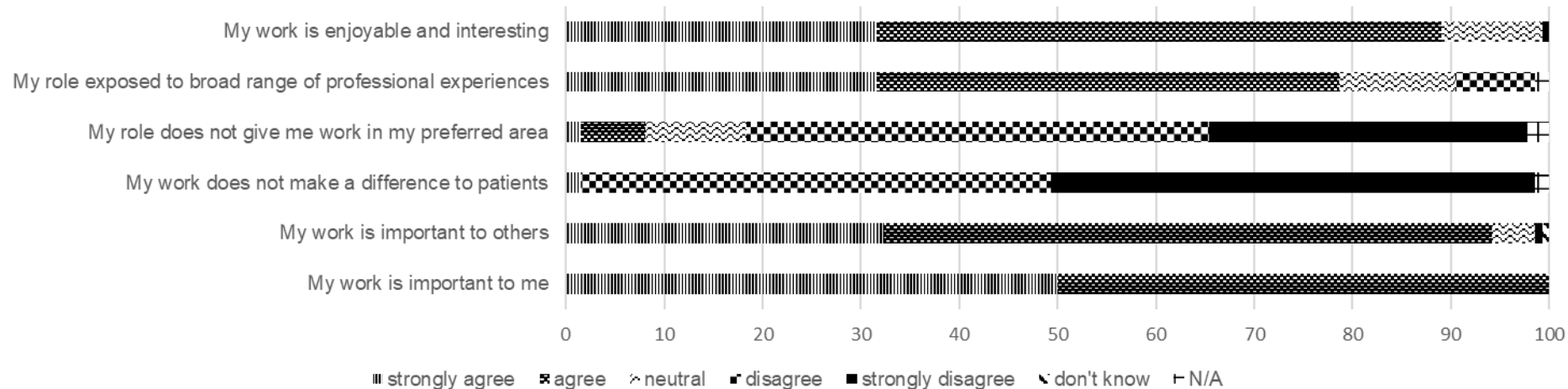
FACTORS REPORTED BY ALL RESPONDENTS

Four themes were developed from open text data from the two surveys and categorised according to answers directly relating to their position held or at an organisation/ department level. (Figure 3).

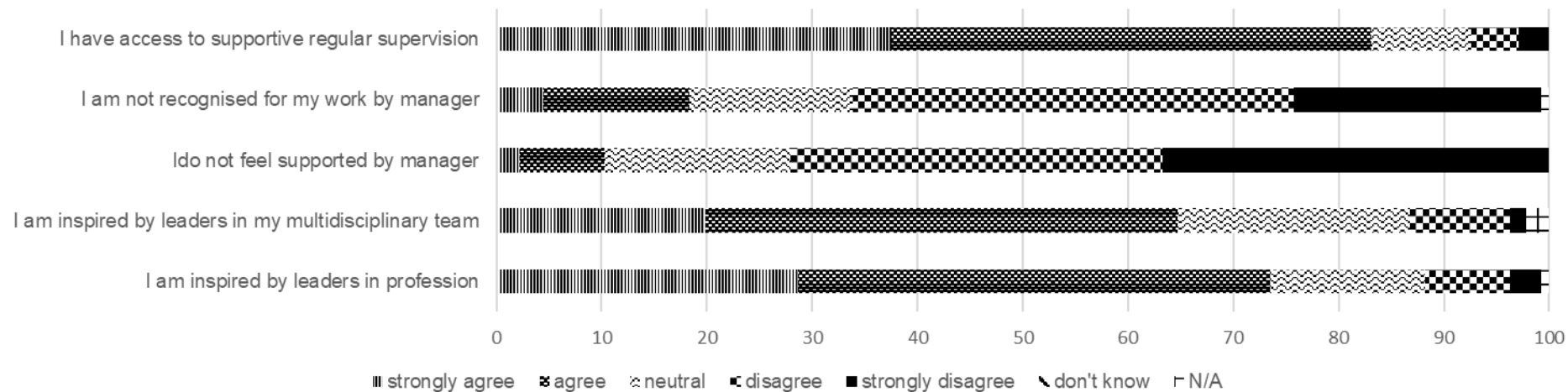
FIGURE 2: WORKFORCE SURVEY RESPONSES (GROUP 2, N=136)



3. Workload and type of work



4. Impact of management and leadership



5. Career progression and access to professional development

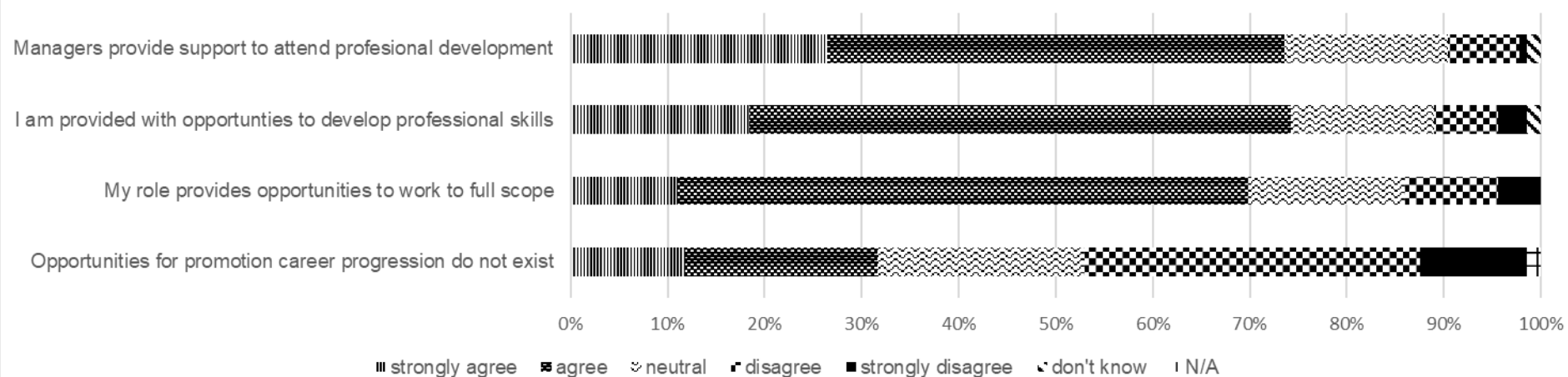


FIGURE 3: MATRIX UNDERPINNING MAJOR THEMES FROM THEMATIC ANALYSIS OF EXIT SURVEY AND WORKFORCE SURVEY RESPONSES

	THEMES			
	1. The job satisfaction triad: alignment, growth and impact	2. Team environment: collaborating with supportive and skilled colleagues	3. Job security and stability, with flexibility and /or proximity	4. Culture and organisational reputation: high quality patient care and striving for excellence
	Role / position		Organisation & Department	
Go:	Seeking learning opportunities offered elsewhere	Desired work-life balance not possible in current position	High demands by organisation affecting provision of best care	
	Lack of opportunities for promotion internally	Working at top or above scope		
	Feeling undervalued and burnt out	Negative 'toxic' team environment	Dissatisfaction with managerial decision	Not feeling 'heard' or feeling disconnected from executive / senior leaders
	Job insecurity e.g. fixed term contracts	Pursuing higher salary commensurate to role/skills	Employment in fixed term contracts	Limited or lack of flexible work conditions
	Perceived role instability		Slow or difficult processes affecting ability to take leave	
	Unreasonable workloads, unfilled vacancies		Perception that KPIs are unreasonable	Inadequate physical space e.g. office, therapy and tea room
Come/ Stay:			Perception of unreasonable expectations and demands causing stress	
	Enabled to learn and grow knowledge and skill	Clinical caseload aligns with interests and skills	Agile career opportunities within organisation	Opportunities to engage in quality improvement and research
	Sense that work 'makes a difference' to patients' lives	Exposure to speciality areas or utilising specialty skills		
	Promotion to senior role with autonomy	Variety in role responsibilities		
	Team based approach to care	Working in a cohesive team with dedicated, supportive, friendly colleagues	Strong culture of teamwork promoted	Working within a highly skilled workforce
		Learning opportunities through multidisciplinary team		
	Job security through permanent employment	Workplace located close to home	'Family friendly' organisation enables flexible work conditions	
	Salary commensurate to position and skills	Flexible work conditions and access to leave entitlements		
	Fair and reasonable workloads		Positive reports about reputation via word of mouth	"Blame free" and inclusive organisational culture
			Organisation committed to evidence informed care	Organisational focus on continuous improvement

1. The Job satisfaction Triad: alignment, growth and impact.

a. Position/role aligns with interests and skills

Allocation of a caseload or work responsibilities that aligned with that respondents' interests and skills consistently impacted job satisfaction.

"If the area of work is interesting to me. If I think it is a match for my skills and experience." (Group 2 responder #68)

Three characteristics of a role - *variety, specialty and complexity* - were repeatedly linked to job satisfaction by respondents. Respondents in junior positions described *variety* in relation to clinical experiences through rotational positions. For respondents in senior positions, *variety* related to being tasked with a range of responsibilities (e.g., clinical, research and quality improvement projects). The second characteristic involved *specialty* skills. Respondents were interested in building expertise in specialty areas of clinical practice, for example, in state-wide services. The third characteristic was *complexity*. Respondents were seeking to be stimulated and challenged and reported experiencing this when working with a clinically complex caseload or participating in quality improvement and research.

"Complexity and variety of patient presentations. Clinical experience of seniors." (Group 2 responder #28)

b. Opportunity for professional learning, growth and career agility

Respondents valued opportunities for professional learning and growth including working with experienced senior clinicians.

"Opportunity to challenge myself and grow, part of a dynamic team" (Group 2 responder #4)

Promotion to senior or leadership positions with increased autonomy was a reason for staying in a position/organisation. Conversely, a common reason cited by group 1 respondents for leaving the organisation was a perceived lack of opportunities for promotion.

c. Commitment to making a difference in patients' lives

Helping people, having a positive impact on the local community and offering exceptional healthcare to everyone who needs it were emphasised as the key factors to being attracted to and staying in a position.

"I wanted to help people who couldn't afford it, to have access to exceptional healthcare" (Group 2 responder #104)

2. Team Environment: collaborating with supportive and skilled colleagues

Respondents highlighted working directly with friendly, like-minded, positive colleagues contributed to their sense of enjoyment at work.

"I love working in a big team of like-minded individuals, I had great amounts of senior support" (Group 2 responder #131)

Feeling disrespected, undervalued or disconnected from executive or senior leaders or dissatisfied with managerial decisions were touted as reasons for leaving. Managers failing to recruit to vacancies, unmanageable workloads and needing to follow up work on days off, leading to burnout, were also cited as reasons for resigning.

"High caseload and demand of the service also impacted decision to look at alternative employment options" (Group 1 responder # 3)

3. Job security and stability with flexibility and/or proximity

Job security offered through permanent employment, rather than fixed term contracts, attracted respondents to positions and fostered job satisfaction. Some exit survey respondents (group 1) in fixed term positions would not have left if their position was ongoing or made permanent.

"I have been on a series of part time contracts and got offered a full-time position elsewhere" (Group 1 responder #12)

Perceptions that 1) salary was not commensurate to skill level or responsibilities assigned to a position, or 2) better wages were available elsewhere, were also cited as reasons for ceasing their employment.

"I would never have resigned if I was provided with a job opportunity at a higher-grade level with better benefits (salary, etc)" (Group 1 responder #10)

Respondents were attracted to "family-friendly employers" (Group 2 Responder #9), who offered flexible work hours and the occasional ability to work from home. Less time travelling and more time for work-life balance was one of the top three reasons cited for leaving.

4. Culture and organisational reputation: high quality patient care and striving for excellence.

Respondents reported feeling attracted to a position within an organisation with a positive 'culture and reputation' and a focus on continuous improvement, commitment to excellence and high-quality patient care. High-quality care was defined by one respondent as, "contemporary approaches that are evidence-based and make a difference in the lives of patients" (Group 2 responder #21).

Satisfaction was eroded when it was perceived that an organisation placed higher value on 'quantity over quality' of patient care.

"All areas are understaffed and therefore we are not always able to provide best care." (Group 2 responder #39)

DISCUSSION

In this study, attrition was impacted by factors negatively influencing job satisfaction: job insecurity, lack of career promotion and opportunities to work at top of professional scope and feeling unable to provide best care. Job satisfaction is a known predictor of intention to leave for AHPs working in metropolitan hospitals [15].

Consistent with previous studies, attrition was negatively impacted by a culture where staff felt undervalued, burnt out or disconnected [16], job instability, inadequate remuneration [17], inflexible conditions [18] and unreasonable workloads [19]. A study from the United Kingdom exploring reasons why 647 AHPs left the National Health Service reported similar findings [20]. Interestingly, the need to look after children was a common reason for leaving. In contrast, our findings indicated the need to seek better work-life balance was important, but family care-giving responsibilities did not drive attrition. Over two thirds of AHPs in this study reported the workplace to be 'family-friendly' and agreed that managers supported flexible workplace arrangements which have been shown to reduce attrition [21].

Our study indicated 23% of AHPs intended to leave their jobs within the next six months to find employment at another health service, suggesting they were not looking to leave their profession or allied health but rather their current place of employment. High staff turnover has significant cost implications with the average total cost of recruiting an AHP reported to be around AUD\$26 000 to AUD\$45 000 per vacancy depending on setting [22]. Organisational strategies could be developed to improve employee satisfaction and reduce attrition. Additionally, developing state-wide or national workforce datasets could usefully inform future workforce planning strategies and policy to aid retention and reduce costly staff turnover.

Survey responses in this study indicated that retention was enhanced when AHPs perceived a strong sense of enjoyment in their work and believed they were 'making a difference' in the public sector. Additionally, caseloads with variety, complexity, speciality and autonomy led to higher job satisfaction in our participants. Two Australian studies involving dietitians also reported that caseload variety was a positive determinant of workforce retention [18,19]. Our finding suggests that burnout, a factor impacting attrition, appears to relate to volume of work rather than complexity. Managers should consider patient complexity in addition to the number of patients when allocating clinical caseloads. Low complexity, high volume work could be reallocated to the allied health assistant workforce as a strategy to reduce burnout and increase retention of AHPs.

Work flexibility and proximity, job stability and security impacted retention. Previous research has suggested temporary, casual allied health workforce models lead to dissatisfaction [23], necessitating workforce redesign to adopt flexible work arrangements to retain highly skilled and specialist staff employed with ongoing contracts [21]. Paradoxically, the increased uptake of flexible work arrangements may reduce attrition, but the fixed term contracts required to backfill may counteract these benefits. Future workforce strategies could incorporate these factors (e.g., permanent employment opportunities) and measure these outcomes (e.g., self-perceived value) given they appear to influence retention.

STRENGTHS AND LIMITATIONS

A strength of this study was the integration of datasets of current and resigned AHPs. However, findings relate to one organisation so generalizability to other health organisations may be limited. Timing coincided with a number of post COVID-19 surveys being circulated with survey fatigue likely impacting response rate. Additionally, this study was conducted in Melbourne post an extended period of lockdown imposed during the COVID 19 pandemic which may have influenced workforce attitudes towards retention. Our findings, however, were similar to previous studies pre COVID-19 in allied health profession specific studies that reported career opportunities, more challenging and interesting work, reward and recognition influenced retention rates [24, 25, 26].

This study did not differentiate differences between allied health professions. Future research could explore factors unique to each profession and include a broader range of clinical settings (e.g. private practice, disability and aged care sectors) and locations (regional, rural, remote, international). Expanding on the themes emerging from the qualitative data with a larger cohort of AHPs could also inform future interventions.

IMPLICATIONS

Many of the factors influencing attrition and retention are modifiable and could be influenced by strategies including creating opportunities for staff to engage in quality improvement, research and professional development; improving performance review processes and clinical supervision; involving staff in decision making and enhancing communication between staff and managers. Tailoring of caseloads to enhance variety and complexity and manage volume according to the different needs of junior and senior staff may also improve job satisfaction, reduce burnout, staff turnover and the associated costs.

It was evident AHPs enjoy challenging, meaningful, satisfying work where they can grow as part of a supported team and be recognised for their contribution. In Australia there has been a rise in home-based health care replacing inpatient hospital bed-based services. Managers should consider strategies for ensuring AHPs delivering care in the home working in solitary roles or working in matrix governance structures, remain connected to their professional teams with access to the clinical supervision and professional development they require. Career pathways for AHPs should be inbuilt into the design of new service models of care [27]. The introduction of advanced and extended models care of that optimises the AHP's scope of practice and autonomy have been successful in creating new career pathways for allied health professions like physiotherapy [28,29]. Establishing Communities of Practice for AHPs with shared interests to exchange knowledge and improve skills could foster the sense of professional growth, connection and camaraderie between AHPs of different health services that improve retention, whilst also building networking opportunities to partner in new initiatives and research internal and external to allied health [30].

Improving our understanding of what is driving attrition and retention of AHPs across the healthcare sector is essential considering regional [31] and local projections [4] predict an increasing shortage of health professionals. Future workforce planning needs to address the reasons why experienced AHPs are leaving. Retaining our current AHPs is preferable to recruitment campaigns targeting overseas trained AHPs which is only likely to worsen global healthcare worker shortages. Developed countries like Australia need to be cognisant of the eight countries in the Western Pacific region identified by the World Health Organisation with the most fragile health systems who cannot afford to lose their healthcare workforce [32].

Real time workforce data is required to identify and monitor the allied health professions and clinical settings where shortages exist. Evaluation of effective interventions targeting attrition should be shared, tested in different settings and implemented in scale so allied health workforces across the region can be strengthened.

CONCLUSION

The findings from this study adds to the limited but growing understanding of the factors influencing attrition and retention of AHPs. An AHP's experience of working in public health underpins their desire to stay or leave. Multifactorial influences on attrition and retention at a public, metropolitan healthcare organisation were identified, most of which could be modifiable with contemporary management and leadership strategies. Initiatives that challenge AHPs to maximise their scope of practice and in turn deliver high quality patient care could benefit AHPs by creating opportunities for career growth. Targeted interventions that focus on improving job satisfaction with greater recognition, professional support, opportunities for career progression such as expanding allied health advanced practice, appropriate workload allocation, optimisation of job security and work environments may address the attrition and retention of AHPs.

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DEVELOPMENT OF THE BMSU ACCREDITATION MODEL WITH THE APPROACH OF THE WISDOM-BASED UNIVERSITY

Amir Amiri¹, Abbas Abbas Pour², Ali Khoursandi², Mohammad Khoramshad³, Abbas Ebadi⁴, Milad Rezaiye*⁴

1. Department of Medical Ethics, School of Health, Baqiyatallah University of Medical Sciences, Tehran, IR Iran
2. Department of Educational Management and Planning, Faculty of Psychology and Educational Sciences, Allameh Tabataba'i University, Tehran, IR Iran
3. Department of Political Science, Faculty of Law and Political Science, Allameh Tabataba'i University, Tehran, IR Iran
4. Nursing Care Research Center, Clinical Sciences Institute and Nursing Faculty of Baqiyatallah University of Medical Sciences, Tehran, IR Iran

Correspondence: miladrezaie73m@gmail.com

ABSTRACT

OBJECTIVE:

This study aims to develop an accreditation model for Baqiyatallah University of Medical Sciences, employing a wisdom-based university approach through a mixed exploratory method (qualitative-quantitative).

METHODS:

A mixed exploratory design was used in this study. In the qualitative phase, data were collected via semi-structured interviews with 16 experts and analyzed using MAXQDA software. The quantitative phase involved a descriptive-analytical survey-correlation design, analyzing data with LISREL software. The statistical population included academic staff and officials from Baqiyatallah University and experts from wisdom-based universities, with a sample size of 305 participants. A researcher-developed questionnaire, validated for content (CVR and CVI), face validity, and construct validity (confirmatory factor analysis), was implemented. The questionnaire comprised 7 categories and 35 items, achieving a reliability score of 0.80 via Cronbach's alpha.

RESULTS:

Inferential data analysis confirmed the model's fit through structural equation modelling. The validation results indicated significant paths and model strength, leading to the recognition of the proposed accreditation model as suitable.

CONCLUSION:

The accreditation model for Baqiyatallah University of Medical Sciences encompasses seven areas: 1) Strategies and Mission; 2) Faculty Members; 3) Executive Management; 4) Social Accountability; 5) Educational and Content Environment; 6) Assessment for Learning; and 7) Education and Research Process. It includes 22 main measures and 91 sub-measures. A wisdom-based university is characterized by integrating science, experience, reason, philosophy, imagination, and revelation into its curriculum, emphasizing practical learning, social service, teamwork, and the cultivation of national self-confidence among students and staff.

KEYWORDS

accreditation; wisdom; wisdom-based university; higher education

INTRODUCTION

Accreditation plays a pivotal role in higher education as a mechanism for quality assurance, institutional accountability, and continuous improvement. It serves as a formal recognition that an institution or program meets established standards of excellence, ensuring that educational offerings are aligned with societal needs and global benchmarks [1]. Accreditation not only enhances the credibility and reputation of institutions but also fosters a culture of self-evaluation and innovation, encouraging universities to adapt to evolving educational demands [2]. In an era of rapid technological advancement and shifting societal expectations, accreditation models must evolve to address emerging challenges, such as the need for interdisciplinary learning, ethical leadership, and sustainable development [3]. This context underscores the importance of developing innovative accreditation frameworks that reflect the dynamic nature of higher education, particularly in the context of wisdom-based universities.

The traditional accreditation models have often been criticized for their rigidity and inability to keep pace with the rapidly changing higher education environment [1]. The emergence of the Fifth-Generation University, characterized by its focus on innovation, entrepreneurship, and community engagement, necessitates a re-evaluation of accreditation processes [2]. Fifth-generation universities are widely recognized as wisdom-based institutions, prioritizing holistic education and individual growth [3].

Wisdom-based universities are institutions of higher education dedicated to nurturing wisdom in their students and equipping them with knowledge and skills [4]. These universities prioritize the following key characteristics:

- Emphasizing the development of practical wisdom, moral reasoning, and ethical decision-making over purely academic knowledge [5].
- Designing curricula and teaching methods that promote critical thinking, reflection, and the integration of knowledge with moral values and social responsibility [6].
- Recognizing wisdom as a multidimensional construct that encompasses cognitive, reflective, and affective components, beyond just intellectual ability [7].
- Creating an environment and activities within the university that foster the development of wisdom, moral intelligence, and socially conscious leadership [8, 9].

In essence, wisdom-based universities seek to produce graduates who not only excel academically but also possess the wisdom to apply their knowledge in ways that benefit society and promote ethical, sustainable practices, moving away from a narrow focus on technical skills or career preparation alone [9, 10].

Developing wisdom-based universities is crucial for a multitude of reasons. Wisdom encompasses more than just the transmission of knowledge and skills; it encompasses the cultivation of practical judgment, moral reasoning, and the ethical application of knowledge for the betterment of society [11]. The goal of wisdom-based universities is to graduate individuals who not only excel academically but also possess the wisdom to use their knowledge responsibly [12].

In an era characterized by rapid technological and social changes, there is an increasing need for leaders and citizens who can navigate complex problems and make decisions that balance multiple, sometimes conflicting, priorities. Wisdom-based universities focus on nurturing these higher-order cognitive and affective capacities [13].

Wisdom-based approaches in higher education can help address the fragmentation and isolation of knowledge across academic disciplines. By promoting the integration of diverse ways of knowing and considering a variety of perspectives, wisdom-based universities can foster more holistic and contextual understandings of issues [14, 15].

Moreover, wisdom-based universities underscore the significance of values, ethics, and social responsibility alongside academic accomplishment. This emphasis can help develop graduates who are not only technically adept but also committed to leveraging their knowledge for the betterment of society [16].

The application of wisdom-based principles in accreditation models has significant real-world implications. For instance, integrating wisdom-based criteria into accreditation processes can encourage institutions to adopt more holistic and ethical approaches to education. This could include evaluating how universities foster moral reasoning, promote community engagement, and address global challenges such as climate change, health disparities, and social inequality [17]. Additionally, wisdom-based accreditation models can serve as a benchmark for institutions seeking to align their educational practices with the United Nations Sustainable Development Goals (SDGs), ensuring that graduates are equipped to contribute meaningfully to global sustainability efforts [18]. By embedding wisdom-based principles into accreditation frameworks, universities can better prepare students to navigate the complexities of the modern world and make decisions that prioritize the common good.

In essence, wisdom-based universities aim to produce graduates who are not just knowledgeable, but wise – capable of critical thinking, moral reasoning, and the application of their abilities in service of the greater good. This educational objective is crucial for addressing the intricate challenges facing the world today. Therefore, this study aimed to explore the development of the BMSU (Baqiyatallah Medical Science University) Accreditation Model within the context of the Wisdom-Based University. Through an exploratory sequential mixed-methods study, this article aims to shed light on the significance of this approach and its potential impact on the future of higher education.

MATERIALS AND METHODS

STUDY DESIGN AND SETTING

An Exploratory Sequential Mixed-Method Study approach was employed in this research. Following the approval of the study by the Research Ethics Committee at Baqiyatallah University of Medical Sciences, the research was conducted in two stages.

The current study aimed to comprehensively understand the components and dimensions of Wisdom-based University. The objective is to use this understanding to design an accreditation model for BMSU, based on the approach of a Wisdom-based University.

To achieve this, the initial phase involved collecting qualitative data through content analysis. This was done using both library and field research methods, to design the accreditation model of a Wisdom-based University.

Subsequently, the dimensions and components of the accreditation model of a Wisdom-based University were identified. This information was then used to finalize the accreditation model for BMSU, incorporating the approach of Wisdom-based University.

A data collection tool was developed, and quantitative data was gathered through a selected statistical sample. For qualitative data analysis, the study employed MaxQda (20) software. For quantitative data analysis, the study utilized the factor analysis method, along with structural equation modeling using LISREL software.

QUALITATIVE STAGE

The qualitative aspect of the research was conducted in two phases. In the initial phase, qualitative data was extracted from texts, documents, and articles using the conventional content analysis method [19-21]. The data obtained from this phase served as the foundation for conducting semi-structured interviews in the subsequent phase.

The study employed directed content analysis to develop theories and conceptual frameworks [19]. In the second phase of qualitative research, directed content analysis was utilized, and qualitative data was extracted through semi-structured exploratory interviews, building upon the primary components identified in the earlier phase. The textual data was subsequently generated, organized, and condensed into categories and codes. These codes were then further

summarized, and the qualitative data was presented in the form of factors, categories, components, and strategies. Based on these factors and components, the conceptual model of accreditation was developed.

STUDY PARTICIPANTS AND SAMPLING

In the process of sampling, a purposive and snowball approach was used because it was challenging to readily identify experts in the field of accreditation and Wisdom-based University. This method involved the researcher identifying participants based on recommendations from other experts. The criteria for selecting participants included having management experience in scientific and executive aspects, as well as involvement in validation and the development of new approaches within the realm of Wisdom-based University.

A survey on the university accreditation model with a Wisdom-based University approach was conducted, gathering insights from 16 participants representing seven major expert groups. To maintain confidentiality, specific details about the experts are not disclosed. The groups and their respective affiliations were as follows:

1. Experts from Baqiyatallah University of Medical Sciences, Tehran (8 participants)
2. Expert from Shahid Beheshti University of Medical Sciences, Tehran (1 participant)
3. Expert from Allameh Tabatabai University, Tehran (1 participant)
4. Expert from Imam Hossein Tehran University (2 participants)
5. Expert from Tehran University of Medical Sciences (1 participant)
6. Expert from Imam Sadiq Qom Research Center (1 participant)
7. Expert from Tehran Sharif University of Technology (1 participant)

DATA COLLECTION TOOL AND TECHNIQUE

During the research, face-to-face interviews were conducted with participants in their respective offices at various times throughout the day. The average duration of each interview was 102 minutes, and interviews continued until data saturation was achieved. Before starting the interviews, informal and friendly conversations were initiated to create a comfortable environment. Participants were reassured about the confidentiality of their opinions and the interview process. The researcher then provided an overview of the study's purpose, explained the contents of the informed consent form, and outlined the general research process before asking the interview questions.

The depth and emphasis of discussion for certain questions varied depending on the participants' expertise. The interview guide is detailed in the Table (1-3) below. With permission, the interviews were recorded using a tape recorder while maintaining strict confidentiality. Throughout the interview process, information was collected, transcribed, and categorized into main and subcategories. Ambiguous questions were reviewed and modified as needed.

After conducting ten interviews, all main categories and most subcategories were identified. It was observed that the categories were becoming repetitive and no new data was emerging. However, to ensure comprehensive data collection, six additional interviews were conducted, bringing the total to 16. The researcher implemented and transcribed all interviews to maintain accuracy and consistency in the data collection process.

TABLE (1-3). INTERVIEW GUIDE QUESTIONS

Row	Interview guide
1	What strategies and methods are required to establish a wisdom-based framework at BMSU?
2	What educational and research processes are necessary to cultivate students' self-esteem, confidence, and independence, enhance their social interaction skills, and promote a culture of wisdom and civilization at BMSU?
3	What plans are in place to attract, retain, and advance faculty members at BMSU to facilitate wisdom-based education?
4	How will students be attracted, assessed, educated, and trained to embrace wisdom-based learning at BMSU?

5	What staffing recruitment, promotion, support, and leadership initiatives are in place to enable wisdom-based education at BMSU?
6	What resources, content, environment, and educational spaces are essential to establish a knowledge-based structure at BMSU?
7	What programs are needed for internal communication, community engagement, and international outreach to establish a wisdom-based institution at BMSU?

QUANTITATIVE STAGE

During the quantitative stage, we developed a comprehensive questionnaire to measure the variables of the Wisdom-based University accreditation model and its constituent elements. Experts reviewed the questionnaire to ensure its content validity, and then we tested it on a small subset of the target population to establish its reliability. To validate the theoretical model, we used the same questionnaire to gather data. The statistical population for the quantitative segment of the study included university officials, faculties, faculty members from BMSU, students, and experts in the field of Wisdom-based University from other academic institutions and scientific centers across the country.

SAMPLING IN THE QUANTITATIVE STAGE

The research population consists of all academic staff, officials of BMSU, and professors who know Wisdom-based University in the country. The scope of the accreditation category requires the inclusion of faculty members, BMSU officials, and expert professors in the field of Wisdom-based University in the country.

In the quantitative part of the research, study subjects were selected using a multi-stage cluster sampling method. Clusters were chosen through simple random sampling. The sample size of 305 people was determined based on the population size using the Krejcie and Morgan table.

VALIDITY OF DATA COLLECTION TOOLS

In this research, several methods were used to ensure the validity of the questionnaire in the qualitative part of the study. These methods included peer review by experts and colleagues, triangulation of data sources, and review by experienced individuals.

Peer review involved sharing the data analysis process and results with experts and colleagues who were part of the research. Their satisfaction with the process and results provided assurance of the validity of the analysis and results. This interaction between the researcher and experienced individuals in research methods offered guidance for research design, data collection, and data analysis. Furthermore, the data analysis and results were reviewed by two experts, assistant professors, and members of the academic faculty of the university, ultimately receiving approval.

The method of investigation by the interviewed members involved analyzing and summarizing the data, which was then presented to a group of interviewees for their review of the findings. Subsequently, two interviewees were consulted again to validate the findings, leading to some revisions. Their final opinions on the compatibility of the findings with their views and the reasonableness of the obtained findings indicated the acceptability of the validity of the qualitative research.

To validate the questionnaire, the content validity method was used, which involved calculating the content validity ratio (CVR) and content validity index (CVI). Face validity was conducted in consultation with faculty members and professors in the university, and construct validity was confirmed through factor analysis. Ultimately, a questionnaire consisting of 7 main components and 22 items was designed and implemented.

RELIABILITY OF DATA COLLECTION TOOLS

In the present study, the retest reliability and intrasubject agreement method were used to evaluate the reliability of the qualitative interviews. The open reliability test and agreement method were employed between two coders to assess the interviews' reliability. To evaluate this, two interviews were randomly chosen from the conducted interviews and coded twice by the researcher with a two-week interval. Table 3-2 shows that out of the total 68 codes in the two intervals, 50 demonstrated agreements, while 18 did not.

TABLE (3-2). CALCULATING RELIABILITY USING THE TEST-RETEST METHOD

	Interviewee code	Total codes in two stages	Number of agreed codes	Number of failed codes	Retest reliability percentage
1	P1	37	29	8	63%
2	P2	31	21	10	73%
-	Total	68	50	18	68%

To evaluate the reliability of the interview process, the within-subject agreement method involving two coders was used. In order to ensure accuracy, an expert was invited to participate in the research alongside the researcher's colleague. The researcher and the expert then coded two interviews, and the reliability of the interviews was assessed using the intra-subject agreement method outlined in the following form Table (3-3).

TABLE (3-3). CALCULATING THE RELIABILITY OF TWO CODERS

	Interviewee code	Total codes in two stages	Number of agreed codes	Number of failed codes	Retest reliability percentage
1	P1	69	30	9	63%
2	P2	64	27	10	77%
-	Total	133	57	19	86%

In this study, we assessed the reliability of the questionnaire using the Cronbach's alpha method in SPSS. The obtained Cronbach's alpha coefficient of 0.80 indicates a high level of accuracy for the questionnaire.

ETHICAL CONSIDERATIONS

This study received ethical approval from Baqiyatallah University of Medical Sciences and strictly adhered to local legislation and institutional requirements. All participants provided written informed consent to participate in the study, and the researcher meticulously followed the guidelines outlined in the Declaration of Helsinki throughout the research. Participants were assured that their responses would remain anonymous and solely utilized for the study's purposes.

RESULTS

PARTICIPANT CHARACTERISTICS

During the qualitative phase, interviews were conducted with 16 individuals who held PhD degrees, ranging from assistant professors to full professors. However, it is worth noting that only one of the interviewees was a female. In the subsequent quantitative phase, the validation process involved 305 participants with educational qualifications ranging from undergraduate to post-graduate level. The participants included individuals of different ages, and among them, 15 were females.

COMPONENT IDENTIFICATION AND DEVELOPMENT

After conducting research, the measures and components that were extracted are organized into coding axes. The accreditation model of BMSU is based on a Wisdom-based University in 7 key areas, which include effective strategies and missions to realize the university's structure, faculty members' plans, executive management, social accountability, educational and content environment, assessment for learning, education and research process. This model consists of 22 main measures and 91 sub-measures. The findings indicate that a Wisdom-based University integrates the source of revelation with science, experience, reason, philosophy, and imagination into its curriculum content. The university places emphasis on practicality and the internalization of student learning, social services, self-sacrifice, spirituality, teamwork,

and student participation. In the realm of education and research, the university focuses on fostering independence, self-belief, and national self-confidence. Furthermore, in practical programs outside the university, officials, staff, students, and professors are physically present.

CREATION OF A SURVEY TOOL

Based on the interview findings and their implications, the qualitative section revealed significant relationships among its components. As a result, all the research hypotheses derived from the qualitative data were validated quantitatively. This integration is reflected in the conceptual model, incorporating insights from experts. The qualitative and quantitative results were integrated through factor analysis and structural equations, resulting in the validation of the quantitative part of the research's conceptual model. LISREL software was used for first- and second-order confirmatory factor analysis to validate the assumed model's variables.

ANALYSIS OF SOCIO-DEMOGRAPHIC CORRELATIONS

Differences Between Faculty Members and Students

- **Perceptions of the Accreditation Model:** Faculty members and students exhibited statistically significant differences in their perceptions of the wisdom-based accreditation model ($p < 0.05$). Faculty members placed greater emphasis on the integration of moral reasoning and ethical decision-making into the curriculum, while students prioritized practical applications and skill development.
- **Social Accountability:** Faculty members rated social accountability as a critical component of the accreditation model (mean score = 4.5/5), whereas students assigned it a slightly lower priority (mean score = 3.8/5).

Variations Based on Gender

- **Gender Differences:** Female participants rated the importance of teamwork and student participation higher than their male counterparts (mean score = 4.6/5 vs. 4.1/5, $p < 0.01$). However, no significant gender differences were observed in other areas, such as executive management or educational environment.

Variations Based on Academic Rank

- **Academic Rank:** Assistant professors and full professors differed in their perceptions of the role of executive management in the accreditation model. Full professors emphasized the need for strong leadership and strategic planning (mean score = 4.7/5), while assistant professors focused more on faculty development and support (mean score = 4.2/5).

Variations Based on Institutional Affiliation

- **Institutional Affiliation:** Participants from Baqiyatallah University of Medical Sciences rated the educational and content environment as the most critical component of the accreditation model (mean score = 4.8/5), while participants from other institutions prioritized social accountability (mean score = 4.6/5).

STRUCTURAL EQUATION MODELING AND MODEL VALIDATION

The research model was tested using structural equation modeling, which yielded two distinct and standardized models. The first model proposed that BMSUs' accreditation, with the Wisdom-based University approach as a latent variable, is influenced by various factors. These factors include effective Strategies and Missions to realize the university's structure, Faculty Members' plans, Executive Management, Social Accountability, Educational and Content Environment, Assessment for Learning, Education, and Research Process. Each of these latent variables was measured using a set of indicators, with an error term added to each measured variable.

The Maximum Likelihood Estimation (MLE) method was used for parameter estimation and model testing. The overall fit of the model and parameter details were analyzed using various fit indices, such as CMIN, NFI, CFI, IFI, PNFI, PCFI, and RMSEA. The chi-square index, relative fit indices, and absolute fit index were evaluated to determine how well the model corresponded to the sample. The results indicated a good model fit, with non-significant chi-square values, high relative fit indices, and low absolute fit indices. These findings are detailed in Table (4-1).

TABLE (4-1). FIT INDICES

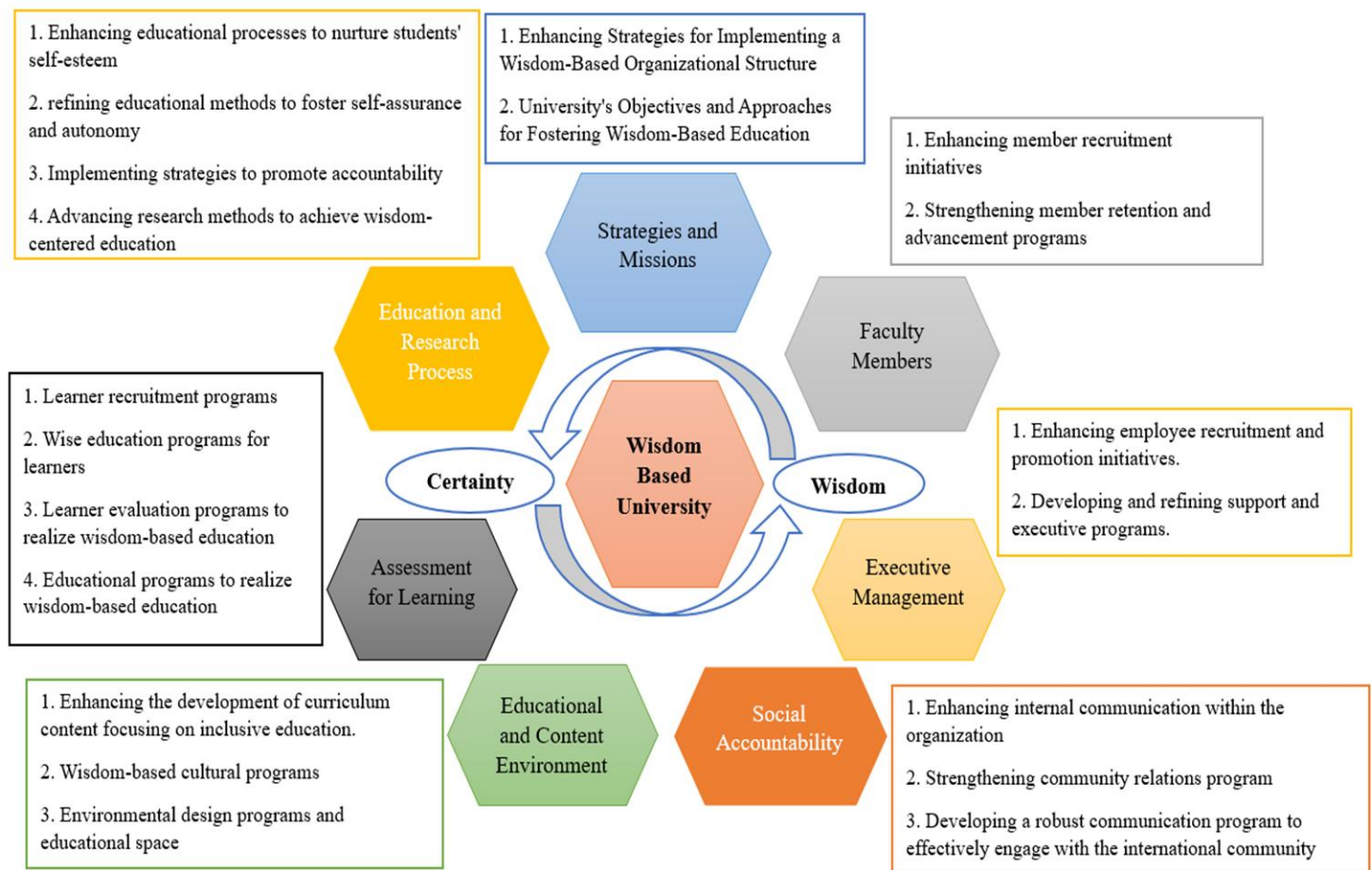
Parsimonious Indices		Relative Indices		Absolute Indices	
Value	Indices	Value	Indices	Value	Indices
.50	PNFI	.95	CFI	110/63	CMIN
.49	PCFI	.95	IFI	.79	RMSEA
		.96	NFI		

Based on the data presented in the Table (4-1), the fit indices consistently indicate a strong fit for the model, suggesting an overall favorable model condition. The model demonstrates a robust and well-supported structure, with 25 estimated parameters and 53 degrees of freedom.

FINAL ACCREDITATION MODEL

After conducting a thorough review and validation, the accreditation model for BMSU was developed to align with the approach of Hikmat Banyan University. This model encompasses 7 general areas, 22 main criteria, and 91 secondary criteria for a comprehensive measurement. For a more detailed overview of the primary and secondary metrics, please refer to Figure 4-1.

FIGURE (4-1): BMSU'S ACCREDITATION MODEL WITH A WISDOM-BASED UNIVERSITY APPROACH



DISCUSSION

A Wisdom-based University is an institution that integrates empirical science, reason, senses, and imagination, along with teachings from divine religions into its educational programs [22]. It emphasizes pragmatism and comprehensive internalization of knowledge through research and community engagement. It distinguishes itself by integrating

theoretical and applied knowledge from experimental science, rational science, the science of fantasy and imagination, and revelations. To be considered as knowledge, information must be confirmed from all four sources [23]. This approach is grounded in the theoretical framework of integrative knowledge systems, which emphasize the synthesis of diverse epistemologies to address complex societal challenges. By bridging the gap between traditional and modern knowledge systems, the Wisdom-based University model aligns with the principles of transformative learning theory, which advocates for holistic education that fosters critical reflection and ethical decision-making [4].

The university places a strong emphasis on the practical implementation and internalization of knowledge, requiring students to apply what they learn in their personal lives from the outset. Professors and students engage in practical implementation together, focusing on problem-solving and critical thinking across all courses [24]. The institution values teamwork and encourages student participation in teaching and research to instill the role of mentoring in students [25]. Its competitive advantage lies in training graduates with multidimensional, ethical, spiritual, and God-oriented qualities to serve society. However, the implementation of this model is not without challenges. One significant limitation is the difficulty of balancing traditional religious teachings with modern scientific paradigms, which can lead to resistance from stakeholders accustomed to conventional educational frameworks [26]. Additionally, the lack of standardized tools for measuring practical wisdom poses a barrier to the institutionalization of ethical and spiritual concepts [27].

In the pursuit of wisdom, there is a crucial distinction between theoretical and practical wisdom. While theoretical wisdom has received significant attention, tangible progress in practical wisdom is essential [5]. For instance, the concept of "humble behavior" [28] requires the development of software or tools to effectively instill and institutionalize it among university professors, students, and officials [29, 30]. To address this gap, the proposed accreditation model incorporates practical wisdom metrics derived from virtue ethics theory, which emphasizes the cultivation of moral character and ethical behavior. This theoretical grounding ensures that the model not only assesses academic excellence but also fosters the development of virtuous leaders capable of addressing societal challenges [31].

Existing research has not identified appropriate tools or software for the institutionalization of practical concepts. Recommendations and announcements regarding the implementation of Islamic concepts lack a suitable mechanism to realize practical implementation [32, 33]. To address this gap, a comprehensive accreditation model has been designed comprising seven areas, 22 main criteria, and 91 secondary criteria to implement wisdom concepts practically within university settings. However, the model's implementation may face challenges such as resource constraints, resistance to change, and the need for faculty training. For example, pilot projects in other regions, such as the Ethical behavior among academic staff in Malaysian public universities [34], have highlighted the importance of stakeholder engagement and continuous evaluation in ensuring the success of such initiatives.

The model is measurable and can be effectively implemented through the establishment of a suitable legal framework and the organization of annual festivals to recognize and incentivize faculty members and students. National awards for the Wise Professor, Wise Student, and Wisdom-based University could further promote the implementation of these concepts. By leveraging these components, universities and faculty officials can track progress and measure growth annually, ultimately honoring institutions based on their advancements in these areas. To ensure wider adoption, policymakers should consider integrating the Wisdom-based University model into national accreditation frameworks, particularly in regions where ethical and spiritual education is prioritized. For instance, the success of similar initiatives in Asia, such as the Holistic Education Framework in India [35] and the Moral Education Program in Singapore [36], demonstrates the potential for contextual adaptations of the model.

Despite its strengths, the Wisdom-based University model has certain limitations. For example, the emphasis on spiritual and ethical dimensions may not align with the secular educational policies of some countries, limiting its global applicability. Additionally, the model's reliance on qualitative metrics for assessing practical wisdom may pose challenges in terms of objectivity and comparability [4]. Future research should explore contextual modifications of the model to address these limitations, such as developing region-specific criteria for assessing practical wisdom and integrating digital tools for tracking ethical behavior.

In summary, the unique approach of the Wisdom-based University to knowledge acquisition, practical implementation, and ethical education sets it apart as a pioneering institution in higher education. However, its successful implementation requires addressing challenges such as stakeholder resistance, resource constraints, and the need for contextual adaptations. By incorporating theoretical frameworks, drawing on global best practices, and providing concrete policy recommendations, this model has the potential to transform higher education and contribute to the development of ethical and socially responsible leaders.

STUDY LIMITATIONS

The study is constrained by a lack of scientific resources and theoretical background in the research subject area, which hinders progress. It is also challenging to access relevant research and documents related to the subject. Furthermore, officials may have limited familiarity with the research topic due to its novelty. Additionally, difficulty in accessing subject matter experts for interviews posed another challenge.

CONCLUSION

In conclusion, the accreditation model encompasses 7 general areas, 22 main measures, and 91 sub-measures, which demonstrate the practical application and execution of the concepts described in the Wisdom-based University model. The purpose of the accreditation model is to be flexible and suitable for both Islamic and non-Islamic countries, allowing for the inclusion of the fourth source, a revelation source, in accordance with the predominant religion in a particular country. Existing literature provides evidence that wisdom is highly valued by scientists from different religious backgrounds, which justifies the need for extensive research. This model has the potential to provide a workable framework for incorporating the principles of wisdom in various religious contexts.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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NEXUS BETWEEN HEALTH DETERMINANTS AND HEALTH OUTCOMES: A COMPARATIVE GLOBAL ANALYSIS

Dillip Kumar Muduli¹, Pradipta Kumar Sahoo^{*2}, Aiswarya Das³, Debasis Pahi⁴

1. S.V.M. Autonomous College, Jagatsinghpur, India
2. Narasingh Choudhury Autonomous College, Jajpur (Utkal University), India.
3. School of Social, Financial & Human Sciences, KIIT Deemed to be University, India
4. Model Degree College, Malkangiri, India

Correspondence: pradiptaiith@gmail.com

ABSTRACT

The present study examines the nexus between healthcare determinants and health outcomes of different income group countries.

For this, the study uses the Feasible Generalized Least Square (FGLS) model on a panel of 143 countries spanning from 2000 to 2019.

The findings suggest that total health expenditure and GDP per capita significantly improve health outcomes by reducing infant mortality and increasing life expectancy in all income groups and in all geographic regions. Further, socioeconomic determinants like urbanisation and sanitation significantly contribute to the improvement of health status.

Therefore, our results suggest that government health expenditures have to increase to enhance the health outcomes of different countries. At the same time, the policymakers have to focus to increase the income level of the people in order to enhance the health outcomes of the countries.

KEYWORDS

life expectancy at birth, infant mortality rate, health expenditure, FGLS, JEL codes: I10, I15, I18, C23

INTRODUCTION

The nexus between health determinants and health outcomes is a complex and multifaceted issue. The important determinants of health outcomes include well-known factors such as health expenditure [1, 2], income [2], education level [3, 4] and sanitation [5]. Recent empirical studies focus on the role of information and communication technology [6], income inequality [7] and ethnic diversity [8-10] on health outcomes of countries. Since last two decades, a large disparity in health outcomes has been apparent between rich and poor countries. For instance, World Population

Prospects 2022 reported that life expectancy at birth (LEB) in Sub-Saharan Africa is 59.7 years in 2021 and based on prediction, it might increase to 66.7 years in 2050. LEB in central and southern Asia was 67.7 years in 2021 and it is predicted to increase to 77.1 years in 2050. However, LEB in Europe and North America is 77.2 years in 2021 and it is predicted to increase to 83.8 years in 2050. In addition, Sub-Saharan countries are also leading the table in "infant mortality rate" (IMR), "maternal mortality rate" (MMR), and "crude death rate" (CDR). Such disparities in health outcomes across the different regions of the world are due to wide variations in the social, cultural, and economic characteristics of those regions. However, a significant amount of health expenditures, i.e., "government health expenditure" (GHE) or "private health expenditure" (PHE), can improve health outcomes and reduce health disparities between developed and developing countries [2, 11].

Previous studies [1, 12-15] did not find any consistent nexus between health expenditures and health outcomes. The key determinants of child mortality were not public healthcare spending but rather the depth of "poverty, income inequality, female education, and other socioeconomic factors" [12]. Additionally, a World Bank report on Indian states did not reveal no correlation between healthcare spending and infant mortality rate.

Carbon dioxide (CO₂) emissions are the principal origin of human-induced global warming and associated climate change, which is widely seen to be one of the most serious worldwide threats to human health [16]. In general, it may influence population health in the following manners. First, inhaling high concentrations of emissions directly harms the respiratory system of people, inducing headaches, shortness of breath, and even delirium [17]. Second, emissions may indirectly influence population health through climate change, which will lead to around 250,000 deaths each year over the period 2030–2050, according to the World Health Organization. On the one hand, increasing CO₂ emissions leads to global warming that changes the pattern and amount of precipitation and increases the intensity and frequency of extreme weather. On the other hand, by increasing air pollution and facilitating the propagation of climate-sensitive diseases, global warming will affect population health [18].

From the previously mentioned existing studies, our study differs in the following grounds. The present study provides the novelties such as; First, from the existing literature, we found that "the role of health expenditure on health outcome" only in country based either on income or on region, but in our study, we have made a comparative study on the impact of different health determinants on health outcomes between the income-based as well as region-based countries. In this case, the study has examined the differential effect of health determinants on IMR and LEB for various income group countries and also examined the differential regional effect on income group countries. Second, we have emphasised the effects of health determinants on two major health outcomes i.e., IMR & LEB. Third, we have used a novel FGLS model by capturing the heterogeneity of the countries through cross-section dependency. Next, the debate on the nexus between health determinants and health outcomes is indeterminate; the present study attempts to justify this discussion by offering a piece of new evidence from this comparative study.

The findings of the study show that total health expenditure and GDP per capita significantly improve health outcomes by reducing infant mortality and increasing life expectancy in all income groups. The study also finds the same results across all the geographic regions. Further, the study finds that other factors significantly contribute to the improvement of health outcomes. For instance, higher per capita income is associated with lower infant mortality and higher life expectancy at birth. Per capita income elasticities are higher than those of total health expenditure, suggesting that the impact of income level on health status is greater. In addition, urbanisation and sanitation also contribute to the reduction of infant mortality and in the increase of life expectancy at birth. However, CO₂ emission does not show a statistically significant relationship with two health outcomes.

The organisation of the remaining parts of the study is as such: Section 2 reports the literature review; Section 3 provides a brief overview of the health status outcomes of the countries based on region and income groups; Section 4 describes the methodology, data and model; Section 5 analyses empirical results; and finally, Section 6 concludes the paper with some policy suggestions.

LITERATURE REVIEW

A large body of literature reports the link between health determinants and health outcomes. These studies provide contrasting results between two variables i.e., health determinants and health outcomes. This may happen due to wide variations in cultural and economic characteristics across countries. The detailed literature has been explained below.

RELATIONSHIP BETWEEN HEALTH EXPENDITURE AND HEALTH OUTCOMES

There are many studies in the literature on the nexus between health expenditure and health outcomes. Anyanwu & Erhijakpor [19] studied the data from 47 African nations between 1999 and 2004 to study the association between government health spending and IMR and under-5 mortality. They found that there was a highly significant association between health expenditure and infant and under-5 mortality. Similarly, Novignon et al. [11] observed a significant inverse link between healthcare spending and IMR in 44 Sub-Saharan Africa (SSA) countries. Edeme [20] examined the effects of government health expenditure on health outcomes such as IMR and LEB in Nigeria from 1981 to 2014 and found that government health spending has a significant effect on health outcomes in Nigeria. In addition, Arthur & Oaikhenan [1] discovered a substantial inverse link between health spending and IMR for Sub-Saharan African (SSA) nations.

In the instance of industrialised nations, Crémieux et al. [21] examined the link between Canadian health spending and health outcomes over a 15-year period. Their research revealed a statistically significant link between lower healthcare spending and a rise in infant mortality. Similarly, Nixon & Ulmann [15] using a panel data set for the 15 EU members from 1980 to 1995, found that substantial reductions in infant mortality are significantly correlated with increase in healthcare spending. Similar to this, Berger & Messer [22] looked at the impact of health expenditures, health insurance, and other factors on health outcomes using panel data from 20 OECD nations. The study found that factors other than public spending had measurable positive influence on health outcomes. Furthermore, Kim & Lane [23] examined the link between public health expenditure and health outcomes among EU developing nations. They used OLS and 2SLS estimators to analyze the relationship between dependent and independent variables and found that public health expenditure and health outcomes are in a long-run equilibrium relationship and health expenditure can improve LEB. Similarly, several studies [9, 10, 24, 25] examined the role of health determinants on different regions.

RELATIONSHIP BETWEEN PER CAPITA INCOME AND HEALTH OUTCOMES

Some empirical studies found that per capita income is more significant in explaining the health outcomes. Vărzaru [26] investigated the determinants of infant mortality at the municipal level in Brazil covering the period from 1970 to 2000. They discovered that the drop in infant mortality in Brazil was largely due to improvements in per capita income, sanitation, and education. Bokhari et al. [27] linked per capita income to two health outcomes such as under-5 mortality (U5M) and maternal mortality (MM). They found that elasticity with respect to per capita income is -0.40 and -0.44 for U5M and MM, respectively, and both are statistically significant. Raeesi et al. [28] examined the link between per capita income and 3 health outcomes, such as LEB, IMR and U5M within 4 different health care systems for 25 countries between 2000 and 2015. They found that 1 unit increase in per capita income leads to 5.52 units increase in LEB, and -1.24, and -1.11 unit decrease in IMR and U5M respectively. Similarly, Rahman et al. [2] investigated the impact of per capita income on three health outcomes, such as IMR, CDR and LEB for 15 countries in the SAARC-ASEAN region over a 20-year period (1995-2014). They found that per capita income growth rate had a significant positive impact in improving LEB and reducing IMR in the region.

RELATIONSHIP BETWEEN CO₂ EMISSION AND HEALTH OUTCOMES

Matthew Oluwatoyin et al. [29] attempted to find the impact of carbon emission on LEB in Nigeria between 1979 and 2012. They used Johansen Co-integration and VECM techniques to establish long-run relationship between CO₂ emission and LEB. They found that carbon emission significantly deteriorates LEB in Nigeria. Farooq et al. [30] investigated the role of CO₂ emission in health issues on an unbalanced panel data of 30 Chinese provinces between 1996 and 2015. They found that health issues are increasing in all Chinese provinces with higher exposure to CO₂ emission. Matthew et al. [31] examined the long-run effect of greenhouse gas (GHG) on life expectancy in Nigeria employing time series data from 1985 to 2016 and found that 1% increase in greenhouse gas emission leads to 0.04% decline in life expectancy. Erdoğan et al. [32] analyzed the impact of carbon emissions on health indicators between 1971 and 2016 in Turkey. They found that a long run relationship exists between health indicators and carbon emissions. An increase in carbon emissions

reduces life expectancy and increases infant mortality rate. Omri et al. [33] investigated the impact of CO₂ emission on infant mortality and life expectancy in Saudi Arabia over the period 2000-2018. They discovered that CO₂ emissions have negative impacts on health outcomes.

RELATIONSHIP BETWEEN URBANIZATION AND HEALTH OUTCOMES

Cyril et al. [34] examined the effect of urbanization on health and found that increased urbanization is associated with deleterious health outcomes. Li et al. [35] examined the impact of urbanization on health in China and found that regions with highest urbanization level were found with a high prevalence of chronic disease in recent decades.

RELATIONSHIP BETWEEN SANITATION AND HEALTH OUTCOMES

A number of studies establish the negative effects of unsafe WASH on child health outcomes [36, 37, 38, 39]. Almond & Currie [40] points out that conditions in-utero and early in life have been found to have long-lasting consequences on individuals' health and economic outcomes. Hence, the adverse effects of WASH on maternal and newborn health must not be ignored. Gülmezoglu et al. [41] established that interventions to improve hygiene conditions during pregnancy, childbirth and in the early days of life could significantly reduce maternal and neonatal deaths. Similarly, Cameron et al. [5] found that access to at least basic household sanitation is strongly associated with substantially decreased overall risk during pregnancy and birth.

According to the aforementioned literature review, there isn't enough research on the nexus between health outcomes and health care spending, specifically a comparative study between countries based on income and regions that employs large panel data. This study fills a significant gap in the literature and has significant policy suggestions because it has a much wider scope and uses macro data from the four income groups of countries and four region-based countries.

HEALTH STATUS OUTCOMES OF INCOME GROUPS AND REGIONS

TABLE 1. MEAN DIFFERENCE OF HEALTH OUTCOMES

Panel A: Mean of IMR & LEB by Region and Income Category										
REGION	IMR					LEB				
	HIG	LIG	LMI	UMI	ALL	HIG	LIG	LMI	UMI	ALL
AFRICA	12.17	69.29	51.1 2	42.2 7	56.34	73.04	56.20	61.18	60.75	59.39
ASIA	6.558	66.62	34.8 8	20.3 4	23.39	77.78	60.58	69.04	72.06	72.20
AMERICA	9.21		23.9 8	19.0 2	17.63	78.14		70.99	73.33	74.03
EUROPE	4.27		10.6 8	9.16	5.43	78.89		69.70	72.47	77.34
ALL	5.60	69.15	41.0 0	21.3 5	28.52	78.38	56.43	65.50	70.72	69.70
Panel B: Mean Difference of IMR & LEB between Regions										
REGION	IMR				LEB					
	AFRICA	ASIA	AMERICA	EUROPE	AFRICA	ASIA	AMERICA	EUROPE		
AFRICA	0.00 (0.000)	32.95*** (30.15)	38.71*** (30.05)	50.91*** (52.1)	0.00 (0.000)	-12.80*** (-38.25)	-14.64*** (-35.3)	-17.94*** (-53.1)		
AISA			5.76*** (5.85)	17.96*** (24.4)			-1.83*** (-6.15)	-5.14*** (-20.15)		

AMERICA				12.19*** (32.5)				-3.30*** (-13.15)
EUROPE				0.00 (0.000)				0.00 (0.000)
Panel C: Mean Difference of IMR & LEB between Income Groups								
Income Group	IMR				LEB			
	HIG	LIG	LMI	UMI	HIG	LIG	LMI	UMI
HIG	0.00 (0.00)	- 63.54*** (-83.05)	-35.39*** (-45.95)	-15.75*** (-29.45)	0.00 (0.00)	21.95*** (85.95)	12.88*** (44.7)	7.66*** (32.9)
LIG			28.14*** (20.10)	47.79*** (41.75)			-9.07*** (-19.85)	-14.29*** (-37.95)
LMI				19.64*** (19.70)				-5.21*** (-14.5)
UMI				0.00 (0.00)				0.00 (0.00)

Notes: "t values are in parentheses, *** indicates significance level at 1%"

From Table 1. In Panel A, mean IMR and LEB are compared across geographic regions and income groups. First, comparing across regions, mean IMR is highest in Africa (56.34 per 1000 live births), which is over ten times higher than that in Europe (5.43 per 1000 live births). Different socioeconomic factors are considered responsible for the high rate of infant mortality in Africa. The most cited factors are low female education, lower per capita income, lack of environmental cleanliness, lack of improved sanitation, and low expenditure on health [42]. In addition, America and Asia have mean IMRs of 17.63 and 23.39, respectively. Second, a comparison of IMR across income groups reveals that the low-income group has the highest mean IMR at 69.15, while the high-income group has the lowest mean IMR at 5.61. The mean IMR for the upper-middle-income group is 21.36, while that for the lower-middle-income group is 41.00. The study also found different IMRs in different geographic regions under a particular income group. For instance, under the upper-middle income group, Africa has mean IMR of 42.27, while Europe has a mean IMR of 9.16. Therefore, the findings imply that geographic region influences IMR to a greater extent.

Further, panel A displays that the highest (77.34 years) and the lowest (59.40 years) mean LEB were reported in Europe and Africa, respectively. Further, America and Asia have mean LEBs of 74.04 and 72.20 years, respectively. A comparison of LEB across income groups showed that the high-income group has the highest LEB of 78.38 years, while the low-income group has the lowest LEB of 56.43 years. Additionally, LEB for the "upper-middle-income group" is 70.72 years, while that for the "lower-middle-income group" is 65.50 years. Hence, the difference in LEB is more across income groups than across geographic regions. Therefore, income level is a significant determinant of LEB.

The large regional differences in mean IMR and LEB are reported in panel B of Table 1. The mean IMR in Africa is 50.91 higher than the mean IMR in Europe. The mean LEB in Africa, on the other hand, is 17.94 less than the mean LEB in Europe. Furthermore, panel C of Table 1 demonstrates the significant variations in mean IMR and LEB amongst various income categories. In comparison to the low-income group, the mean IMR in the high-income group is 63.54 lower. On the other side, the mean LEB in the high-income group is 21.95 greater than the mean LEB in the low-income group. These differences in health outcomes tend to examine the effect of various health determinants on health outcomes in case of different income groups and regions of the world. These issues have clearly been addressed in the empirical section.

DATA DESCRIPTION AND METHODOLOGY

DATA

The present study employs annual data for 143 countries over 20 years (2000-2019). The countries are categorised on the basis of geographic region, and the income group (World Bank). The data are collected from the World Development Indicators Database. The countries are selected based on the availability of data for constructed variables. Detail definition of variables is given in Table 2.

TABLE 2. VARIABLES AND DEFINITIONS

Variable name	Definition
Infant mortality rate	"The number of infants dying before reaching one year of age, per 1,000 live births in a given year."
Life expectancy at birth	"The number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life."
Total health expenditure (% of GDP)	"The sum of general government expenditure on health and private expenditure on health in a given year"
GDP per capita (constant 2015 US \$)	"GDP per capita is gross domestic product divided by midyear population."
CO ₂ emission (metric tons per capita)	"CO ₂ emissions are those stemming from the burning of fossil fuels and the manufacture of cement."
Urbanisation (% of total population)	"The percentage of total population living in urban areas as defined by national statistical offices"
Sanitation (% of total population)	"The percentage of total population using improved sanitation facilities that are not shared with other households"

Source: World Development Indicators, (World Bank 2022)

METHODOLOGY

The panel data estimation method is employed in this paper. Panel data estimate is the ideal method to use for research that involves numerous countries. Comparing panel data analysis to cross section and time series analysis, the following benefits are also present: i) panel data, which offers greater degrees of freedom and sample heterogeneity, allows for a more precise inference of model parameters, improving the efficiency and reliability of econometric results ii) the impact of omitted variables is controlled by the panel data iii) inter-individual differences are also taken into account by the panel data, and (iv) various data points can be used for various countries. Therefore, the panel data analysis for this study is justifiable.

CROSS-SECTIONAL DEPENDENCE (CSD)

As the countries are heterogeneous in nature based on their income category, so it is better to check the Cross-Sectional Dependence (CSD) among the countries. As such we use the CD test [43] to gain more clarity about that. The CSD is

calculated using the residual of the estimated ordinary least square based on the pair-wise correlation of variables. The CSD test statistics for all variables reject the null of non-existence of CSD against the alternate existence of CSD.

The literature says that panel data models are possibly to show significant cross-sectional dependency in errors due to the presence of related shocks and idiosyncratic pairwise correlation in errors without a specific pattern of similar components or positional dependence [43, 44, 45]. With the presence of CSD, the standard "Fixed Effects" (FE) and "Random Effects" (RE) models become consistent but not efficient, and the standard errors are biased [46]. So, the issues of the presence of CSD can be addressed with the application of the "Feasible Generalised Least Square" (FGLS) model. "FGLS accounts for non-constant variance and correlated error terms by estimating and incorporating the structure of the variance-covariance matrix, thereby producing more efficient and consistent parameter estimates". The FGLS model is defined as follows:

$$\text{IMR}_{it} = \beta x'_{it} + \gamma_2 D_{2it} + \gamma_3 D_{3it} + \gamma_4 D_{4it} + \delta_i + \gamma_t + \varepsilon_{it} \dots\dots\dots (1)$$

$$\text{LEB}_{it} = \beta x'_{it} + \gamma_2 D_{2it} + \gamma_3 D_{3it} + \gamma_4 D_{4it} + \delta_i + \gamma_t + \varepsilon_{it} \dots\dots\dots (2)$$

Where IMR and LEB are the dependent variables, reflecting health outcomes of different income groups and geographic regions. X refers to the vector of independent variables that includes health expenditure, environmental factor, and socioeconomic factors. Health determinants are HE, GDPPC, CO₂ emission, URB, and SAN. D's are the dummies taking a value of 1 in the relevant regions (D_2 = Asia, D_3 = America, and D_4 = Europe), and 0 otherwise. We have taken Africa as the reference region to avoid dummy variable trap. γ_2, γ_3 and γ_4 are regional effects of being Asia, America, and Europe respectively. β and γ 's are the coefficients need to be estimated. δ_i is the cross section and γ_t is the time elements of the model and where ε_{it} is the error component. The FGLS estimator follows the succeeding moments.

$$g(\beta) = \sum_{i=1}^m z'_i \Omega^{-1} \varepsilon_i(\beta) \dots\dots\dots (3)$$

Where z'_i is considered as cross section matrix of i-th countries, $\varepsilon_i(\beta) = (y_{it} - \alpha - x'_{it}\beta)$ and Ω is a consistent estimation of the "variance-covariance matrix" Ω . The error variance in a cross-sectional analysis could differ between the groups, affecting the consistency of the estimators. The issue can be resolved with the presence of GLS, but other variability of variance might be there [47]. FGLS uses the estimated variance-covariance matrix for accurate standard errors and t-statistics and is considered as a more efficient estimator.

EMPIRICAL ANALYSIS AND DISCUSSION OF THE RESULTS

TABLE 3. IMR AND ITS DETERMINANTS

IMR	ALL	HIG	UMI	LMI	LIG
	-0.047***	-0.161***	-0.078***	-0.018*	-0.016
Inhe	(-0.006)	(-0.018)	(-0.017)	(-0.008)	(-0.00)
	-0.289***	-0.431***	-0.451***	-0.259***	-0.0967***
Ingdppc	(-0.012)	(-0.012)	(-0.029)	(-0.024)	(-0.027)
	0.006	0.094***	0.011	-0.009	-0.027**
Inco2	(-0.005)	(-0.017)	(-0.016)	(-0.008)	(-0.009)
	-1.148***	-0.299*	-0.732***	-1.305***	-0.243***
Inurb	(-0.037)	(-0.117)	(-0.081)	(-0.057)	(-0.054)
	-0.021***	-0.123***	-0.004	-0.099***	-0.355***
Insan	(-0.004)	(-0.011)	(-0.005)	(-0.015)	(-0.029)
	-0.409***	0.0397	-0.894***	-0.640***	0.125
Asia	(-0.044)	(-0.120)	(-0.109)	(-0.074)	(-0.072)

	-0.171**	0.18	-0.650***	-0.298	
America	(-0.055)	(-0.112)	(-0.098)	(-0.168)	-
	-0.799***	-0.052	-1.633***	-0.667	
Europe	(-0.061)	(-0.114)	(-0.119)	(-0.457)	-
	10.34***	7.893***	10.61***	10.94***	6.618***
Constant	(-0.121)	(-0.441)	(-0.350)	(-0.176)	(-0.206)
Obs(Country)	2860 (143)	900 (45)	740 (37)	840 (42)	380 (19)

Note: "Author's estimation. ***, **, and * indicate significance level at 1%, 5%, and 10% respectively. Standard errors are in parentheses."

Table 3 presents the impact of health determinants on IMR in overall countries and in different income groups. It also shows the impact of health determinants of different regions of the world. The results reveal that an increase in health expenditure significantly reduces IMR in high income, upper-middle income, and lower-middle income countries. However, it has no impact on IMR in low-income countries. This is true because out-of-pocket expenditure and budgetary allocations to the healthcare sector are comparatively higher in the other three income groups than in the low-income group [48, 49]. The other control variables are also found significant in the case of IMR. For example, GDP per capita remained a significant determinant of IMR for all income groups. The effect of GDP per capita is highest in the upper middle-income group, while it is lowest in low-income groups suggesting that higher per capita income results in a better standard of living which eventually improves health conditions [50, 51]. In fact, higher income enables individuals to access goods and services that improve their health. However, Anyanwu & Erhijakpor [19] discovered that variations in health outcomes in Africa were not well explained by changes in per capita income. Economic growth may not result in improved health outcomes when there is severe income inequality since preventable mortality and morbidity are typically more among the poor. Because of this, public health expenditure would counteract rising income inequality.

CO₂ emission does not demonstrate robust relationship with infant mortality since their association varies from country to country. The results in table 3 show that in high income groups, IMR increases by 0.094 per cent when CO₂ emission increases by 1 per cent. However, in low-income group, IMR reduced by 0.027 per cent when CO₂ emission increases by 1 per cent. Further, CO₂ emission is not a significant predictor of IMR in lower middle income and upper middle-income groups. The reason is that infant mortality is mainly dependent on post-natal care, hygiene and sanitation.

We also find that urbanisation is a significant predictor of IMR in overall nations and in all income groups. The findings reveal that urbanisation improves health outcomes. The reason is that urbanisation facilitates access to health services and information, quality education, safe drinking water, and better incomes which ultimately result in better health outcomes. The findings of McDade & Adair; Chinn & Fairlie; and Kohler [52, 53, 54] are consistent with our findings.

Additionally, sanitation is found to be associated with better health outcomes since there is a significant negative relationship between sanitation and IMR for three income groups except the upper middle-income group. The highest effect of sanitation on IMR is observed for the low-income group, while the smallest effect is observed for the lower middle-income group. Sanitation is crucial in health facilities as part of quality-of-care and infection prevention and control strategies, particularly to protect pregnant women and newborns from infections that could result in adverse pregnancy outcomes, sepsis, and mortality [55, 56]. Our findings are consistent with findings of Vărzaru and Rahman et al. [26, 2].

At the same time, the study also includes the regional effect on IMR for all income groups. Considering Africa as a reference geographic region, the effect of Asia, America, and Europe have been examined. The results of table 3 show a significant reduction in IMR in all the regions. Additionally, Europe has a greater potential in reducing IMR than Asia and America, particularly in the case of upper middle-income group. This is true because Europe has a policy that allows nurses or other medical staff to visit parents and infants at home. These visits combine well-baby checkups with support and caregiver advice. The findings of the results are consistent with the literature [57].

Table 4 reveals that health expenditure is positive and statistically significant for the overall countries as well as for different income groups. The result suggests that raising total health expenditure by 1 per cent will improve LEB in high income, upper middle income, lower middle income, and low-income groups by 0.016, 0.007, 0.004, and 0.009 per cent, respectively. The highest effect of total health expenditure on LEB is obtained for the high-income group, while the smallest effect is obtained for the lower middle-income group, contradicting the findings of [58].

TABLE 4. LEB AND ITS DETERMINANTS

LEB	ALL	HIG	UMI	LMI	LIG
	0.006***	0.016***	0.007***	0.004***	0.009**
Inhe	(-0.001)	(-0.002)	(-0.002)	(0.001)	(-0.003)
	0.026***	0.043***	0.034***	0.041***	0.0352***
Ingdppc	(-0.001)	(-0.002)	(-0.002)	(-0.003)	(-0.008)
	-0.003**	-0.021***	-0.006***	0.003*	0.005*
Inco2	(-0.001)	(-0.00)	(-0.002)	(-0.001)	(-0.002)
	0.190***	0.020*	0.080***	0.182***	0.117***
Inurb	(-0.006)	(-0.008)	(-0.007)	(-0.010)	(-0.016)
	0.001*	0.011***	-0.001	0.015***	0.089***
Insan	(0.000)	(-0.000)	(-0.000)	(-0.01)	(-0.009)
	0.072***	0.001	0.197***	0.106***	0.044**
Asia	(-0.006)	(-0.027)	(-0.016)	(-0.008)	(-0.015)
	0.050***	0.008	0.191***	0.055***	
America	(-0.007)	(-0.027)	(-0.016)	(-0.008)	-
	0.058***	-0.017	0.211***	-0.021	
Europe	(-0.008)	(-0.027)	(-0.016)	(-0.036)	-
	3.205***	3.811***	3.447***	3.108***	3.149***
Cons	(-0.019)	(-0.042)	(-0.030)	(-0.032)	(-0.063)
Obs(Country)	2860 (143)	900 (45)	740 (37)	840 (42)	380 (19)

Note: "Author's estimation. ***, **, and * indicate significance level at 1%, 5%, and 10% respectively. Standard errors are in parentheses."

Per capita income is also positive and statistically significant for the overall countries and for all income groups indicating that higher per capita income leads to higher LEB. The people with higher level of income always have tendency towards avoiding unhealthy behaviours and incurring more health expenditure. Moreover, higher income per capita ensures people to live in less polluted areas and improved houses. This is consistent with previous studies [59].

Further, urbanisation and sanitation significantly improve LEB in the overall nations as well as in all income groups. Large cities of these regions could have better access to health care, quality education, safe drinking water, and better incomes, which result in better health outcomes [52, 53, 54]. Finally, CO₂ emission has significantly reduced LEB in high-income, upper-middle-income, and overall nations. However, it has marginally improved LEB in lower-middle-income and low-income groups.

Considering Africa as a reference geographic region, the present study investigates the impact of the geographic region on LEB. The results of Table 4 show a significant improvement in LEB in all the regions. In the upper-middle-income group, all regions have significantly increased LEB, with highest improvement of LEB in Europe i.e., 0.211 in addition to Africa. In lower-middle-income group, Asia and America have increased LEB respectively by 0.106 and 0.055 from Africa. In high-income group, no region has significant impact on LEB. The changes in LEB are disproportionately determined by high per capita GDP rather than regional factors such as urbanisation, sanitation, and CO₂ emissions.

CONCLUSION AND POLICY SUGGESTIONS

This paper has examined the impact of health determinants on two health outcomes such as infant mortality rate and life expectancy at birth for groups of countries defined on the basis of the income level and geographic location. The objectives of this paper were: (1) to investigate the relationship between different health determinants and health outcomes in groups of countries with different income level and geographic regions, (2) to compare the effects of health determinants on health outcomes between income groups and geographic regions. After employing FGLS model, total health expenditure improves health outcomes by reducing infant mortality and increasing life expectancy in different income groups and geographic regions. The present research confirms the findings of previous research on the relationship between health expenditure and health outcomes [1, 2, 60]. Further, the study finds that other factors significantly contribute to the improvement of health outcomes. For instance, higher per capita income is associated with lower infant mortality and higher life expectancy at birth. Per capita income elasticities are higher than that of total health expenditure, suggesting that the impact of income level on health status is greater. In addition, urbanisation and sanitation also contribute to the reduction of infant mortality and in the increase of life expectancy at birth. However, CO₂ emission does not show consistent relationship with two health outcomes.

The present study makes the following policy recommendations in light of the aforementioned research findings. Firstly, health expenditure must rise across all countries, especially in lower and lower-middle income categories to enhance the health status of the people in these areas. Secondly, efforts should be made and the right policies must be approved to raise the per capita income and per capita health expenditure. Further, in high income and upper middle-income countries, carbon emission is relatively more due to rapid industrialisation and usage of heavy vehicles. Therefore, green technology and proper environmental policies should be executed by these countries in order to improve the health status of these countries. Next, the countries must adopt policies for the improvement of urbanisation and sanitation for the betterment of health status of the people.

The present study faced some limitations. Some important variables such as diet, lifestyle, education level, corruption and environment have not been incorporated as explanatory variables in the models. These variables might have a significant impact on the health status of the population. Future research may address these limitations.

DECLARATION OF COMPETING INTEREST:

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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ASSESSMENT OF THE PHYSICAL AND FUNCTIONAL ASPECTS OF PRIMARY HEALTH CARE CENTERS

Nazar P. Shabila

College of Health Sciences, Catholic University in Erbil, Erbil, Iraq

Correspondence: nazarshabila@gmail.com

ABSTRACT

BACKGROUND:

Adequate information and data are required for assessing the primary health care system's performance. This study aimed to assess the physical and functional aspects of a sample of primary health care centers in Erbil, Iraqi Kurdistan Region.

METHODS:

This quantitative cross-sectional study was conducted on eight randomly selected primary health care centers in Erbil, Iraqi Kurdistan Region. An assessment tool was designed to evaluate the selected centers' physical and functional performance, including physical infrastructure, workforce, preventive care, curative care, and support. We adopted a scoring system to measure performance based on several criteria for every aspect.

RESULTS:

The overall quality of physical and functional aspects of the primary health care centers was low. Two primary health care centers were judged to perform well, and both were in Erbil city. The centers located in Erbil city performed best in most aspects, followed by the centers in areas around Erbil city. The primary concerns causing the poor performance of various aspects were poor building status and unsuitable waiting areas for the physical structure component, unavailability of diagnostic facilities for curative care, and shortage of family planning services and lack of female doctors for preventive care. Other major concerns were the low health staff ratio compared to administrative staff and the unavailability of training and continuing professional development opportunities.

CONCLUSIONS:

The primary health care centers performed poorly in most physical and functional aspects. This poor performance was particularly evident in the centers located outside Erbil city. The main components and issues affecting the performance were recognized and described.

KEYWORDS

Primary health care, physical assessment, poor performance, Erbil

INTRODUCTION

Primary care is a core component of a health care system as it provides an essential front-line resource for curative and preventive health care services, especially for those without other access to health care and in low-income countries [1,2]. A strong primary care system is central to improving the health of the country and, in particular, removing inequalities in health. Research evidence is available about the specific contribution primary care can make to improved health outcomes [3,4].

Primary care refers to providing comprehensive, integrated, accessible, and continuing health care services to individuals and families during the first presentation to the formal health system. It can be defined as an approach to health care involving a wide range of services aimed at keeping people well [5]. Primary care services include curative, promotion, preventative, rehabilitation, and supportive services. Such services vary from health promotion and disease screening to assessment, diagnosis, treatment, rehabilitation, and personal social services. These services are usually provided at primary level facilities, including clinics, health posts, outpatient departments in district hospitals, community health centers, and outreach services like home visits and mobile services [6]. Thus, primary care services provide a fully accessible first-level contact by self-referral. These services strongly emphasize working with individuals and communities to improve their health and social well-being [7].

Primary health care services should be provided equitably, effectively, and efficiently. Availability, accessibility, and quality of care are the main dimensions of an effective primary health care system [3]. To ensure the availability and accessibility of a particular service, the primary health care facility should have the required resources such as infrastructure, workforce, supplies, and equipment. Only with these resources can we ensure the provision of effective and quality care at these facilities that can reasonably meet standards of care [8].

Research evaluating primary health care services focuses on organizational evaluations, care performance assessments, and critical assessment of the institutional mechanisms for monitoring and assessing the services [9,10]. There are several validated tools used to assess primary health care, including the WHO Primary Care Assessment Tool (PCET) [11], the General Practice Assessment Questionnaire (GPAQ), the ADHD Questionnaire for Primary Care Providers (AQ-PCP), and the Primary Care Assessment Tool (PCAT) [9,12]. The main dimensions of evaluation in the above tools include stewardship, resource generation, finance, and delivery of care. The delivery of care dimensions, which is the main interest of the current study, is based on a number of functions, including access to services, continuity, coordination, and comprehensiveness [11]. It has been emphasized that there is a need for country specific research tools to assess primary health care, which can assist in providing new directions to improve primary health care and family healthcare in that country [13].

Primary health care services in Iraq are provided by a network of public primary health care centers. Over the last few decades, devastating internal conflicts, wars, international sanctions, and political and security instability significantly affected the health care system in Iraq [14,15]. Iraq witnessed a substantial drop in major health indices resulting in having a damaged health system struggling to address the population's needs. The Iraqi primary health care system was significantly affected by these devastating effects. The primary health care system continues to face the problems common throughout the Iraqi health care system [15-17].

It is generally agreed that the primary health care system in Iraq and the Kurdistan region is poorly functioning. There is an essential and urgent need to reorganize and restructure primary health care services [15,18]. To do this effectively, there is a need for a comprehensive assessment of the primary care system as there is limited empirical and documented knowledge available on the challenges facing the primary health care system in Iraq, especially in the Kurdistan region [19]. Also, adequate information and baseline data are needed to evaluate the performance of the primary health system [20]. The availability of such knowledge can provide the health policy and decision-makers with knowledge about

the quality of primary care services, help determine the potential for development, and direct action to improve the primary care system. Therefore, this study aimed to evaluate the physical and functional components of a sample of primary health care centers in Erbil governorate, Iraqi Kurdistan Region.

METHODS

DESIGN AND SETTING

This cross-sectional study was carried out in Erbil governorate, Iraqi Kurdistan Region. This study involved quantitative evaluation of the physical and functional aspects of a sample of primary health care centers using a set of criteria and a scoring system.

SAMPLING

Eight primary health care centers were selected through a stratified random sampling method. A sample frame of all main primary health care centers within Erbil governorate stratified by their geographical locations was obtained. The sample included three primary health care centers from Erbil city center stratum, three primary health care centers from areas around Erbil city stratum, and two primary health care centers from remote areas to Erbil city stratum.

DATA COLLECTION TOOL

Structural quality was evaluated in reference to the expected standards. An initial list of structural criteria based on national and international standards was developed. This list used the existing supervision checklists in Iraq and some tools from other countries [11,13,19]. The list was reviewed and finalized in consultation with several public health academics, professionals, and health managers within Erbil governorate. This step helped in ensuring the local relevance of the assessment tool.

The selected criteria reflected realistic expectations of the primary health care center structure and services needed to provide quality care. For each criterion, good, average, poor performance, and unavailability were defined in statements of expected availability/practice. The criteria assessed the condition of physical infrastructure, curative care (case management facilities, drugs, equipment, care providers), preventive care (preventive structural facilities, care providers, supplies), workforce (number of care providers and type of professions) and the support received (supervision, training, ambulance).

We developed a scoring system to evaluate performance based on 18 to 42 criteria for each component. For each criterion, unavailability scored '0' point, poor performance scored '1' point, average performance scored '2' points, and good performance scored '3' points. The total score for each center was calculated as a percentage of the maximum total and represented the overall performance. A standard of 60% was decided to differentiate between good and poor-quality health facilities regarding physical and functional performance.

The criteria were also grouped under various subclasses to allow a more detailed evaluation of various components of each aspect. For each subclass, the total scores were calculated as the percent of the maximum total to allow comparison across health facilities. Exploratory data analysis was conducted, allowing the full exploration of the available data.

ETHICAL ASPECTS

The anonymity of the primary health care centers included in the study was ensured. Coding of the primary health care centers was used to report the results. As one person undertook all observations, an assessment of inter-observer variation was not necessary. The Research Ethics Committee of the author's institution provided ethical approval (IRB reference number 4/16 dated 20.05.2020).

STATISTICAL ANALYSIS

The statistical package for the social sciences (IBM SPSS Statistics version 22) was used for data analysis. Data analysis included calculating overall and category-specific total and mean scores and descriptive statistics presented in tables.

RESULTS

OVERALL PERFORMANCE

The physical and functional quality was generally low. Two out of eight primary health care centers were considered to perform well based on the 60% standard. Both primary health care centers were located in Erbil city, one in high and one in middle socioeconomic sectors. Primary health care centers located in Erbil city performed better in all components, followed by the primary health care centers located around Erbil city and the primary health care centers located in remote areas. The primary health care centers performed best in the physical structure component. This was followed by curative care and workforce components. Table 1 shows the details of the overall physical and functional performance of the primary health care centers.

TABLE 1: THE OVERALL PHYSICAL AND FUNCTIONAL PERFORMANCE OF THE PRIMARY HEALTH CARE CENTERS

Component	Erbil city			Around Erbil city			Remote of Erbil city	
	Center 1	Center 2	Center 3	Center 4	Center 5	Center 6	Center 7	Center 8
Physical structure	66.7	54.5	51.4	44.5	50.2	39.3	48.3	36.0
Workforce	57.6	69.7	60.8	46.5	39.2	49.9	19.7	28.8
Preventive care	59.3	70.6	39.0	23.9	28.3	29.6	33.9	20.7
Curative care	66.6	72.5	58.1	43.2	45.5	52.2	32.9	32.3
Support	41.2	58.3	62.0	46.8	25.7	44.9	15.3	27.8
Overall	61.4	65.8	54.3	41.2	40.3	44.1	33.2	31.5

PHYSICAL STRUCTURE PERFORMANCE

The unavailability of guiding labels, poor building status, poor healthy buildings, lack of gardens, and unsuitable waiting areas primarily undermined the physical structure of primary health care centers. Only one primary health care center was considered to perform at good levels based on the 60% standard for the physical structure component. This primary health care center was located in the high socioeconomic status of Erbil city. The primary health care centers in Erbil city performed better, followed by the primary health care centers around Erbil city, and the primary health care centers in remote areas. Table 2 shows the details of the physical structure performance of the primary health care centers.

TABLE 2: THE PHYSICAL STRUCTURE PERFORMANCE OF PRIMARY HEALTH CARE CENTERS

Component	Erbil city			Around Erbil city			Remote areas	
	Center 1	Center 2	Center 3	Center 4	Center 5	Center 6	Center 7	Center 8
Landmark sign	66.7	66.7	66.7	66.7	66.7	33.3	66.7	33.3
Guiding label	33.3	66.7	0.0	0.0	0.0	0.0	0.0	0.0
General view	66.7	33.3	33.3	66.7	66.7	33.3	66.7	33.3
Healthy building	66.7	33.3	33.3	33.3	66.7	33.3	33.3	33.3
Hygiene	100.0	33.3	66.7	66.7	66.7	33.3	66.7	66.7
Building status	66.7	33.3	33.3	33.3	66.7	33.3	66.7	33.3
Garden	100.0	66.7	66.7	0.0	0.0	66.7	33.3	33.3
Air-conditioning	66.7	33.3	66.7	33.3	33.3	66.7	66.7	33.3

AC Generator	66.7	66.7	100.0	66.7	66.7	66.7	66.7	66.7
Waiting area	66.7	46.7	53.3	40.0	53.3	33.3	43.3	36.7
Toilets	66.7	50.0	33.3	50.0	50.0	50.0	66.7	33.3
Distance from main referral centers	55.6	77.8	55.6	55.6	55.6	33.3	33.3	33.3
Overall	66.7	54.5	51.4	44.5	50.2	39.3	48.3	36.0

CURATIVE CARE PERFORMANCE

Two primary health care centers, one from the high and one from the middle socioeconomic sectors of Erbil city, were considered to perform at good levels based on the 60% standard. This component of the primary health care centers was primarily affected by a lack of labor services, investigation facilities like ultrasound, x-ray, and laboratory facilities, the number of doctors in the primary health care centers, and the proportion of doctors per inhabitants. There was a wide variation between the primary health care centers of Erbil city and those outside Erbil city. Details of the curative care performance of primary health care centers are shown in Table 3.

TABLE 3: THE CURATIVE CARE PERFORMANCE OF PRIMARY HEALTH CARE CENTERS

Component	Erbil city			Around Erbil city			Remote areas	
	Center 1	Center 2	Center 3	Center 4	Center 5	Center 6	Center 7	Center 8
Case management facilities	94.4	66.7	88.9	66.7	52.8	47.2	55.6	55.6
Doctors	77.8	100.0	55.6	55.6	11.1	22.2	0.0	11.1
Health workers	100.0	100.0	100.0	66.7	66.7	100.0	33.3	16.7
Consultation, inhabitants per doctor	66.7	66.7	16.7	50.0	33.3	41.7	16.7	66.7
Pharmacy	57.1	50.0	71.4	57.1	53.6	50.0	50.0	35.7
Drug store	80	70	70	70	60	50	70	0
Dental services	66.7	74.1	70.4	0.0	55.6	59.3	55.6	50.0
Laboratory	73.3	53.3	66.7	46.7	46.7	46.7	46.7	0.0
Labor room	0.0	78.9	0.0	0.0	0.0	0.0	0.0	0.0
X-ray	66.7	80.0	40.0	0.0	40.0	80.0	0.0	0.0
Ultrasound	75.0	83.3	50.0	0.0	0.0	16.7	0.0	0.0
ECG	66.7	83.3	66.7	83.3	83.3	83.3	0.0	83.3
Drugs	58.3	58.3	50.0	58.3	66.7	66.7	66.7	66.7
Supply	50.0	50.0	66.7	50.0	66.7	66.7	66.7	66.7
Overall	66.6	72.5	58.1	43.2	45.5	52.2	32.9	32.3

PREVENTIVE CARE PERFORMANCE

One primary health care center was considered to perform well in the preventive care component. The primary health care centers located around and remote from Erbil city performed exceptionally low. The main concerns in this component were related to a lack of family planning services, female doctors and pediatricians, and ultrasound for antenatal care services. Table 4 shows the details of the preventive care performance of primary health care centers.

TABLE 4: THE PREVENTIVE CARE PERFORMANCE OF PRIMARY HEALTH CARE CENTERS

Component	Erbil city			Around Erbil city			Remote areas	
	Center 1	Center 2	Center 3	Center 4	Center 5	Center 6	Center 7	Center 8
Health education posters	100.0	33.3	66.7	33.3	33.3	33.3	66.7	33.3
Vaccination	78.9	73.7	68.4	63.2	55.3	52.6	63.2	52.6
Antenatal care	78.9	68.4	68.4	0.0	55.3	52.6	57.9	0.0
Female doctors	33.3	100.0	0.0	0.0	0.0	0.0	0.0	0.0
Ultrasound	70.0	80.0	40.0	0.0	0.0	20.0	0.0	0.0
Pediatricians	0	100	0	0	0	0	0	0
Growth monitoring	63.2	78.9	52.6	68.4	60.5	57.9	63.2	50.0
Oral rehydration	59.1	59.1	54.5	50.0	50.0	50.0	54.5	50.0
Family planning	50.0	42.1	0.0	0.0	0.0	0.0	0.0	0.0
Overall	59.3	70.6	39.0	23.9	28.3	29.6	33.9	20.7

WORKFORCE PERFORMANCE

Two primary health care centers located in Erbil city were considered to perform well in the workforce component. The primary health care centers in remote areas performed exceptionally poorly. The primary problems of this component were related to the shortage of health staff compared to administrative and support staff, the lack of female doctors and pharmacists, and a large number of consultations. Again, the primary health care centers in remote areas performed exceptionally poorly on this component. Table 5 shows the details of the workforce performance of primary health care centers.

TABLE 5: THE WORKFORCE PERFORMANCE OF PRIMARY HEALTH CARE CENTERS

Component	Erbil city			Around Erbil city			Remote areas	
	Center 1	Center 2	Center 3	Center 4	Center 5	Center 6	Center 7	Center 8
Consultation/doctor	66.7	33.3	33.3	33.3	33.3	16.7	50.0	66.7
Inhabitant/doctor	66.7	100.0	83.3	66.7	33.3	66.7	33.3	66.7
Doctors	100.0	100.0	100.0	66.7	33.3	33.3	0.0	33.3
Female doctors	66.7	100.0	33.3	33.3	0.0	0.0	0.0	0.0
Inhabitants/dentist	33.3	66.7	66.7	0.0	66.7	100.0	100.0	100.0
Dentists	66.7	100.0	66.7	0.0	33.3	33.3	0.0	33.3
Inhabitants/pharmacist	33.3	66.7	66.7	100.0	100.0	100.0	0.0	0.0
Pharmacists	0.0	0.0	33.3	33.3	33.3	33.3	0.0	0.0
Health/Admin-Support ratio	0.0	0.0	18.8	44.4	31.7	31.7	0.0	0.0
Health workers	100.0	100.0	100.0	66.7	66.7	100.0	33.3	16.7
Specialist doctors	100.0	100.0	66.7	66.7	0.0	33.3	0.0	0.0
Overall	57.6	69.7	60.8	46.5	39.2	49.9	19.7	28.8

SUPPORT PERFORMANCE

One primary health care center from Erbil city is considered to perform well on the support component. The primary problems in the support component were the lack of training and professional development opportunities and the

unavailability of ambulances/vehicles. Table 6 shows the details of the support performance of primary health care centers.

TABLE 6: THE SUPPORT PERFORMANCE OF PRIMARY HEALTH CARE CENTERS

Component	Erbil city			Around Erbil city			Remote areas	
	Center 1	Center 2	Center 3	Center 4	Center 5	Center 6	Center 7	Center 8
Administrative facilities	75.0	91.7	91.7	66.7	54.2	66.7	58.3	41.7
Computers	55.6	66.7	55.6	22.2	33.3	77.8	0.0	0.0
Ambulance and vehicles	0.0	75.0	41.7	25.0	0.0	25.0	0.0	25.0
Training	33.3	33.3	33.3	33.3	0.0	33.3	0.0	0.0
Supervision	50.0	50.0	50.0	33.3	33.3	33.3	0.0	0.0
Director at work	33.3	33.3	100.0	100.0	33.3	33.3	33.3	100.0
Overall	41.2	58.3	62.0	46.8	25.7	44.9	15.3	27.8

DISCUSSION

This study evaluated the physical and functional performance of the primary health care system in the Iraqi context. Primary health care centers in Erbil city performed much better in most aspects than those outside the city. Such a problem is common in most countries since most efforts and resources go to the health facilities in the main urban areas [21]. The best performance of the primary health care centers was in the physical structure and health workforce components. The worst performance was in the support and preventive components. These findings agree with another study that assessed the primary health care system in Iraq [19] and corresponds to a study from a similar context [22].

Several problems of the poor physical structure reported in this study, such as poor healthy buildings, poor building statuses, lack of guiding labels, and unsuitable waiting areas, were similarly reported by another study from Iraq [19]. Infrastructure decay of primary health care facilities is a commonly found problem in most developing counties [23,24]. While Iraqi Kurdistan region has witnessed some expansion of primary health care facilities, much should still be done to reach the required standards. On the other hand, there has been a slow pace of improvement in the rest of Iraq, primarily related to the unstable security situation [17].

Several other studies from Iraq have similarly reported poorly performed curative services in primary health care centers. These studies have also primarily reported on the lack and irrational use of medications, poor patient-provider interaction, and shortage of investigation facilities [18, 25, 26]. Other studies from Iraq have also identified several other problems related to poor curative services in primary health care centers, such as short consultation time, overly and unnecessary prescription of drugs, and overuse of medicine by patients [16, 26, 27].

Regarding preventive services, another study from Iraq also identified antenatal care and immunization as the best functioning services in primary health care centers and recognized health education as the worst functioning service [18]. Preventive services, especially immunization, have good logistical, financial, and training support from international organizations like WHO and UNICEF as part of worldwide programs [28]. As a result, the staff members involved in these programs are better trained and are better established in their positions. Another reason for properly functioning immunization services could be related to having the service provided only by the public sector, thus avoiding the negative effects of public/private conflicts of interest. All these factors, in addition to having these services provided free of charge, make them better utilized and eventually more positively perceived.

The primary problems of the workforce were a lack of health professional staff compared to administrative and support staff, a lack of female doctors, and a large number of consultations. Several other studies from Iraq also reported these concerns. One study identified a poor workforce skill mix, particularly for nurses, and uneven distribution of doctors [19]. A study from Erbil governorate that evaluated the medical professionals' viewpoints of the health system showed good satisfaction toward the availability of adequate nurses and other health care workers in health facilities [29]. Uneven distribution of the doctor workforce and an imbalance in numerical, geographical, specialty, institutional, and gender terms were reported by another study from Erbil [30].

The primary concern in the support component was the need for more training and continuing professional development programs. Other studies from the Iraqi context also reported the lack of training and educational opportunities for the primary health care workforce [16,25,31]. The unavailability of opportunities for professional development for the primary health care workforce is common in many developing and post-conflict countries [32, 33].

The main limitation of this study is having a small number of primary health care centers and only from Erbil governorates. However, it is still an interesting and important pilot study to assess primary health care facilities in Iraqi context. The study highlighted the primary problems facing the primary health care system.

CONCLUSION

This study provided helpful insight into the different problems facing the primary health care system. The primary health care centers performed poorly in most physical and functional aspects. Such poor performance was evident in the primary health care centers located outside Erbil city. The primary components responsible for such underperformance under each of these components were recognized and described.

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OPTIMIZING OUTPATIENT PHARMACY WAITING TIME DURING PEAK HOURS: A JKN-BASED ANALYSIS OF QUEUE CATEGORIES AND POLYCLINIC BOTTLENECKS

Ulva Rosyana^{*1,2}, Musa Ghufroⁿ¹, Yudied Agung Mirasaⁿ¹, Muhammad Zidan Fikri Akromyⁿ²

1. Muhammadiyah University of Surabaya, Indonesia

2. Department of Pharmacy, Rumah Sakit Umum Daerah Mohammad Noer Provinsi Jawa Timur, 69323

Correspondence: ulva.rosyana-2024@fk.um-surabaya.ac.id

ABSTRACT

BACKGROUND:

Long prescription waiting times in outpatient pharmacies critically reduce patient satisfaction and hospital reputation, especially under Indonesia's National Health Insurance (JKN) dominance.

OBJECTIVE:

To compare prescription waiting times between morning (07.00-10.00) and afternoon (10.00-13.00) periods by queue category and originating polyclinic.

METHODS:

A cross-sectional observational study analyzed secondary data from 2,005 outpatient prescriptions (April 8-25, 2025) using descriptive statistics; unpaired t-tests compared mean waiting times across queues (ΣA : compounded, ΣB : JKN-chronic, ΣN : non-chronic, ΣF : fast track), and polyclinics. Results: Average waiting time surged from 45.46 minutes (morning) to 84.44 minutes (afternoon) ($p < 0.01$), with the steepest increases in the ΣA queue (110% rise) and Cardiology polyclinic (114% rise). Only 11.29% of compounded (ΣA) met the ≤ 60 -minute standard in the afternoon (vs. 89.09% in the morning, $p < 0.01$), while JKN-Chronic (ΣB) dropped to 2.82% compliance with the ≤ 30 -minute benchmark.

CONCLUSIONS:

Strategic Lean-ToC interventions are empirically recommended to resolve the critical peak-hour prescription bottleneck, strengthening Indonesia's JKN sustainability.

KEYWORDS

waiting time, outpatient pharmacy, peak hours, queue category, JKN (National Health Insurance)

INTRODUCTION

Outpatient pharmaceutical services, as the final hospital contact point [1], face critical waiting time issues impacting patient satisfaction and hospital reputation [1,2]. Long waiting times cause patient discomfort and frustration [3], affect patients' experiences [4], and potentially reduce trust [5], particularly in Indonesian government hospitals on Java, where JKN (National Health Insurance) patient queues are prevalent [6]. These facilities report lower satisfaction levels than private hospitals [7], high visit volumes causing congestion in and complaints [8].

Indonesia's JKN system creates unique challenges for government hospitals. High-volume prescription processing strains pharmacy workflows at Mohammad Noer General Hospital, East Java, Indonesia based on preliminary data in 2025. Preliminary observations indicate variability in outpatient prescription waiting times, particularly during peak hours [5]. One study at a government hospital found that the average waiting time was 80 minutes for compounded medications and 64 minutes for non-compounded medications [5]. This results in 40% longer waits than private hospitals [7]. Another study involving JKN patients revealed that only 18% of compounded and 20% of non-compounded medication met the standard waiting time requirements [9].

Previous studies have generally focused only on waiting times for two types of prescriptions: compounded and non-compounded medications [1,10]. Research analyzing the factors influencing waiting time has also been conducted, including studies that examine the number of drugs prescribed in a single prescription [11]. A recent study explored waiting time for compounded and non-compounded medications based on the time of prescription receipt [5]. Although factors such as prescription type (compounded/non-compounded) have been investigated [1,10], no prior study has concurrently analyzed four queue categories ($\Sigma A/\Sigma B/\Sigma N/\Sigma F$), originating polyclinics, and service time patterns (07.00–10.00 vs. 10.00–13.00) within an integrated framework. Identifying inefficiencies through these critical variables is vital for designing Theory of Constraints-based interventions, particularly under Indonesia's JKN system, which dominates healthcare delivery [12].

This study aims to analyze significant differences in the average waiting time for outpatient prescription services between two service periods (07.00–10.00 and 10.00–13.00), categorized by queue type, as well as variations in waiting time among different polyclinics. It offers new contributions to several aspects that have rarely been explored, namely: waiting time based on prescription service periods, four distinct queue categories, and the originating polyclinic of the prescription. The findings of this study are expected to serve as a basis for strategic recommendations for hospital management in optimizing service flow, resource allocation, and staff scheduling—particularly during peak hours. Furthermore, the results can contribute to the broader field of public health studies by demonstrating how time-related and system-related factors jointly influence the duration of outpatient prescription waiting time in the hospital.

METHODS

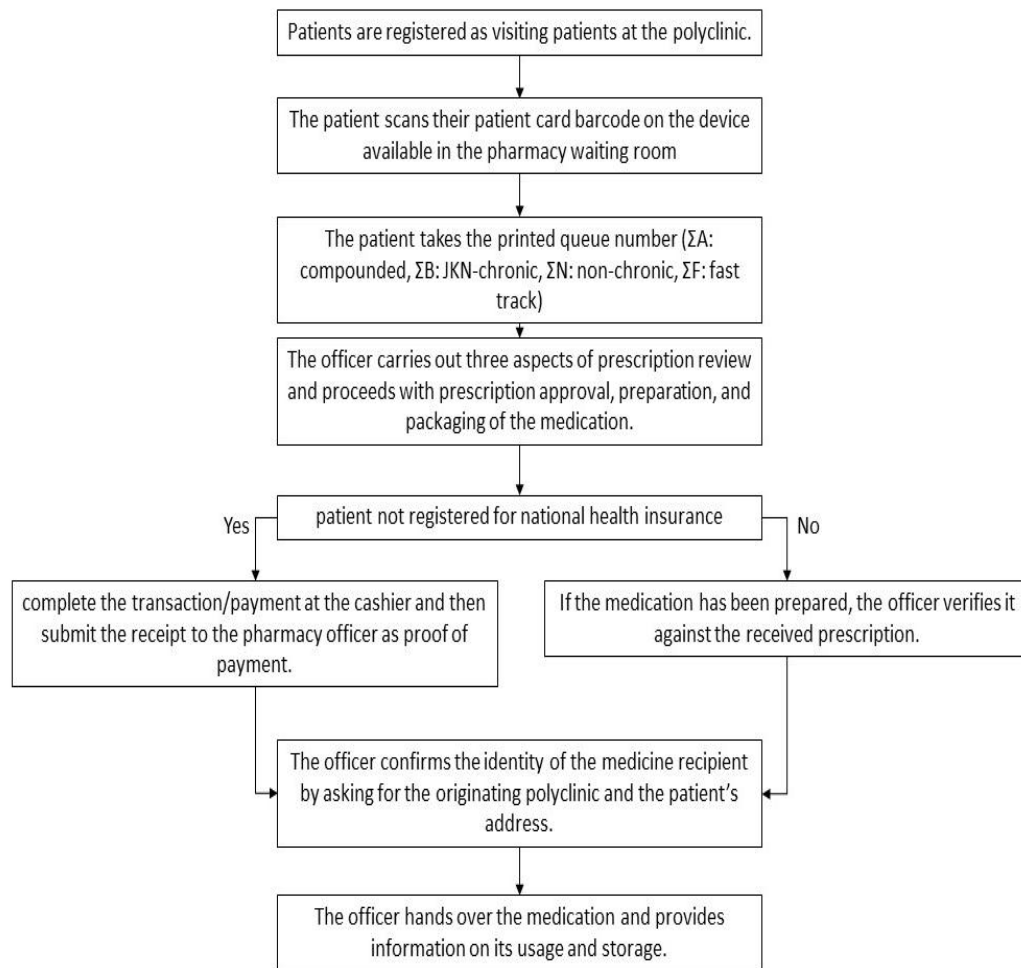
STUDY DESIGN

A comparative observational study with a cross-sectional design was conducted, selected for its efficiency in comparing group differences (morning vs afternoon periods) without intervention [13]. The prescription arrival times were grouped into two time periods: 07.00–10.00 (morning) dan 10.00–13.00 (afternoon). The selection of these time intervals was based on prescription intake patterns, which typically peak in the morning and continue into the afternoon [14].

STUDY SETTING

Secondary data were extracted from the hospital information system of Mohammad Noer General Hospital's outpatient pharmacy (April 8–25, 2025). Waiting time was operationally defined as the duration from patient barcode scanning (queue entry) to medication handover (service exit). The workflow of prescription services in the outpatient pharmacy department is illustrated in Figure 1.

FIGURE 1. THE WORKFLOW OF PRESCRIPTION SERVICES IN THE OUTPATIENT PHARMACY



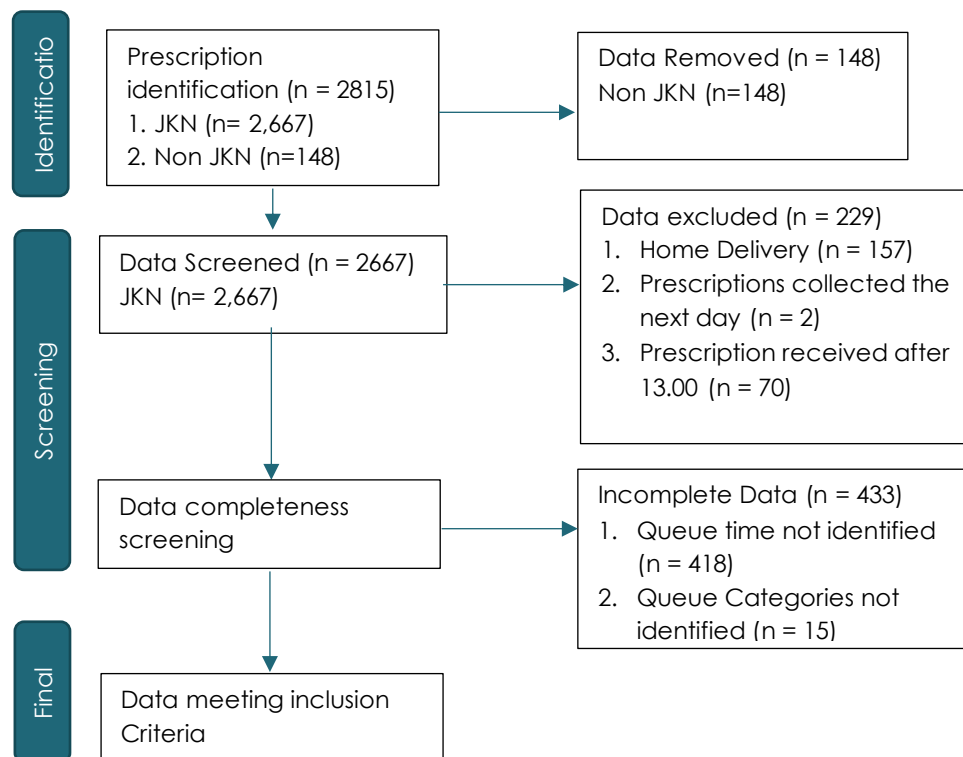
POPULATION AND SAMPLE

The study population consisted of all outpatient prescriptions issued during the study period (N = 2,815). Total sampling was applied, with inclusion criteria covering all JKN outpatient prescriptions. Exclusion criteria were:

1. Home-delivery prescriptions,
2. Prescriptions collected the next day,
3. Prescriptions arriving after 13.00,
4. Incomplete data (e.g., missing timestamps or queue categories).

The specifics for non-JKN prescriptions (n=148) that were excluded was because they followed a different workflow involving the payment process for medication at the cashier. Given that JKN prescriptions constitute 95% of the Indonesian healthcare system [12], optimizing the prescription workflow was the primary focus of this service improvement study. The final sample included 2,005 prescriptions (Figure 2). Incomplete data (n=433) were primarily due to unidentified queue timestamps (n=418) or missing queue categories (n=15). Missingness was random across periods and queues, suggesting no systematic bias. Sensitivity analysis confirmed a negligible impact on overall trends.

FIGURE 2. SAMPLE SELECTION CRITERIA



STATISTICAL ANALYSIS

All statistical analyses were conducted in Microsoft Excel. Quality control procedures included automated timestamp validation via the hospital's barcode system, double-checking data entry, and cross-checking selected results were conducted with two different researchers. For the t-test, assumptions were evaluated before analysis. Homogeneity of variances was tested using the F-test Two-Sample for Variances. The result ($p < 0.05$) indicated significant difference in variances of each of the groups in both of queue categories and polyclinics categories; therefore, an unpaired t-test assuming unequal variances (Welch's t-test) was applied. All tests used a significance level of $\alpha = 0.05$. Descriptive statistics (mean, SD, proportions) summarized waiting times. Unpaired t-tests compared mean waiting times between morning (07.00–10.00) and afternoon (10.00–13.00) periods across queue categories ($\Sigma A/\Sigma B/\Sigma N/\Sigma F$) and polyclinics. Analyses were conducted using Microsoft Office Excel 2019 statistical processing software.

ETHICAL APPROVAL

This study was conducted with the ethical approval and research permit from Mohammad Noer General Hospital, under approval number 000.9/2296/102.16/2025

RESULTS

A total of 2,005 prescriptions were analyzed, with 42.29% ($n=848$) arriving during the morning period (07.00 -10.00) and 57.71% ($n=1,157$) in the afternoon (10.00-13.00). Mean waiting time increased significantly from 45.46 minutes (morning) to 84.44 minutes (afternoon) ($\Delta = +85.7\%$, $p<0.001$), indicating severe workflow inefficiency during peak hours.

VARIATIONS BY QUEUE CATEGORY

There are four queue categories: ΣA (prescription queue for compounded medications or compounded), ΣB (prescription queue for JKN patients receiving non-compounded medications for 30-day or chronic treatment or JKN-chronic), ΣN (prescription queue for non-chronic, non-compounded medications or non-chronic), and ΣF (prescription queue for fast-track category or fast track). Based on queue categories (Figure 2), the highest proportion of prescriptions was in category ΣB (50.57%)

As detailed in Table 1, all queue categories exhibited significant afternoon delays ($p < 0.001$). ΣA most impacted, with a 110.4% increase (45.44 to 95.61 minutes). Only 11.29% met the ≤ 60 -minute standard in the afternoon (vs. 89.09% morning). JKN-Chronic (ΣB): 85.5% longer waiting times (47.73 to 88.57 minutes), with ≤ 30 -minute compliance dropping to 2.82% (vs. 28.26% morning). Fast track (ΣF) & non-chronic (ΣN): Both exceeded 75-minute averages in the afternoon despite being "simpler" queues.

FIGURE 3. NUMBER OF PRESCRIPTIONS BY QUEUE CATEGORIES

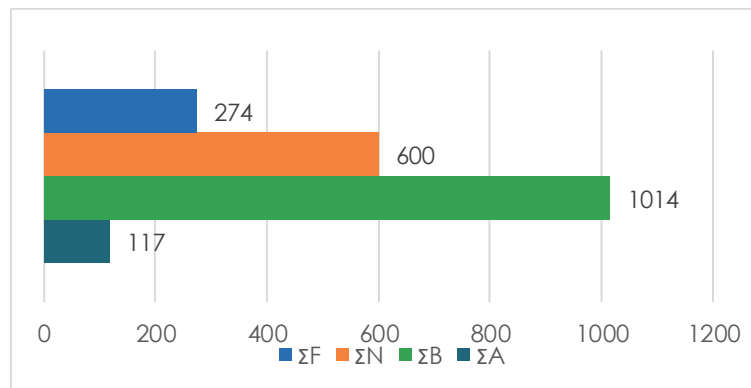


TABLE 1. WAITING TIME ANALYSIS BY QUEUE CATEGORY

Queue Category	Time Period	Number of Prescriptions (n)	Mean/Average Waiting Time (minutes)	Δ (%)	≤ 60 min (%)	≤ 30 min (%)	Sig.
ΣA	07.00-10.00	055	45.44 $\pm$ 14.91		89.09		1.07×10^{-15}
	10.00-13.00	062	95.61 $\pm$ 37.22	+110.4	11.29		
ΣB	07.00-10.00	375	47.73 $\pm$ 27.94			28.26	1.81×10^{-71}
	10.00-13.00	639	88.57 $\pm$ 38.71	+85.5		2.82	
ΣN	07.00-10.00	279	43.33 $\pm$ 35.46			40.14	2.51×10^{-27}
	10.00-13.00	321	76.93 $\pm$ 37.18	+77.5		8.41	
ΣF	07.00-10.00	139	43.58 $\pm$ 26.11			38.85	1.27×10^{-15}
	10.00-13.00	135	77.57 $\pm$ 38.82	+78.0		5.19	
Total	07.00-10.00	848	45.46 $\pm$ 29.78				P < 0.001
	10.00-13.00	1,157	84.44 $\pm$ 38.66	+85.7			

VARIATIONS BY ORIGINATING POLYCLINIC

Similar variations were observed based on the originating polyclinic of the prescription (Table 2). Cardiology ($\Delta=114\%$, $p<0.001$) and Pulmonology ($\Delta=151\%$, $p<0.001$) showed the most severe afternoon delays (Table 3). Internal Medicine consistently had high wait times (>69 minutes), indicating chronic workflow issues. Exceptions: ENT and TB-Dots showed no significant differences ($p>0.01$) due to small sample sizes ($n<15$).

FIGURE 4. NUMBER OF PRESCRIPTIONS BY ORIGINATING POLYCLINIC

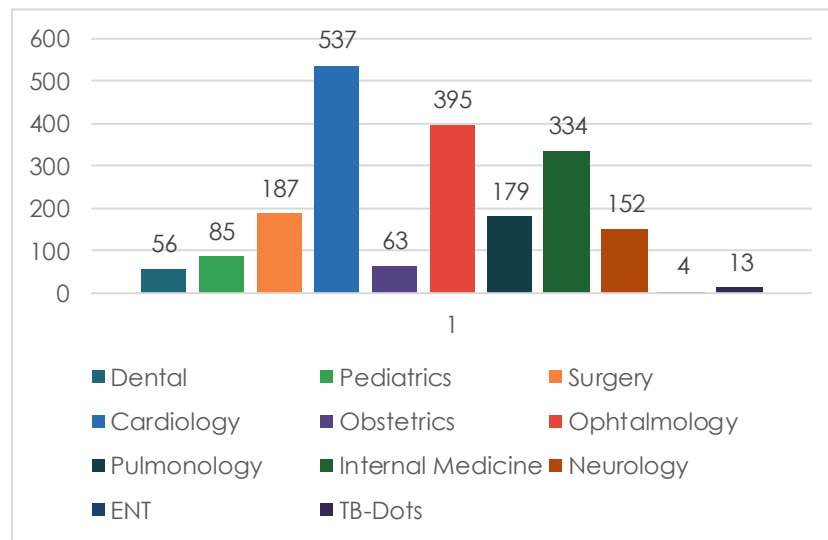


TABLE 2. WAITING TIME ANALYSIS BY ORIGINATING POLYCLINIC

Polyclinic	Time Period	Number of Prescriptions (n)	Average Waiting Time (minutes)	Δ (%)	Sig.
Dental	07.00-10.00	024	37.92 ± 16.18	+120%	2.40 × 10 ⁻⁷
	10.00-13.00	032	83.34 ± 39.38		
Pediatrics	07.00-10.00	050	49.16 ± 18.16	+85%	1.39 × 10 ⁻⁸
	10.00-13.00	035	90.83 ± 33.98		
Surgery	07.00-10.00	095	48.06 ± 44.49	+55%	1.04 × 10 ⁻⁵
	10.00-13.00	092	74.58 ± 38.33		
Cardiology	07.00-10.00	270	44.02 ± 26.00	+114%	3.33 × 10 ⁻⁴⁹
	10.00-13.00	267	94.07 ± 41.63		
Obstetrics	07.00-10.00	024	39.83 ± 22.96	+78%	3.51 × 10 ⁻⁵
	10.00-13.00	039	71.00 ± 34.98		
Ophthalmology	07.00-10.00	223	43.18 ± 30.71	+78%	3.30 × 10 ⁻¹⁹
	10.00-13.00	172	76.78 ± 37.99		
Pulmonology	07.00-10.00	062	36.82 ± 13.96	+151%	6.17 × 10 ⁻³³
	10.00-13.00	177	92.55 ± 35.45		
Internal Medicine	07.00-10.00	054	69.09 ± 36.47	+17%	1.76 × 10 ⁻²
	10.00-13.00	280	80.68 ± 35.71		
Neurology	07.00-10.00	043	46.37 ± 19.51	+88%	3.08 × 10 ⁻¹⁵
	10.00-13.00	109	87.24 ± 37.53		
TB-Dots	07.00-10.00	002	46.00 ± 36.77	+60%	2.31 × 10 ⁻¹
	10.00-13.00	011	73.73 ± 53.99		
ENT	07.00-10.00	001	40.00 ± 00.00	-	-
	10.00-13.00	003	52.33 ± 00.00	-	-

Overall, the greatest inefficiencies occur during the peak hours (10.00 – 13.00), particularly in prescription queues for ΣA and polyclinics with high patient volumes (such as Cardiology and pulmonology). On the other hand, TB-Dots and ENT polyclinic showed statistically insignificant results ($p=0.231$), primarily due to very small sample sizes (TB-Dots: $n=2$ in the morning, $n=11$ in the afternoon; ENT: $n=1$ in the morning, $n=3$ in the afternoon).

An imbalance in resource allocation and accumulation of prescription backlogs during peak hours are key factors that exacerbate waiting times, especially within the context of the JKN system, which dominates healthcare service delivery. These findings are consistent with the research objective, which is to identify critical inefficiency points based on service times and prescription queue categories. The results can serve as an empirical basis for hospital management in formulating strategies for staff allocation, workflow optimization, and priority scheduling during peak hours.

DISCUSSION

KEY BOTTLENECKS BASED ON THEORY OF CONSTRAINTS

This study demonstrates that outpatient prescription waiting times at Mohammad Noer General Hospital increase dramatically during afternoon peak hours (10.00–13.00), with the most severe inefficiencies observed in compounded (ΣA : 110.4% increase) and Cardiology polyclinic services (114% increase). These patterns align with the Theory of Constraints (TOC), revealing two fundamental bottlenecks:

1. **Capacity-Throughput Mismatch:** Fixed pharmacy staffing levels clash with a 36% surge in prescription volume during peak hours (1,157 vs. 848 prescriptions), while ΣA processing requires 2.3× longer than non-compounded queues [5]
2. **Resource Constraints:** The limited number of compounding stations and mandatory JKN drug substitution protocols, which affect 30% of cardiovascular medications, create cascading delays during verification [15]. The collapse in service standards (only 11.29% of ΣA met ≤ 60 -minute targets) signals systemic failure under JKN-dominated workloads.

According to the Theory of Constraints (TOC), a bottleneck refers to the problem of resource capacity being less than or equal to the demand load [16]. Prolonged waits due to increasing patient volumes, complexity of patient management, and limited healthcare resources [17]. One of the key factors influencing waiting times is material constraints, particularly related to drug availability. If a medication for JKN patients is unavailable, patients must wait until it becomes available or until an alternative medication is approved. However, pharmacists are required to confirm substitutions beforehand, which ultimately extends the overall waiting time [15].

This suggests that the pharmacy service system is not adequately equipped to handle the complexity of prescriptions and the surge in demand during peak hours. During the medication preparation process, pharmacists are required to ensure the accuracy of the medication and dosage, particularly for pediatric patients. Additionally, drug interaction screening, especially for compounded medications, must be conducted as a critical step in evaluating the benefits and safety of treatment for each patient [5].

In addition, the queue for ΣB (JKN-chronic) also experienced a substantial increase of 86%, from 47.74 minutes in the morning to 88.57 minutes in the afternoon. Notably, only 2.82% of JKN-chronic (ΣB) met the ≤ 30 -minute benchmark (vs. 28.26% in morning), falling critically below Indonesia's Ministry of Health service standard [15]. This delay threatens medication adherence in chronic diseases like hypertension [18]. The pharmacy department is responsible for preparing a one-month (30-day) supply of medication for each patient in the ΣB queue. A greater number and variety of medications per prescription often indicate a tendency towards polypharmacy, which contributes to longer service waiting times [5].

High-volume polyclinics (e.g., Cardiology and Pulmonology) exhibited the highest increase in waiting times during the day (94.07 minutes and 92.55 minutes, respectively), indicating that prescription complexity and concentrated patient flow are critical contributing factors. The prolonged waiting time at the Cardiology polyclinic is largely because most medications prescribed to JKN patients are intended for 30-day use. The complexity of Cardiovascular therapy, which is often dominated by polypharmacy prescriptions, also carries a high risk of adverse drug events and therefore requires careful attention [18]. Similarly, long waiting times at the Pulmonology polyclinics may result from the frequent use of

compounded medications, particularly in cases such as stable Chronic Obstructive Pulmonary Disease (COPD), where combination therapy is more effective than monotherapy [19].

STRATEGIC RECOMMENDATIONS FOR LEAN INTERVENTION

The results of this study reveal the dynamics of outpatient prescription service waiting times, which are significantly influenced by prescription service hours. The sharp increase in the average waiting time from 45.46 minutes in the morning to 84.44 minutes in the afternoon reflects the workload accumulation that is not optimally managed. The accumulation is primarily due to multiple polyclinics operating simultaneously, leading to a surge in prescription submissions during peak hours (10.00-13.00) [5].

The practical implications of these findings highlight the necessity of implementing time-based and queue category-based management strategies, including staff allocation optimization by increasing personnel in the non-compounded medication preparation and packaging unit [21]. Furthermore, real-time hospital data integration for prescription prediction. This study also emphasizes the importance of tailored policies for JKN patients, considering their significant contribution to the pharmacy departments' workload. Implementing automated queuing systems, staff expansion for high patient volumes, redesigning the pharmacy layout to reduce congestion, providing a chair in the waiting area for patients, and implementing interdepartmental communication protocols [22].

The identified inefficiencies represent critical muda (waste) in seven lean domains, particularly waiting, overprocessing, and unnecessary motion [23]. Lean Six Sigma may be used to reduce waiting time and increase service capacity without additional resource input [17]. The implementation of Lean Healthcare can also contribute to reducing waiting times or Length of Stay (LOS) in outpatient services by focusing on identifying and eliminating non-value added activities (NVAs) [23]. To eliminate waste and restore service standards, we propose that pre-packaged compounding kits prepared during low-volume periods (07.00–09.00) could reduce preparation time by 40% through standardized formulations for the ΣA Queue [24].

The hospital where this study was conducted has implemented e-prescribing to streamline the prescription transcription process and enhance efficiency [5]. For High-Volume Polyclinics, Heijunka (load leveling) via staggered e-prescription, e.g., 30% of Cardiology requests pre-10.00 to flatten peak-hour demand. However, challenges such as technical issues highlight the need for improved technological infrastructure, including hardware, software, and network systems [25].

POLICY IMPLICATIONS FOR INDONESIA'S JKN SYSTEM

With JKN covering almost 95% of patients, prolonged waits directly threaten medication adherence for chronic conditions like heart failure and COPD [18,19]. This is important for JKN program from both of hospital and government to implement the policy, according to Decree of the Indonesian Ministry of Health Number HK.01.07/MENKES/1645/2024 concerning the Referral-Return System for Chronic Diseases to Primary Healthcare Facilities, patients with stable clinical conditions should to returning to the Primary Community Health Center, and patient with unstable clinical conditions are being classified to 'iter' prescription, which permits the advance preparation of medications. In line with this policy, hospital management requirements can be optimized to reduce patient volume and shorten waiting times for medication preparation. For certain chronic patients that takes routines medications, JKN reimbursement processing can be performed simultaneously with medication preparation, thereby eliminating the need for additional administrative input in the pharmacy. The integration of technology (Bridging JKN-Hospital Information System), wherein reimbursement checks are conducted simultaneously with medication preparation instead of sequentially, has the potential to reduce administrative delays by approximately 50%. [25].

LIMITATIONS AND RECOMMENDATIONS

This study has several limitations that must be acknowledged. The cross-sectional and retrospective nature of the design limits the capacity to ascertain causal relationships or to account for unmeasured confounding variables, such as variations in staffing levels or modifications in workflow. The short period of data collection timeframe at a single hospital may not adequately represent seasonal or contextual fluctuations, thereby diminishing the generalizability of the findings. However, to increase interpretability and potential validity, the authors used a total population sampling approach with

inclusion and exclusion criteria, where all data points that met eligibility criteria in the target population were included in the analysis. Future research should explore alternative validation methods, such as automated real-time tracking systems or randomized audits using available hardware, to enhance data reliability.

The others, polyclinics type likes TB-Dots and ENT polyclinic, showed statistically insignificant results due to very small sample sizes. The limitation affects the generalizability of the findings, as sample size determination is a critical component in quantitative research design [20]. Therefore, further studies with larger and more representative samples are recommended to better explore the dynamics of prescription waiting times in these polyclinics.

CONCLUSION.

This study confirms that outpatient prescription waiting times at Indonesian government hospitals under the JKN system escalate dramatically during afternoon peak hours (10.00–13.00), with the most severe inefficiencies observed in compounded (ΣA : 110.4% increase) and high-volume polyclinics like Cardiology (114% increase). These delays stem from systemic bottlenecks—identified through the Theory of Constraints—including workload-capacity imbalances and resource limitations, which reduce service standard compliance to critical lows (e.g., only 11.29% of ΣA prescriptions met ≤ 60 -minute targets). To address this, we propose a Lean-ToC hybrid framework integrating peak-hour staffing adjustments, pre-packaged compounding kits, and JKN-specific reforms like parallel e-claim validation. Future research should validate this model in multi-center trials and quantify its impact on medication adherence for chronic diseases. Ultimately, optimizing these bottlenecks is essential not only for patient satisfaction but also for strengthening the sustainability of Indonesia's national health insurance system.

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RELATIONSHIP BETWEEN PROFESSIONAL SELF-CONCEPT WITH INTENTION TO LEAVE, AND PROFESSIONAL QUALITY OF LIFE AMONG PSYCHIATRIC NURSES

Sajjad Javanbakht¹, Mohammad Pourebrahimi², Mohammad Saatchi^{3, 4}, Zahra Tamizi⁵, Reza Ahmadi¹, Jirandeh, Mobina Sanaeipour¹, Mohammadjavad Hosseinabadi-Farahani^{*6, 7}

1. Master student in psychiatric nursing, Department of nursing, University of social welfare and rehabilitation sciences, Tehran, Iran.
2. Nursing Care Research Center, Clinical Sciences Institute, Nursing Faculty, Baqiyatallah University of Medical Sciences, Tehran, Iran.
3. Assistant Professor, Department of Biostatistics and Epidemiology, University of Social Welfare and Rehabilitation Science, Tehran, Iran
4. Assistant Professor, Health in Emergency and Disaster Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.
5. Ph.D. in nursing, Clinical research development center, Razi Psychiatric Hospital, University of social welfare and rehabilitation sciences, Tehran, Iran.
6. Assistant Professor, Department of Nursing, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.
7. Assistant Professor, Clinical Research Development Center, Rofeideh Hospital, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.

Correspondence: J.Hosseinabadi@gmail.com

ABSTRACT

BACKGROUND:

Nurses working in psychiatric wards face unique challenges compared to other departments, such as job dissatisfaction and turnover, which require special attention from management. A positive professional self-concept can play a crucial role in enhancing adaptability in the high-stress nursing environment.

OBJECTIVE:

The research team aimed to investigate the relationship between professional self-concept and the tendency to leave the profession and professional quality of life among psychiatric nurses.

DESIGN:

This was a descriptive-analytical cross-sectional study.

SETTING:

The study was conducted on 219 nurses employed at Razi Educational and Treatment Center in Tehran, Iran in 2023. The sample was selected using a census method.

MAIN OUTCOME MEASURES:

Data collection tools included a demographic information questionnaire, Kevin's Professional Self-Concept Questionnaire, Hinshaw's Turnover Intention Questionnaire, and Stamm's Professional Quality of Life Questionnaire. The results were analyzed using SPSS software version 25.

RESULTS:

The average professional self-concept score of the nurses was 25.37 ± 69.22 . The tendency to leave the job, compassion satisfaction, burnout, and secondary trauma stress were at moderate levels. Professional self-concept and satisfaction with received salary were predictors of the tendency to leave the job. Professional self-concept was the only predictor of compassion satisfaction and secondary trauma stress. Burnout was predicted by both professional self-concept and satisfaction with salary.

CONCLUSIONS:

It is recommended that managers and policymakers develop programs to enhance professional self-concept and increase the salary of nurses working in psychiatric departments to reduce their tendency to leave the profession and improve their professional quality of life.

KEYWORDS

Professional self-concept, Intention to Leave, Quality of professional life, Psychiatric nurse, Psychiatric hospital.

INTRODUCTION

Among various professions, some require higher levels of self-concept, and the nursing profession holds a special position in this regard [1-4]. A positive professional self-concept can play a crucial role in increasing adaptability in the high-stress nursing environment, especially in psychiatric wards, which are highly stressful for nurses due to continuous and exhausting stimulation [5, 6]. Additionally, a positive professional self-conception enhances nurses' empowerment, clinical performance, and problem-solving abilities, consequently improving the quality of care provided. In contrast, nurses with a low professional self-concept have lower clinical competency and job satisfaction and a higher tendency to leave the profession [7-10].

Since professional self-concept is a complex phenomenon, all related variables need to be studied [11, 12]. According to the study by Cowin and colleagues, nurses' professional self-concept has a stronger correlation with their decision to stay in the profession compared to job satisfaction [13]. Results from Owolabi's study indicate that nurses have the highest tendency to leave their positions compared to other healthcare system staff [14]. The shortage of nurses in Iran is highlighted in a statement by the Iranian Ministry of Health, which declared that even if 20,000 new nurses are recruited annually, it will take until 2026 to reach the global standard [15]. Besides the increased burnout rates and the average age of employed nurses, their intention to leave the profession may lead to reduced care quality and even higher patient mortality rates [16]. To assess job turnover intention, various models of the turnover process should be considered, including individuals' perceptions of their current job and organization, with motivations also being evaluated as immediate determining factors [17]. An individual's perception of their current job may reflect their professional self-concept, and given the importance of turnover intention among nurses, examining the relationship between these two variables is highly relevant and is one of the objectives of this study.

Due to the challenging and high-risk working conditions, psychiatric nurses experience more work-related stress compared to nurses in other departments, which can impact their professional quality of life [18]. Studies focusing on the professional quality of life of nurses report high levels of compassion fatigue and burnout among psychiatric nurses [19, 20]. The professional quality of life of healthcare system employees affects patient safety and care quality [21]. Therefore, a decrease in nurses' professional quality of life may reduce patient care quality and safety, highlighting the importance of this concept. Professional quality of life is a multidimensional concept influenced by employees' perceptions of their work and organization [22]. Thus, it can be envisioned that professional self-concept could be one of the factors affecting nurses' professional quality of life.

Nurses' professional self-concept is an evolving process that begins when an individual is accepted as a nursing student at university and continues and develops as they are allowed to work as a graduate nurse in the clinical field [23]. Understanding the impact of various dimensions of professional self-concept on professional quality of life and turnover intention can facilitate the design of relevant interventions and promote longer retention of nurses in healthcare systems. Given that no study has yet investigated the relationship between professional self-concept, professional quality of life, and turnover intention among nurses in Iran, this research appears to be necessary.

METHODS

DESIGN OF THE STUDY

This cross-sectional descriptive study was conducted between February and April 2024. The participants in this study were nurses working at Razi Psychiatric Hospital affiliated to the University of Social Welfare and Rehabilitation Sciences in Tehran City, the capital of Iran. The reason for choosing this hospital was that Razi Psychiatric Hospital is the largest specialized center for providing psychiatric services and care in Iran. This hospital was established in 1918 and is known as one of the oldest hospitals in Iran. All the nurses working in this hospital (except for the nursing manager and supervisor) who have the inclusion criteria for entering the study were investigated by census sampling method. The inclusion criteria were a master's degree in psychiatry nursing or a nursing expert who has completed psychiatry courses and also has a one year experience. Finally, out of a total of 278 nurses, 260 of them met the inclusion criteria and were examined.

DATA COLLECTION

Data was collected using four questionnaires:

- 1) Demographic Information Questionnaire, including 11 questions related to age, gender, marital status, service history, type of employment, education, current position, work history in general and Razi hospital, satisfaction with salary and participation in psychiatric nursing courses.
- 2) Covin's Professional Self-Concept Questionnaire, this questionnaire has 36 items and six dimensions including: General Nursing, Care, Staff Relations, Communication, Knowledge, and Leadership. In total, each person's score ranges from 36 to 288, and the higher the score, the better the person's self-concept [24].
- 3) Hinshaw's Turnover Intention Questionnaire, this questionnaire has 12 items and a Likert scale of 1 to 5 points from "completely disagree" to "completely agree". [25]
- 4) Stamm's Professional Quality of Life Questionnaire. This questionnaire has three subscales of "compassion satisfaction", "job burnout" and "secondary trauma", totaling 25 questions [26, 27].

ETHICAL CONSIDERATIONS:

The study was approved by the Committee of Ethics in Human Research at the University of Social Welfare and Rehabilitation Sciences with code of ethics no: IR.USWR.REC.1402.158. Written informed consents were obtained from the participants.

DATA ANALYSIS

Data analysis was done using SPSS25 software. Normality of data distribution was examined by Kolmogorov-Smirnov (KS) test ($P > 0.05$). Data was analyzed with descriptive statistics including frequency distribution, mean and standard deviation, and inferential statistics including independent t-test, ANOVA, and Pearson correlation coefficient.

RESULTS

Among the 260 questionnaires distributed, 219 were correctly completed by the nurses and then analyzed. The mean and standard deviation of the age and work history of the nurses were 38.87(8.6), 14.01(8.43) respectively. Most of the nurses were female (58.4%), had a bachelor's degree in nursing (90%), were married (80.8%), and had a history of participating in psychiatric nursing courses (91.3%) (Table 1).

TABLE 1: SOCIODEMOGRAPHIC CHARACTERISTICS OF THE PSYCHIATRIC NURSES (N=219)

Variable		M(SD)	n (%)
Age		38.87(8.6)	
Gender	Female		128(58.4)
	Male		91(41.6)
Education	Bachelor's degree		197(90)
	Master's degree		22(10)
Marital status	Single		42(19.2)
	Married		177(80.8)
Type of employment	Formal		131(59.8)
	By contract		79(36.1)
	Compulsory service		9(4.1)
Current position	Nurse		199(90.9)
	Head nurse		20(9.1)
Work history in general	1 to 6 years	14.01 (8.43)	52(24.6)
	7 to 12 years		64(30.3)
	13 to 18 years		30(14.2)
	19 years and more		73(33.3)
Work history in Razi hospital	1 to 6 years		103(47)
	7 to 12 years		38(17.4)
	13 to 18 years		34(15.5)
	19 years and more		44(20.1)
Satisfaction with salary	Low		164(74.9)
	Moderate		55(25.1)
	High		0(0)
Participation in psychiatric nursing courses	Yes		200(91.3)
	No		19(8.7)

The mean and standard deviation of professional self-concept scores of nurses were 225.69 ± 37.2 . Among the dimensions of professional self-concept, the dimension of "care" had the highest score and the dimension of "general nursing self-esteem" had the lowest score. (Table 2). The mean and standard deviation of intention to leave was 2.87 ± 0.62 . Table 3 shows the mean and standard deviation of the professional quality of life scores and its dimensions among psychiatric nurses. According to this, the highest score is in the dimension of "compassion satisfaction".

TABLE 2: MEAN AND SD OF PROFESSIONAL SELF-CONCEPT AND ITS DIMENSIONS AMONG PSYCHIATRIC NURSES (N=219)

Variable	Mean	SD
Professional self-concept	225.69	37.25
General Nursing	35.19	9.24
Care	39.03	6.07
Staff Relations	38.8	6.32
Communication	39.38	5.81

Knowledge	37	6.87
Leadership	36.32	7.44

TABLE 3: MEAN AND STANDARD DEVIATION OF THE DIMENSIONS OF PROFESSIONAL QUALITY OF LIFE AMONG PSYCHIATRIC NURSES (N=219)

Dimension	Mean	SD	Rang
Compassion satisfaction	39.17	6.66	16-50
Job burnout	14.86	4.76	5-25
Secondary trauma	26.07	7.28	11-45

The results of the Pearson correlation coefficient showed that there is an inverse and significant relationship between the intention to leave and professional self-concept and all its dimensions ($r=-0.348$, $p<0.001$), so that with the increase of professional self-concept and its dimensions, the intention to leave the job decreases (Table 4).

TABLE 4) CORRELATION BETWEEN PROFESSIONAL SELF-CONCEPT AND ITS DIMENSIONS WITH THE INTENTION TO LEAVE THE PROFESSION.

Variables	General Nursing	Care	Staff Relations	Communication	Knowledge	Leadership	Professional self-concept
Intention to leave	$r = -0.463$ $p<0.001$	$r = -0.271$ $p<0.001$	$r = -0.290$ $p<0.001$	$r = -0.247$ $p<0.001$	$r = -0.242$ $p<0.001$	$r = -0.281$ $p<0.001$	$r = -0.348$ $p<0.001$

The results of Pearson's correlation coefficient showed that there is a direct and significant relationship between satisfaction with compassion and professional self-concept and all its dimensions ($r=0.800$, $p<0.001$) in such a way that with the increase of professional self-concept and its dimensions are increased by the satisfaction of compassion. Also, there is an inverse and significant relationship between burnout and secondary trauma stress dimensions with professional self-concept and its dimensions (respectively $r=-0.411$, $p<0.001$ and $r=-0.331$, $p<0.001$). Therefore, with the increase of professional self-concept and its dimensions, burnout and secondary trauma stress are reduced (Table 5).

TABLE5) CORRELATION BETWEEN PROFESSIONAL SELF-CONCEPT AND ITS DIMENSIONS AND DIMENSIONS OF PROFESSIONAL QUALITY OF LIFE.

Variables	General Nursing	Care	Staff Relations	Communication	Knowledge	Leadership	Professional self-concept
Compassion satisfaction	$r = 0.732$ $p<0.001$	$r = 0.725$ $p<0.001$	$r = 0.683$ $p<0.001$	$r = 0.736$ $p<0.001$	$r = 0.737$ $p<0.001$	$r = 0.676$ $p<0.001$	$r = 0.8$ $p<0.001$
Job burnout	$r = -0.438$ $p<0.001$	$r = -0.334$ $p<0.001$	$r = -0.314$ $p<0.001$	$r = -0.294$ $p<0.001$	$r = -0.411$ $p<0.001$	$r = -0.335$ $p<0.001$	$r = -0.411$ $p<0.001$
Secondary trauma	$r = -0.306$ $p<0.001$	$r = -0.287$ $p<0.001$	$r = -0.266$ $p<0.001$	$r = -0.236$ $p<0.001$	$r = -0.303$ $p<0.001$	$r = -0.263$ $p<0.001$	$r = -0.331$ $p<0.001$

Among the demographic variables, satisfaction with the salary received had a significant relationship with the intention to leave ($p=0.006$, $t=2.8$). Also, satisfaction with the salary received had a significant relationship with the burnout dimension of the quality of professional life, so that people with a low level of satisfaction with the received salary had more scores in the burnout dimension ($p=0.025$, $t=2.262$).

Among other demographic variables, the experience of participating in psychiatric nursing courses had a significant relationship with the "care" ($p=0.03$, $t=-2.09$), and "communication" ($p=0.05$, $t=-1.96$) dimensions of professional self-concept, so that nurses who participated in psychiatric nursing courses obtained higher scores in these dimensions.

The gender variable only had a significant relationship with the "compassion satisfaction" dimension of nurses' professional life quality, so that women had obtained higher scores in this dimension ($p=0.03$, $t=2.182$). Also, the results of Pearson's correlation coefficient showed that there is a positive and significant relationship between age and the dimension of "Compassion satisfaction" of nurses' professional life quality ($r=0.171$, $p=0.011$). In addition, the age variable with the dimension "Staff Relations" had a positive and significant relationship. ($r=0.136$, $p=0.044$).

Based on the results from Table 6, multiple linear regression analysis showed that the intention to leave is significantly explained by the model ($p<0.001$). This model predicts about 14% of the variance in the intention to leave the job. Among the variables in the model, satisfaction with received salary ($p=0.012$) and professional self-concept ($p<0.001$) significantly predict the intention to leave the job. Specifically, lower satisfaction with salary increases the intention to leave by 0.234 units, while an increase of one unit in professional self-concept decreases the intention to leave the job by -0.006 units.

TABLE 6) MULTIPLE LINEAR REGRESSION FOR PREDICTING THE INTENTION TO LEAVE THE JOB USING THE ENTER METHOD

predictor variables	b	β	t	p
Fixed value	4.016	-	12.914	<0.001
Gender (Male)	0.106	0.083	1.315	0.190
Satisfaction with salary(Low)	0.234	0.162	2.520	0.012
Age	-0.003	-0.041	-0.0640	0.523
Professional self-concept	-0.006	-0.328	-5.168	<0.001
F (10/089), p value= <0/001, $R^2=0/159$ Adj $R^2=0/143$				
Regression equation: $4.016 + \text{Gender} \times 0.106 + \text{Satisfaction with salary} \times 0.234 + \text{Age} \times -0.003 + \text{professional self-concept} \times -0.006$				

DISCUSSION

This study aimed to determine the relationship between professional self-concept and the intention to leave the profession, as well as the quality of professional life among psychiatric nurses in 2024 in Tehran. First, we measured professional self-concept, defined as each nurse's perception of their own competence, role clarity and professional identity. Second, we assessed their intention to leave the profession. Third, we evaluated their quality of professional life, including "compassion satisfaction", "job burnout" and "secondary trauma".

The results of this study indicated a significant inverse relationship between professional self-concept and its dimensions and the intention to leave the nursing profession. Specifically, as professional self-concept and its dimensions increase, the intention to leave the job decreases. Additionally, multiple regression results showed that professional self-concept significantly predicts the intention to leave the job.

The findings of Hu et al. (2022) indicated that professional identity and the intention to leave the job have a significant inverse relationship, aligning with the current study's results [28]. Similarly, Beta et al. (2023) found a direct and significant

relationship between the professional self-concept of nurses and its dimensions and the intention to remain in the nursing profession, which is consistent with the current findings[29]. These results suggest that professional self-concept plays a crucial role in enhancing the self-esteem of nurses and their planning regarding their career future. When nurses have a positive view of their profession, they invest more energy into it and show greater enthusiasm. A strong identity and self-concept may help nurses overcome challenges that reduce job satisfaction, thereby decreasing their intention to leave. Conversely, if nurses have a weak self-concept, their likelihood of leaving the job increases when favorable opportunities arise[28]. The professional self-concept of nurses is a developing process that begins as soon as an individual is accepted as a nursing student at university and continues to evolve until they are allowed to work clinically as a graduate nurse [23]. Given the shortage of nurses and psychiatric nurses, designing educational programs throughout the study and service periods to enhance their professional self-concept and increase their income could be a priority for managers and policymakers to reduce nurses' intention to leave their jobs.

The results of this study indicated a direct and significant relationship between compassion satisfaction and professional self-concept, along with its dimensions, among nurses. Specifically, as professional self-concept increases, compassion satisfaction also rises. Furthermore, multiple regression analysis revealed that professional self-concept significantly predicts compassion satisfaction. In the study by Kyun et al. (2020) involving nurses at four general hospitals in Korea, a significant direct relationship between compassion satisfaction and professional self-concept was observed [30]. Similarly, Hong et al. (2019) found a significant direct relationship between compassion satisfaction and professional self-concept among nurses in specialized wards [31].

Despite the differing research environments, the findings of these studies align with those of the current study. Compassion satisfaction is a positive outcome wherein nurses enjoy their profession by providing quality care to patients[32]. Professional self-concept affects thinking patterns, role development, as well as professional behavior and performance. Thus, it can be inferred that higher professional self-concept among nurses leads to greater satisfaction with their profession, prompting them to deliver higher quality services to patients and ultimately achieve greater satisfaction with their work [13]. This relationship can explain the direct connection between professional self-concept and compassion satisfaction among nurses.

The study also revealed an inverse and significant relationship between dimensions of compassion fatigue, namely burnout and secondary traumatic stress, and professional self-concept. As professional self-concept increases, burnout and secondary traumatic stress decrease. Multiple regression analysis further indicated that professional self-concept significantly predicts burnout and secondary traumatic stress. In the study by Durmaz et al. (2024), a significant negative relationship was found between the average scores of compassion fatigue and the scores of professional satisfaction, competence, and professional self-concept among psychiatric nurses[33]. Gholi Roshan et al. (2021) also observed an inverse and significant relationship between professional self-concept and burnout among nurses in hospitals supervised by Babol University of Medical Sciences[34]. The findings of Saberi et al. (2022) confirmed a significant inverse relationship between burnout and professional self-concept as well [35].

The current findings, along with previous studies, confirm that enhancing professional self-concept can reduce the incidence of burnout and secondary traumatic stress in nurses. In fact, professional self-concept plays a crucial role in improving nurses' effectiveness by reinforcing their sense of competence and success in their specialized field. Overall, this research demonstrates that professional self-concept has a direct relationship with compassion satisfaction and an inverse relationship with burnout and secondary traumatic stress. Therefore, strategies focused on enhancing nurses' professional self-concept could lead to increased compassion satisfaction and reduced compassion fatigue, such as burnout and secondary traumatic stress. Approaches like improving nursing knowledge and skills, communication and collaboration abilities, confidence, and leadership are essential for enhancing nurses' self-concept. Healthcare managers and policymakers, particularly in nursing and psychiatric nursing, can create conditions for improving nurses' status and elevating the nursing profession by focusing on these strategies and enhancing professional self-concept among nurses [23, 36].

In Iran's collectivist, high power-distance culture, nurses often see themselves primarily as members of a caring community and family network, emphasizing altruism, patient advocacy and spiritual service in their professional identity. This contrasts with Western nursing cultures, which tend to prioritize individual autonomy and personal achievement. For example, Iranian nurses frequently describe "altruism" and spiritual fulfillment as core to their job satisfaction [37] while facing a public image that still views nursing as a "feminine, physician-subordinate" vocation. Such gendered and hierarchical stereotypes undermine Iranian nurses' self-concept and sense of empowerment, contributing to feelings of frustration and impacting quality of work life. These cultural forces also shape turnover intent: recent evidence suggests Iranian nurses' turnover intention is only moderate overall, perhaps due to strong family/community ties that discourage leaving despite dissatisfaction under rigid hierarchy [38].

Among the demographic variables, a significant relationship was observed between the intention to leave the job and satisfaction with received salary. Specifically, nurses who reported low satisfaction with their salary had a higher intention to leave their jobs. Additionally, the results of multiple regression analysis indicated that satisfaction with salary, along with professional self-concept, significantly predicts the intention to leave the job. In the study by Liu et al. (2022) involving nurses working in 15 hospitals in China, it was found that nurses with low satisfaction regarding their salary had a greater intention to leave their positions [39]. Similarly, the study by Wang et al. (2022) among psychiatric nurses showed that those with higher earnings had a greater intention to leave their jobs [40]. Increasing the income of psychiatric nurses could enhance their job satisfaction and consequently reduce their intention to leave the profession [41].

The results also indicated that nurses with low satisfaction regarding their salary experienced higher levels of burnout, and satisfaction with salary, alongside professional self-concept, significantly predicts burnout. In the study by Qu et al. (2015), a significant difference was observed in emotional exhaustion and depersonalization among nurses based on monthly income, with those earning less showing higher levels of burnout in these dimensions. Low income can lead to decreased job satisfaction, which in turn can contribute to burnout [42]. No significant relationships were found between other demographic variables and burnout. In the study by Babaei et al. (2020), no significant correlation was observed between age, education level, years of service, monthly mandatory hours, and burnout or secondary traumatic stress, aligning with the current study's findings [43]. Similarly, in the study by Dehghan et al. (2023), no significant relationships were found between age, gender, marital status, education, employment status, years of service, and having a second job in relation to burnout [44], which was consistent with the current results. However, a significant relationship was noted between age, education, years of service in specialized units, and having a second job with burnout, which contradicted the current study's findings.

In the study by Sukut et al. (2022), a significant relationship was observed between education and gender with compassion fatigue, while no significant correlations were found between age, work department, position, years of service in psychiatric settings, or shift work with compassion fatigue [45]. These variables also did not show significant relationships with burnout. The discrepancies in study results may be attributed to differences in the demographic characteristics of participants, the working conditions in various departments, and the specific duties of nurses.

One of the limitations of this study was the reliance on data obtained through questionnaires and self-reporting from nurses. Additionally, the emotional and mental states of the nurses could have influenced their responses, and controlling for this factor was not feasible for the researchers.

CONCLUSION

The intention to leave the job, compassion satisfaction, burnout, and secondary traumatic stress among nurses were at a moderate level. Professional self-concept and satisfaction with salary were identified as predictors of the intention to leave the job. Professional self-concept was the sole predictor of compassion satisfaction and secondary traumatic stress. Burnout was predicted by both professional self-concept and satisfaction with salary. Therefore, it is recommended that managers and policymakers develop programs aimed at enhancing professional self-concept and increasing the income

of nurses working in psychiatric departments. Such initiatives could help reduce their intention to leave the profession and improve their quality of professional life. Additionally, considering that the intention to leave the nursing profession is recognized as an important and multifaceted phenomenon, it is suggested that qualitative studies be designed and conducted to gain a deeper understanding of the variables examined in this study.

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COMPETING INTERESTS:

The authors have no relevant financial or non-financial interests to disclose.

AUTHOR CONTRIBUTIONS:

All authors contributed to the study conception and design. SJ, MP, MS, ZT, RAJ, MS, & MH-F: writing the first draft; SJ, MS, & RAJ: data collection; SJ & MH-F: initial design and final version; MP & MH-F: data interpretation; & MS & ZT: data analysis. All authors have agreed with the results and conclusions.

DATA AVAILABILITY:

The datasets generated during and/or analysed during the current study are not publicly available due to confidentiality but are available from the corresponding author on reasonable request.

ETHICS APPROVAL:

The study was approved by the Committee of Ethics in Human Research at the University of Social Welfare and Rehabilitation Sciences with code of ethics no: IR.USWR.REC.1402.158. Written informed consents were obtained from the participants.

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DETERMINANTS INFLUENCING TURNOVER INTENTION AMONG DOCTORS IN EAST NUSA TENGGARA, INDONESIA

Tania*, Leroy Samy Uguy

Faculty of Economics and Business, Pelita Harapan University, Jakarta, Indonesia

Correspondence: Saputra_tania91@yahoo.com

ABSTRACT

OBJECTIVE

High turnover intention among rural doctors disrupts healthcare services and increases organizational costs associated with recruitment and training. This research aims to investigate doctors' turnover intentions and analyse the associated factors that influence them in East Nusa Tenggara (ENT), a remote region in Indonesia.

DESIGN

Doctors' turnover intentions at a single point of time were measured quantitatively with a cross-sectional approach. Data were collected through a structured questionnaire comprising 120 questions, designed to measure turnover intention as the key variable and its related factors. The responses from the questionnaire were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), a statistical technique that allows for the examination of complex relationships between multiple variables and their direct or indirect effects on turnover intention.

SETTING

This study was conducted in ENT, Indonesia, where 13 of 21 regencies are classified as "3T" (In Indonesian: Terdepan, Tertinggal, Terluar; which means: frontier, underdeveloped, outermost). Limited healthcare facilities and professionals hinder service access. Challenges, including poor infrastructure, often lead to doctors' resignation, disrupting healthcare delivery in these remote regions.

RESULTS

Data were collected from 202 general practitioners and specialists in ENT through an online survey. Among the participants, 45.54% expressed an intention to resign. The results indicate that working engagement, pay satisfaction, opportunities for learning and development, work-life balance, and personal accomplishment influence turnover intention through job satisfaction as a mediating variable. Additionally, burnout was found to directly affect turnover intention.

CONCLUSION

This study highlights the importance of targeted interventions—ensuring fair pay, growth opportunities, balanced workloads, and supportive work environments—along with addressing burnout to reduce doctor turnover in ENT. By identifying key turnover factors, this study offers valuable insights for policymakers and hospital management to develop effective retention strategies, ensuring sustainable, high-quality healthcare in ENT.

KEYWORDS

turnover intention, job satisfaction, remote areas, doctor retention, rural health

INTRODUCTION

Indonesia's decentralized governance system influences its tiered healthcare system, spanning public and private sectors across primary, secondary, and tertiary levels [1]. Since implementing National Health Insurance in 2014, primary healthcare centers have served as the frontline of care, tasked with delivering efficient, timely care and managing referrals [2]. However, inefficiencies persist, such as Southeast Sulawesi's 17% referral rate in first-level healthcare facilities in 2016, far exceeding the ideal 5%, primarily due to doctor shortages [3]. Similar issues arise in rural Nigeria, where limited healthcare workers and infrastructure delay referrals and treatment, increasing mortality rates [4].

East Nusa Tenggara (ENT) exemplifies such issues, with a population of 5.6 million but only 14 doctors per 100,000 people, which is far below the WHO standard of 100:100,000, making ENT the region with the second-lowest doctor-to-population ratio in Indonesia [5]. This shortage is partly attributed to the high turnover rate of doctors, influenced by factors such as job satisfaction, resilience, work-life balance, rewards and recognition, and opportunities for professional growth. However, the strongest predictor of actual turnover is turnover intention—the desire to leave one's job [6]. In ENT, only 21% of doctors remain in their positions beyond five years, highlighting retention challenges despite recruitment incentives [7].

Similar trends are seen internationally: in China, 46.9% of doctors in Jining and 42.3% in Chongqing showed high turnover intention, influenced by various factors such as location, job position, work pressure, job satisfaction, resilience, and work engagement [8,9]. Thailand reported 17.6% of doctors permanently leaving rural areas. Turnover disrupts healthcare delivery, undermines patient trust, and raises recruitment costs [10].

In Indonesia, specific data on turnover intention in NTT is unavailable, but a study by Handoyo et al. (2021) [7] revealed a doctor retention rate of only 21% for those working more than five years. While incentives aid in recruitment, they have only minimal impact on doctor retention [7]. This highlights the need for additional strategies, such as fostering resilience during medical education. Retaining doctors in remote areas is critical for sustaining quality healthcare services. High turnover disrupts healthcare delivery, weakens trust between patients and providers, and increases recruitment and training costs for new doctors [10].

Addressing the critical doctor shortage in ENT requires increasing retention by tackling turnover intention. This study investigated doctors' turnover intention in ENT and explored its influencing factors, to enhance retention efforts. The findings aim to guide policymakers and hospital management in improving working conditions and fostering doctors' commitment.

RESEARCH CONTEXT

This study focuses on ENT, an underdeveloped region in Indonesia consisting of 21 regencies and a provincial capital, with 13 regencies classified as "3T" (Terdepan, Tertinggal, Terluar), meaning frontier, underdeveloped, and outermost. The region faces limited healthcare facilities and a shortage of professionals, resulting in unequal access to services. Doctors in ENT include civil servants, contract-based employees, and internship doctors, all of whom face challenges due to inadequate work and living conditions, leading to premature resignations. This disrupts healthcare services, as recruiting replacements in these remote areas is particularly difficult. Therefore, it is essential to identify the turnover intention among doctors in ENT and manage the factors contributing to it to prevent further turnover.

HYPOTHESIS DEVELOPMENT AND RESEARCH MODEL

Turnover intention, defined as an employee's intent to leave their organization voluntarily, is a significant concern, particularly in remote healthcare settings such as ENT. This study adopts a conceptual model where job satisfaction serves as a mediating variable influenced by multiple determinants. Below are the proposed hypotheses based on the relevant theoretical constructs and prior research:

Hypothesis 1: Resilience positively influences job satisfaction among doctors working in ENT

Resilience helps mitigate workplace stressors, enhancing job performance and satisfaction. Studies, including Kuntz et al. (2017) and Matos (2010), highlight resilience as a buffer against stress, showing positive associations with job satisfaction, even in high-pressure environments [11,12].

Hypothesis 2: Work engagement positively influences job satisfaction among doctors working in ENT

Work engagement fosters positive employee experiences, boosting job satisfaction. Mache (2014) emphasized that engaged employees are more motivated, leading to improved satisfaction and retention [13].

Hypothesis 3: Pay satisfaction influences job satisfaction among doctors working in ENT

Fair and reasonable compensation significantly influences job satisfaction. Judge et al. (2010) underscored the role of perceived pay equity in enhancing employee contentment, making pay satisfaction a critical factor [14].

Hypothesis 4: Opportunity to learn and develop influences job satisfaction among doctors working in ENT

Professional growth opportunities positively impact job satisfaction by boosting confidence and fulfillment. Weng et al. (2010) found that employees with access to learning and development feel more competent and satisfied in their roles [15].

Hypothesis 5: Work-life balance influences job satisfaction among doctors working in ENT

Equilibrium between work and personal life enhances job satisfaction. Balanced schedules reduce stress, improve performance, and foster contentment, as evidenced by studies on healthcare workers in Pakistan [16,17].

Hypothesis 6: Burnout negatively influences job satisfaction among doctors working in ENT

Burnout reduces emotional engagement and job satisfaction, particularly in stressful environments. High burnout levels significantly lower satisfaction among healthcare professionals, leading to decreased performance [18].

Hypothesis 7: Personal accomplishment positively influences job satisfaction among doctors working in ENT

A sense of achievement fosters job satisfaction by enhancing engagement and commitment. Research links personal accomplishment to higher satisfaction, emphasizing its role as an intrinsic motivator [19].

Hypothesis 8: Burnout positively influences turnover intention among doctors working in ENT

Burnout erodes emotional attachment, increasing turnover intention. Schaufeli and Bakker (2004) identified burnout as a key predictor, driving employees to seek alternative opportunities [20].

Hypothesis 9: Job satisfaction negatively influences turnover intention among doctors working in ENT

Job satisfaction reduces turnover intention. Studies, including Ali Jadoo et al. (2015), show a strong inverse relationship, with satisfied employees less likely to leave, as observed among physicians in Pakistan and China [21,22].

MATERIAL AND METHODS

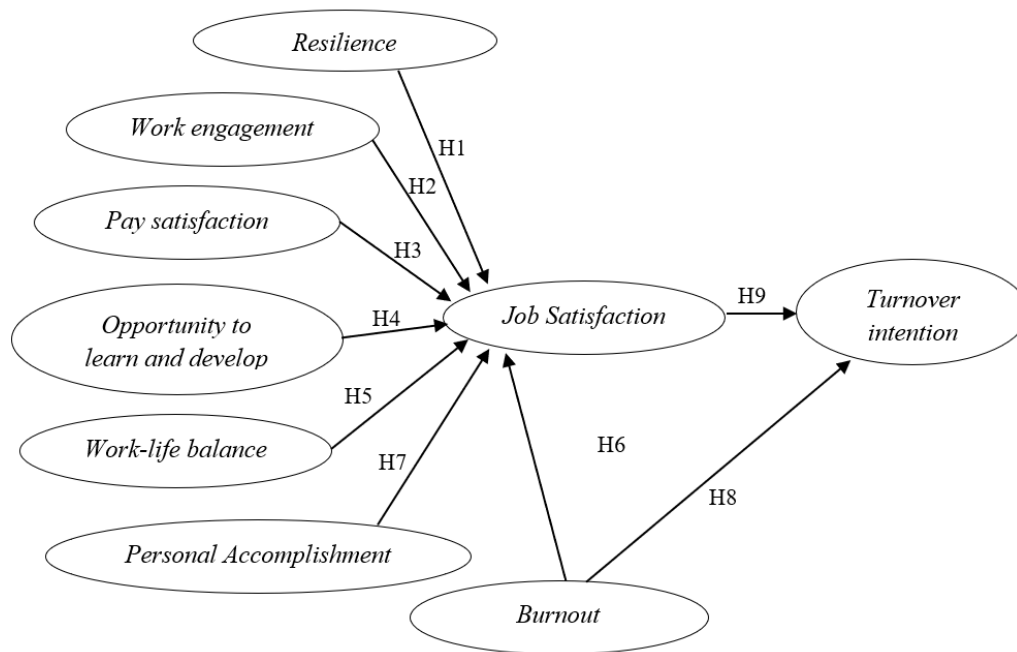
ETHICAL CONSIDERATIONS

This study was approved by the research committee ethic (KEP FEB) Faculty of Economic and Business, Pelita Harapan University (034/MARS/EC/X/2024)

RESEARCH DESIGN

This research was conducted using quantitative method with a cross-sectional approach. The aim of this study is to analyse the factors influencing job satisfaction towards doctor's turnover intention who serve in ENT as one of the remote areas in Indonesia.

FIGURE. 1. RESEARCH MODEL FOR THIS STUDY



There are a total of 9 variables in this study with the turnover intention serves as the dependent variable, while job satisfaction acts as a mediator. Independent variables include resilience, work engagement, pay satisfaction, opportunities for learning and development, work-life balance, burnout, and personal accomplishment (Figure 1).

SAMPLING AND DATA COLLECTION

This study targeted general practitioners and specialists in hospitals across ENT during October 2024. With a total population of 720 general practitioners and 712 specialists, the minimum sample size was calculated using two approaches for partial least square - structural equation modelling (PLS-SEM) analysis. Power analysis with G*Power software determined a minimum of 153 samples, while the inverse square root method suggested 155, ensuring sufficient accuracy. Ultimately, 155 respondents were selected as the reference.

Purposive sampling was used to select general practitioners and specialists in ENT. Data were collected through an online questionnaire designed to evaluate the research variables, incorporating validated indicators and translated into Bahasa Indonesia for clarity. The questionnaire included the TIS-6, which was incorporated to measure turnover intention. Responses were assessed using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), reflecting participants' levels of agreement. In addition to questions related to the research variables, the questionnaire also contained items about the respondents' demographic profiles.

DATA ANALYSIS

This study utilizes PLS-SEM as the analytical approach, ideal for explanatory research. PLS-SEM is preferred over traditional regression methods due to its ability to simultaneously analyse direct and indirect effects, perform robust mediation analysis, and handle complex structural relationships with multiple constructs and indicators [23].

The analysis was conducted using SmartPLS version 4.1.0.8. Two primary models were examined: the outer model and the inner model. The outer model assesses reliability using outer loadings, Cronbach's alpha, and composite reliability, and evaluates validity through average variance extracted (AVE) and the heterotrait-monotrait (HTMT) ratio. Once reliability and validity are confirmed, the inner model investigates construct relationships and tests hypotheses, with statistical significance determined by p-values < 0.05 and t-statistics > 1.645.

RESULTS

RESPONDENT PROFILE

This study's respondents were general practitioners and medical specialists who voluntarily completed an online questionnaire via Google Forms in October 2024. The questionnaire was distributed through the Indonesian Medical Association (IDI) in each district of ENT. A total of 202 respondents from 21 districts met the inclusion criteria and participated within the designated timeframe.

TABLE 1. DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Demographic Variable		Sample (n)	Percentage (%)
Gender	Male	77	38,1
	Female	125	61,9
Total		202	100
Age	20-29 years	87	43,1
	30-39 years	79	39,1
	40-49 years	25	12,4
	>50 years	11	5,4
Total		202	100
District	Alor	10	5
	Belu	15	7,4
	Ende	22	10,9
	Flores Timur	6	3
	District of Kupang	4	2
	Lembata	5	2,5
	Malaka	6	3
	Manggarai	2	1
	West Manggarai	10	5
	East Manggarai	4	2
	Nagakeo	5	2,5
	Ngada	10	5
	Rote Ndao	10	5
	Sabu Rai Jua	1	0,5
	Sikka	18	8,9
	West Sumba	1	0,5
	Southwest Sumba	7	3,5
	East Sumba	8	4
	Timor Tengah Selatan	32	15,8
	Timor Tengah Utara	14	6,9
	Kupang City	12	5,9
Total		202	100

Table 1 presents the demographic profile of respondents, most of whom were female (61.9%) and aged 20–29 years (43.1%). All were practicing doctors in ENT, representing nearly all districts and cities except one due to non-responsiveness. The sample exceeded the required size, ensuring a representative analysis of turnover intention among doctors in the region.

TABLE 2. RESPONDENT JOB PROFILE FOR STUDY RESPONDENTS

Variables			Sample (n)	Percentage (%)
Profession	General practitioners		161	79,7
	Specialists	Internist	8	4
		Pediatrician	7	3,5
		Obstetrician and gynecologist	4	2
		General surgeon	3	1,5
		Neurologist	3	1,5
		Otolaryngologist	3	1,5
		Clinical pathologist	1	0,5
		Physical and rehabilitation medicine specialist	1	0,5
		Clinical microbiologist	1	0,5
		Forensic pathologist	1	0,5
		Anatomy pathologist	1	0,5
		Psychiatrist	2	1
		Cardiologist	2	1
		Orthopedic surgeon	1	0,5
		Anesthesiologist	1	0,5
		Ophthalmologist	1	0,5
		Radiologist	1	0,5
		Total		
Working place	Public/government hospital		64	31,7
	Private hospital		19	9,4
	Primary healthcare facilities (Puskesmas)		66	32,7
	Clinic		9	4,5
	>1 working place		44	21,8
Total			202	100
Working duration	< 1 year		52	25,7
	1-5 years		109	54
	6-10 years		17	8,4
	>10 years		24	11,9
Total			202	100
Working hour/week	<40 hours		37	18,3
	40-80 hours		145	71,8
	>80 hours		20	9,9
Total			202	100
Employment status	Honorary employee		115	56,9
	Permanent medical officer		68	33,7
	Government employees / civil servant		8	4
	Health worker special employment program		11	5,4
Total			202	100

As shown in Table 2, most respondents were general practitioners (79.7%). A significant proportion worked in government hospitals (64%). Most respondents had been in their current positions for 1–5 years (54%), were contractual or honorary staff (56.9%), and worked 40–80 hours per week (71.8%). A smaller portion reported working more than 80 hours per week, with some indicating they were on-call 24 hours a day, seven days a week.

TURNOVER INTENTION AMONG PARTICIPANTS

Turnover intention refers to an employee's inclination or decision to voluntarily leave their current position within an organization [24]. To measure this, the Turnover Intention Scale (TIS-6), a commonly used tool, was employed. The TIS-6 consists of six items in a self-report format, and research has shown it to be a reliable instrument for evaluating turnover intention and forecasting actual employee departure. A five-point Likert scale was employed to rate the responses, and the items were totaled to generate a score. The midpoint of the scale is 18. Scores below 18 suggest a preference to remain in the organization, while scores above 18 indicate an intention to leave. The possible score range for participants is between 6 and 30, with higher scores reflecting stronger turnover intentions.

In this study, 92 out of 202 participants had a TIS-6 score greater than 18, indicating that 45.54% of doctors in ENT have turnover intention [25].

PLS-SEM ANALYSIS RESULTS

The initial data analysis using SmartPLS (version 4.1.0.8) begins with evaluating the outer model for validity and reliability. Convergent validity is assessed via average variance extracted ($AVE \geq 0.50$) and outer loadings (≥ 0.708), with low-loading indicators removed if needed to improve validity. Reliability is measured using Cronbach's Alpha and composite reliability, both required to exceed 0.70 but remain below 0.95 to avoid redundancy [23]. While Cronbach's Alpha values for most variables fall within the acceptable range, job satisfaction exceeds 0.95, indicating high internal consistency. This could stem from deliberate item selection to comprehensively capture the multidimensional nature of Job Satisfaction. Although high alpha values may indicate potential redundancy, the decision to retain all items ensures a thorough representation of the construct's domain.

Table 3 presents the results of reliability and convergent validity testing, indicating that all constructs have AVE values above 0.50 and reliability values between 0.70 and 0.95, demonstrating adequate validity and reliability.

TABLE 3. EVALUATION OF MEASUREMENT MODEL TEST RESULTS

Variables	Items	Outer loadings	Cronbach's Alpha	Composite reliability	Average Variance Extracted (AVE)
Resilience	R12	0,820	0,914	0,919	0,742
	R14	0,865			
	R16	0,858			
	R17	0,887			
	R20	0,875			
Working engagement	WE1	0,824	0,910	0,917	0,689
	WE2	0,869			
	WE3	0,865			
	WE4	0,779			
	WE5	0,848			
	WE6	0,790			
Pay Satisfaction	PS5	0,878	0,941	0,943	0,658

	PS6	0,815			
	PS8	0,770			
	PS9	0,804			
	PS10	0,876			
	PS11	0,872			
	PS13	0,714			
	PS14	0,785			
	PS15	0,862			
	PS16	0,715			
Opportunity to learn and develop	OD1	0,790	0,824	0,835	0,654
	OD2	0,820			
	OD3	0,861			
	OD4	0,760			
Work-life balance	WB1	0,790	0,805	0,827	0,625
	WB2	0,785			
	WB3	0,827			
	WB4	0,759			
Burnout	BO1	0,748	0,931	0,937	0,618
	BO2	0,763			
	BO4	0,835			
	BO6	0,848			
	BO7	0,812			
	BO8	0,862			
	BO9	0,768			
	BO10	0,732			
	BO13	0,751			
	BO14	0,729			
Personal Accomplishment	PA2	0,786	0,900	0,910	0,624
	PA3	0,762			
	PA4	0,820			
	PA5	0,749			
	PA6	0,778			
	PA7	0,812			
	PA8	0,820			
Job Satisfaction	JS1	0,788	0,957	0,958	0,627
	JS2	0,744			
	JS3	0,743			
	JS4	0,829			
	JS6	0,854			
	JS7	0,840			
	JS8	0,796			
	JS9	0,771			
	JS10	0,788			
	JS13	0,750			
	JS14	0,827			
	JS17	0,791			
	JS18	0,804			
	JS19	0,807			

	JS20	0,732			
Turnover intention	TI1	0,833	0,855	0,857	0,696
	TI3	0,838			
	TI4	0,852			
	TI6	0,814			

Discriminant validity was assessed using the HTMT ratio, with all values below 0.90, confirming well-differentiated constructs (Table 4). Multicollinearity was evaluated using the Variance Inflation Factor (VIF), with all values below 3.0, indicating no multicollinearity issues among independent variables.

TABLE 4. DISCRIMINANT VALIDITY

Variable	BO	JS	OD	PS	R	TI	WB	PA	WE
BO									
JS	0,331								
OD	0,259	0,716							
PS	0,210	0,607	0,551						
R	0,341	0,261	0,196	0,113					
TI	0,749	0,494	0,377	0,484	0,325				
WB	0,514	0,631	0,599	0,567	0,252	0,450			
PA	0,503	0,505	0,382	0,244	0,617	0,397	0,507		
WE	0,571	0,555	0,547	0,434	0,456	0,613	0,598	0,716	

In this study, the coefficient of determination (R^2) for job satisfaction was found to be 0.584. This indicates that 58.4% of the variance in job satisfaction can be explained by the predictor variables in the model, while the remaining 42.6% is attributed to variables outside the scope of this study. Similarly, the R^2 value for turnover intention was 0.511, meaning that 52.7% of its variance can be explained by the variables in the model, with the remaining 47.3% explained by external factors. Both R^2 values fall within the category of moderate explanatory power.

Furthermore, the predictive relevance test yielded a Q^2_{predict} value of 0.506 for turnover intention, and 0.536 for job satisfaction. These values are classified as having large predictive relevance. Based on these findings, it can be concluded that the model demonstrates strong predictive capabilities for forecasting turnover intention among doctors working in ENT. If this research model is applied to other studies with similar contextual assumptions and sample criteria, but in a different population, there is a high probability of obtaining similar results.

FACTORS INFLUENCING TURNOVER INTENTION

Table 5 presents the results of hypothesis testing conducted using the bootstrapping method in SmartPLS, revealing that six out of nine hypotheses are supported. The hypothesis testing process is based on two empirical metrics: significance levels and path coefficients. Since the hypotheses are directional, a one-tailed test was employed. A relationship between variables is considered significant if the bootstrapped T-statistic exceeds the T-table value of 1.645 at a 0.05 significance level [26]. Accordingly, all analyses in this study were performed using a one-tailed hypothesis test with a 5% significance threshold.

TABLE 5. HYPOTHESIS TEST RESULTS

Hypothesis	Standardized coefficient	T-Statistics	p-value	Results
H1 Resilience → Job Satisfaction	-0,007	0,137	0,445	Hypothesis not supported
H2 Work Engagement → Job Satisfaction	0,031	0,370	0,356	Hypothesis not supported
H3 Pay Satisfaction → Job Satisfaction	0,274	5,048	<0,001	Hypothesis supported
H4 Opportunity to Learn and Develop → Job Satisfaction	0,343	4,647	<0,001	Hypothesis supported
H5 Work Life Balance → Job Satisfaction	0,159	1,852	0,032	Hypothesis supported
H6 Burnout → Job Satisfaction	-0,000	0,005	0,498	Hypothesis not supported
H7 Personal Accomplishment → Job Satisfaction	0,204	2,801	0,003	Hypothesis supported
H8 Burnout → Turnover Intention	0,599	12,140	<0,001	Hypothesis supported
H9 Job Satisfaction → Turnover Intention	-0,261	4,311	<0,001	Hypothesis supported

The analysis reveals that turnover intention is significantly influenced by both burnout and job satisfaction. Burnout has a strong positive effect on turnover intention ($T = 12.140$, $p < 0.001$), indicating that higher burnout levels lead to an increased desire to leave. Conversely, job satisfaction negatively affects turnover intention ($T = 4.311$, $p < 0.001$), suggesting that greater job satisfaction reduces the likelihood of turnover. Furthermore, job satisfaction serves as a mediating variable, influenced by multiple factors. Pay satisfaction ($T = 5.048$, $p < 0.001$), opportunity to learn and develop ($T = 4.647$, $p < 0.001$), work-life balance ($T = 1.852$, $p = 0.032$), and personal accomplishment ($T = 2.801$, $p = 0.003$) all significantly contribute to job satisfaction, reinforcing its crucial role in retaining employees. However, resilience ($T = 0.137$, $p = 0.445$), work engagement ($T = 0.370$, $p = 0.356$), and burnout ($T = 0.005$, $p = 0.498$) do not significantly impact job satisfaction. These results suggest that improving job satisfaction through pay, development opportunities, work-life balance, and personal accomplishment can help mitigate turnover intention, particularly in environments where burnout is prevalent. Table 6 shows that the opportunity to learn and develop, pay satisfaction, work-life balance, and personal accomplishment significantly influence turnover intention through job satisfaction, with p-values below 0.05 and T-statistics above 1.645. The strongest indirect effect is from opportunity to learn and develop, with a path coefficient of 0.343.

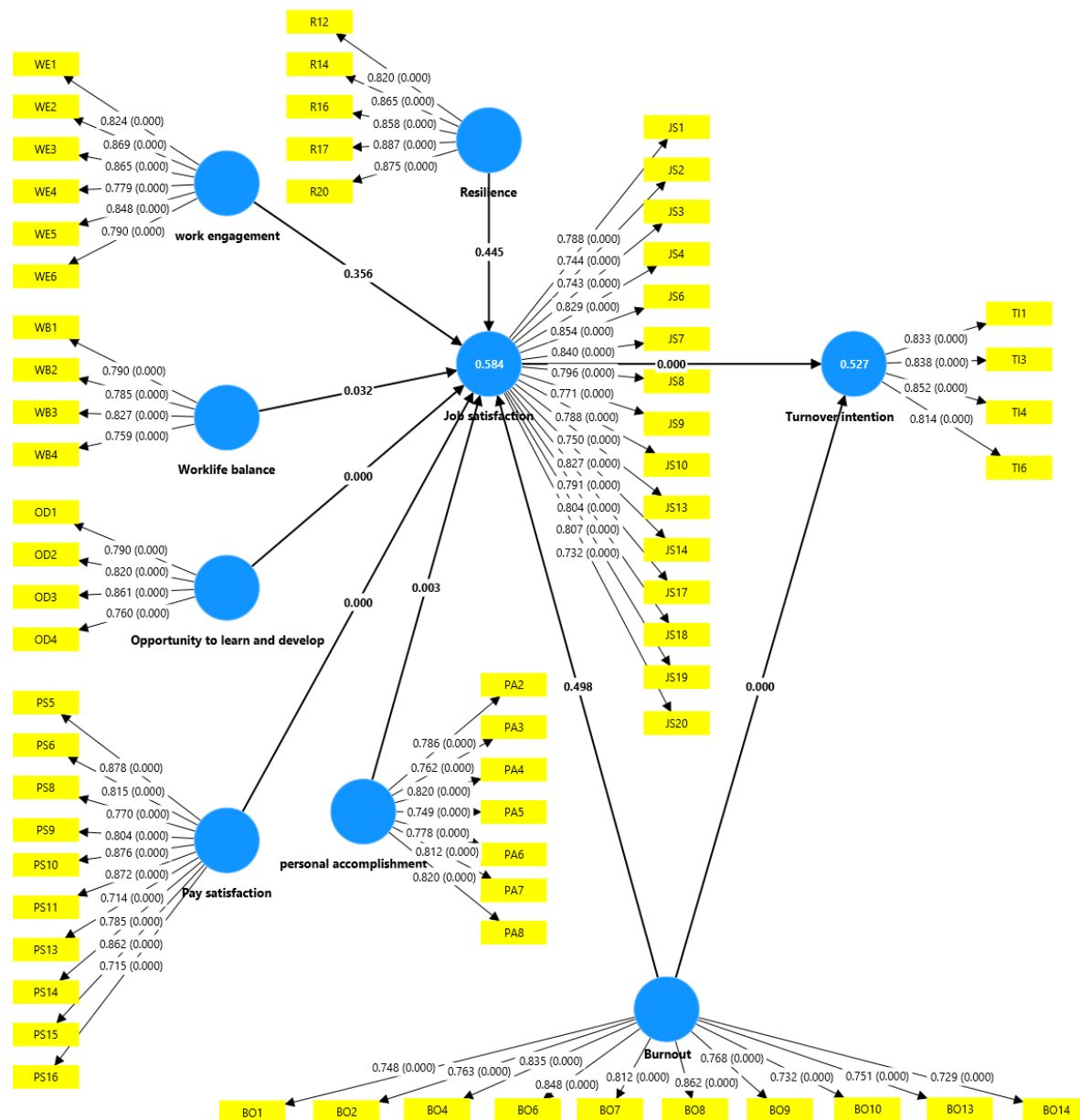
TABLE 6. SPECIFIC INDIRECT EFFECTS

Path	Standardized Coefficient	T-Statistics	p-value
Burnout → Job satisfaction → Turnover intention	0,000	0,005	0,498
Opportunity to Learn and Develop → Job Satisfaction → Turnover intention	-0,090	3,383	<0,001
Pay Satisfaction → Job Satisfaction → Turnover Intention	-0,072	2,934	0,002
Resilience → Job Satisfaction → Turnover Intention	0,002	0,134	0,447
Work-life Balance → Job Satisfaction → Turnover intention	-0,041	1,746	0,040

Personal Accomplishment → Job Satisfaction → Turnover intention	-0,053	2,498	0,006
Work Engagement → Job Satisfaction → Turnover Intention	-0,008	0,351	0,363

Figure 2 presents the significance levels, p-values, and coefficients for the nine paths in the research model. Yellow boxes highlight statistical test results between constructs and indicators, while blue circles show R² values, reflecting the model's explanatory and predictive power. The findings validate the model's effectiveness in explaining factors influencing doctors' turnover intention in ENT.

FIGURE 2. RESULTS MODEL FOR THIS STUDY



DISCUSSION

This study examines organizational factors influencing doctors' turnover intention in ENT, a remote area. Findings show that six of nine hypotheses are supported, with the research model effectively predicting turnover intention. Key factors explored include resilience, work engagement, pay satisfaction, learning opportunities, work-life balance, personal accomplishment, burnout, and job satisfaction, which serves as a crucial mediator. The study addresses a critical gap, offering insights into retention strategies to ensure healthcare continuity and quality in remote regions.

The first factor examined is resilience. Resilience enhances doctors' ability to adapt to challenges and maintain job satisfaction in remote areas. While previous studies link resilience to job satisfaction, this study finds no significant relationship between resilience, job satisfaction, and turnover intention. Despite high resilience levels among ENT doctors known from descriptive analysis, resilience alone does not ensure job satisfaction or retention. This highlights the need for resilience-building efforts alongside workload management and other supportive measures to address stress and burnout. Educational programs on resilience, stress management, and emotional regulation should be integrated into medical training to better equip doctors for rural challenges where doctors may feel isolated and face unique occupational demands [27].

The study also found that work engagement does not significantly relate to job satisfaction or turnover intention. While work engagement is associated with enthusiasm, energy, and involvement in work, in resource-limited rural settings, high engagement levels may inadvertently lead to physical and emotional exhaustion. Extended working hours and intense caseloads, which is common in rural areas, can exacerbate burnout instead of enhancing job satisfaction. These findings call for a reassessment of engagement strategies in rural healthcare environments. Organizations must adopt workload management strategies to sustain engagement without causing excessive fatigue or emotional strain. For instance, reducing administrative tasks and reallocating resources for patient care can create a more manageable workload, enabling meaningful engagement without risking burnout [28].

Pay satisfaction emerges as a significant positive predictor of job satisfaction, emphasizing the importance of adequate compensation in shaping doctors' attitudes toward their work. This is particularly relevant in rural healthcare, where high demands on these roles make adequate compensation critical. Financial remuneration serves as acknowledgment of the unique challenges and sacrifices faced by doctors in remote areas. However, financial compensation alone may not suffice. Offering context-specific benefits, such as housing allowances, relocation assistance, or educational opportunities for doctors' families, can make rural positions more appealing [29].

Besides financial rewards, non-financial rewards also play an important role. Non-financial rewards, such as learning and development opportunities, strongly influence job satisfaction, emphasizing the importance of professional growth in remote healthcare settings. A lack of opportunities for further education, including specialist training, significantly drives turnover intention [30]. Clear agreements on service tenure and study recommendations are needed between local governments, healthcare organizations, and doctors.

Also, work-life balance is particularly relevant in rural settings, where excessive workloads can impact well-being. Flexible work schedules and reduced administrative burdens can improve job satisfaction by enabling doctors to maintain a balance between work and personal life.[31].

In this study, burnout presents a complex dynamic. While it did not significantly reduce job satisfaction, it directly increases turnover intention. Burnout's dimensions—emotional exhaustion, depersonalization, and personal accomplishment—affect job satisfaction inconsistently, particularly in high-stress environments with low support [18]. Doctors may maintain satisfaction through personal fulfillment even when experiencing moderate burnout. However, burnout often drives turnover intention as a coping mechanism, independent of satisfaction levels. A person with good job satisfaction but high burnout levels may reach a point where leaving their job is seen as an escape rather than merely a response to job

dissatisfaction. Addressing burnout requires creating supportive work environments through counseling, peer support, and structured breaks during shifts [32].

Job satisfaction acts as a mediating variable that mitigates the adverse effects of poor working conditions on doctors' turnover intentions. Policymakers and managers in healthcare organizations can promote job satisfaction through resilience training, fair and adequate compensation, opportunities for growth, and balanced working conditions.

Qualitative descriptive surveys of doctors in ENT reveal dissatisfaction due to inadequate pay, delayed payments, unmet incentives, minimal raises, limited opportunities for further education, and poor organizational management. Poor living conditions, including unreliable utilities, lack of transportation, and insufficient recreational facilities, further exacerbate turnover intention. Addressing these issues requires targeted policies, such as improving living conditions, flexible work arrangements, supportive communities, and clear career advancement mechanisms. Revisiting regional contracts could also help retain doctors in remote areas, ensuring essential healthcare services in underserved regions.

MANAGERIAL IMPLICATIONS:

This study provides actionable recommendations to improve doctor retention in underserved areas like ENT, targeting policymakers, hospital management, and medical education institutions:

1. **Resilience:** Integrate resilience-building into medical education to prepare doctors for challenging environments.
2. **Work Engagement:** Create supportive workplaces by addressing resource shortages, fostering open communication, and promoting community integration through housing and family support.
3. **Pay Satisfaction:** Ensure transparent, workload-based salary structures with timely payments and regularly updated regional incentives.
4. **Learning and Development:** Offer clear career pathways and transparent contracts for specialization and professional growth.
5. **Work-Life Balance:** Conduct workload analyses to ensure adequate staffing, manageable schedules, rest periods, and flexible policies to prevent burnout.
6. **Job Satisfaction:** Protect doctors' autonomy by creating standardized operational procedures free from political interference. These measures will provide clarity and safeguard clinical decision-making.

Addressing these areas holistically can mitigate burnout, reduce turnover intention, and sustain a stable, motivated healthcare workforce in remote regions.

LIMITATIONS, RECOMMENDATIONS, AND FUTURE RESEARCH

This study aimed to identify turnover intention among doctors in ENT and the factors influencing it. Data were collected from 21 of the 22 districts in ENT, with no responses obtained from Central Sumba due to non-responsiveness. Additionally, the distribution of respondents across districts was uneven. Methodological limitations include reliance on probability sampling with purposive sampling, which, while effective for targeting specific groups, limits the generalizability of findings. A larger, more evenly distributed sample across districts would enhance the validity and representativeness of the results.

CONCLUSION

This study examines turnover intention among doctors in ENT, highlighting job satisfaction as a key mediator influenced by pay, development opportunities, work-life balance, and personal accomplishment. Resilience and work engagement showed no significant impact on job satisfaction, while burnout directly affected turnover intention without reducing job satisfaction. A multifaceted approach, including fair pay, growth opportunities, balanced workloads, and supportive environments, is essential to improving doctor retention and ensuring healthcare delivery in remote regions.

ETHICAL APPROVAL

This study was approved by the research committee ethic (KEP FEB) Faculty of Economic and Business, Pelita Harapan University with the reference number of 034/MARS/EC/X/2024.

DECLARATION OF INTEREST:

There are no competing interests to be declared.

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SOCIO-ECONOMIC AND DEMOGRAPHIC FACTORS AFFECTING ACCESS TO HEALTHCARE SERVICES IN TÜRKİYE: A PROBIT MODEL ANALYSIS

Banu Beyaz Sipahi

Faculty of Applied Sciences, University of Tarsus, Mersin, Türkiye

Correspondence: banubeyazsipahi@tarsus.edu.tr

ABSTRACT

BACKGROUND:

Healthcare services aim to meet preventive and therapeutic needs and ensure equal access for all. Despite reforms like the Health Transformation Program in Türkiye, socio-economic and demographic inequalities in healthcare access persist. This study, based on the Grossman model, examines the factors affecting healthcare access in Türkiye.

METHOD:

Data from the Turkish Statistical Institute's Health Survey (2014, 2016, 2019, 2022) covering 76,196 individuals aged 15 and above were used. Access to healthcare was measured using an index created from observed variables in the survey. The probit model was used to analyze the impact of socio-economic and demographic factors.

RESULTS:

Gender, age, income, education, and employment status significantly influence healthcare access. Women have better access than men, and older individuals face more challenges despite growing healthcare needs. Income positively impacts access, while higher education shows an unexpected negative effect, suggesting reliance on alternative healthcare services. Employment status and good health improve access, while obesity and poor health are barriers.

CONCLUSION:

To reduce healthcare inequalities, policies expanding insurance coverage and reducing costs for low-income groups are crucial. Interventions such as awareness programs targeting education and elderly individuals can help mitigate barriers. These findings highlight the role of socio-economic factors in healthcare access and inform the development of sustainable health policies.

KEYWORDS

healthcare access, socio-economic factors, probit models, Türkiye

INTRODUCTION

Healthcare services aim to protect health, treat illnesses, and promote healthy living, ensuring equal and quality care for all. The Basic Health Services Law of 1987 mandates equal, high-quality, and efficient services [1]. Healthcare services are divided into public health and personal healthcare, with public health focusing on broad issues like infectious diseases

and vaccinations, and personal healthcare addressing individual needs [2]. This study focuses on access to personal healthcare.

Inequalities in healthcare access are a global issue, particularly in low- and middle-income countries. In Türkiye, the Health Transformation Program (HTP) since 2003 has improved access, but socio-economic inequalities persist [3]. Micro-level studies on healthcare access in Türkiye are limited. [4] found that rural individuals still face significant challenges, with income level being a major factor. [5] highlighted that women, those with no education, and individuals with low income face greater unmet healthcare needs, while improvements in education and income enhance access. [3] examined inequalities during the transition to Universal Health Insurance, and [6] analyzed income-related inequalities after the Health Transformation Program.

This study contributes to the literature by merging healthcare access categories into a single variable, using recent TurkStat data [7] from 2014, 2016, 2019, and 2022, to analyze socio-economic and demographic factors affecting access through a probit model.

This study offers policy recommendations and examines how age, education, and income influence access to healthcare, based on Grossman's health capital model (1972) [8]. The model emphasizes how socio-economic factors affect investments in health capital, with age identified as a key determinant [8]. Access to healthcare services reflects inequities stemming from income, education, and socio-demographic differences among social groups. These inequalities impact individuals globally and vary according to countries' cultural contexts, while also adversely affecting overall societal welfare [9,10]. Grossman's health capital model (1972) is a widely used theoretical framework for explaining these disparities. According to this model, individuals invest in their health based on resources such as income and education. Lower socioeconomic status diminishes individuals' capacity to maintain health and restricts their access to healthcare services. Consequently, the model provides a theoretical foundation for understanding how demographic and economic inequalities generate disparities in healthcare access [11,12].

This study aims to conduct a comprehensive analysis of access to healthcare services in Türkiye, with the goal of contributing to the development of sustainable and equitable health policies. The central research question is: "What factors influence individuals' access to healthcare services?" The study specifically investigates the role of socio-economic and demographic determinants in shaping healthcare access. By employing robust analytical methods and utilizing recent nationally representative data, the research seeks to fill existing gaps in the literature regarding the unique cultural and economic challenges faced by middle-income countries. Ultimately, the findings aim to inform policymakers and relevant stakeholders in designing targeted interventions to reduce inequalities in healthcare access in Türkiye and other countries with similar socio-economic conditions.

DATA AND METHOD

The Türkiye Health Survey (THS), conducted biennially by Turkstat since 2008, collects data on health status, behaviors, age, marital status, education, income, and employment. It includes forms for ages 0-6, 7-14, and 15+. The survey has limitations, such as excluding homeless or temporarily housed individuals by focusing on registered households. This study uses THS data from 2014, 2016, 2019, and 2022 for individuals aged 15 and above, totaling 76,196 observations: 41,053 females and 35,143 males.

The dependent variable in the study is the level of access to healthcare services, which is not directly available in the dataset. Instead, the dataset includes questions grouped into five categories:

- **Inpatient/Outpatient Care:** Variables include receiving inpatient or outpatient services in the last 12 months, reasons for choosing the last healthcare institution, and timing of the last dental or family doctor visit.
- **Ambulatory/Home Care/Emergency Services:** Variables reflect access to specialists, physiotherapists, psychologists, psychotherapists, psychiatrists, and home care services in the last year.

- **Medication Use:** Variables include using prescription or over-the-counter medication and supplements in the last two weeks.
- **Preventive Services:** Variables measure access to flu vaccinations, blood pressure and cholesterol checks, cancer screenings, stool tests, colonoscopies, mammograms, and smear tests.
- **Unmet Healthcare Needs:** Variables capture delays in healthcare access in the past year due to distance, travel difficulties, long wait times, or affordability issues, including unmet needs for medical care, prescriptions, or mental health treatment.

An index for access to healthcare services was created based on these five groups and their questions. As access is a latent variable without direct data, it was calculated using observed (indicator) variables [13]. Factor analysis, which combines variables with different factor loadings, was used for measurement. Confirmatory Factor Analysis (CFA) facilitated the development of the measurement model.

$$h_i = \Lambda_b + H_i + \varepsilon_i^h \quad (1)$$

Equation (1) defines the measurement model, where H represents the latent healthcare access variable. The variable h_i , or its detailed form $h_i = (h_{i1}, \dots, h_{iq})'$ is a q -dimensional vector of observable variables representing individual health levels, with $n \leq q$. The error term has a dimension of $q \times 1$. The latent variable H is an index, where higher values indicate better access to healthcare and lower values indicate poor access. The median value of the healthcare access index, the dependent variable, was used as the threshold: values above it is coded as 1 (access), and those below as 0 (no access). Descriptive statistics for the independent variables are in Table 1.

TABLE 1: SUMMARY STATISTICS FOR VARIABLES

Categorical Variables					
Access to healthcare services	Yes	No			
	75.19	24.81			
Gender	Female	Male			
	46.12	53.88			
Marital Status	Single	Married	Divorced	Widowed	
	11.97	83.35	1.38	3.31	
	Primary or				
Education Level	below	Secondary	High school	University	Graduate
	77.15	4.51	3.6	10.71	4.03
Household Income Group (20%)		Low-Middle	Middle	Upper-Middle	High
	Low Income	Income	Income	Income	Income
	14.01	26.22	39.35	12.17	8.25
Employment Status	Yes	No			
	70.8	29.2			
BMI	Underweight	Normal Weight	Overweight	Obese	
	3.57	39.16	35.69	21.57	
General Health Status	Very Good	Good	Fair	Poor	Very Poor
	8.89	50.99	29.45	9.4	1.27
Continuous Variables					
	Mean	Std.	Dev.	Min	Max
Age	43.4136	17.63923		15	120

Note: Created by researchers from the TÜİK Health Survey data for 2014, 2016, 2019, and 2022.

Although the healthcare access rate is high (75.19%), a significant portion (24.81%) still lacks access. The gender distribution is nearly balanced, with men slightly more represented (53.88%). A large majority of participants are married (83.35%), reflecting the societal demographic. The education level is generally low, with 77.15% having primary school education or less. Regarding income, 39.35% belong to the middle-income group, while 14.01% are in the low-income group, suggesting a segment that may face difficulties accessing healthcare. BMI values show that most participants (39.16%) are of normal weight, but a significant portion (35.69%) is overweight, and 21.57% are obese, posing potential health risks. More than half of the participants (50.99%) rate their health as good, while 9.4% assess it as poor.

This study aims to analyze the socio-economic, demographic, and health-related determinants that influence individuals' access to healthcare services. Within this framework, the central research question is defined as follows: "Which factors significantly affect individuals' access to healthcare?" To address this question, and based on the existing literature and Grossman's health capital model (1972), the following hypotheses have been formulated:

- H1:** Gender is significantly associated with access to healthcare services.
- H2:** Age is significantly associated with access to healthcare services.
- H3:** Household income level is significantly associated with access to healthcare services.
- H4:** Education level is significantly associated with access to healthcare services.
- H5:** Employment status is significantly associated with access to healthcare services.
- H6:** Marital status is significantly associated with access to healthcare services.
- H7:** General health status is significantly associated with access to healthcare services.
- H8:** Body mass index (BMI) category is significantly associated with access to healthcare services.

Since the dependent variable is binary, the choice between the probit and logit models depends on prediction performance and fit metrics. The model with lower AIC and BIC values is preferred, and the probit model showed lower values than the logit model¹. Thus, the probit model was used to analyze factors affecting healthcare access. This model assumes the dependent variable follows a normal probability distribution and examines how independent variables influence this probability [14].

$$Y_i^* = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} \dots \dots \dots + \beta_k X_{ki} + \epsilon_i \quad (2)$$

The dependent variable Y_i is defined as follows, with $X_1, \dots, X_k$ representing the explanatory variables and ϵ_i the error term. The model, based on the cumulative normal distribution, is the probit model. After applying the probit model, marginal effects are calculated to better illustrate the impact of independent variables, especially in nonlinear models like probit. The marginal effects are defined as follows.

$$ME = \frac{\partial \Phi(X\beta)}{\partial X} \quad (3)$$

Here, Φ is the cumulative distribution function of the standard normal distribution, X is the vector of independent variables, and β is the coefficient vector. In the probit model, the marginal effect represents the impact of a one-unit change in the independent variables on the probability of the dependent variable.

RESULTS:

The findings in Table 2 identify factors significantly affecting healthcare access. All variables were statistically significant.

¹ Logit Models:	Probit Models:
• AIC: 53995.18	AIC: 52778.42
• BIC: 54226.21	BIC: 53009.44

TABLE 2: PROBIT MODEL RESULTS

Variable	Coef.	Robust Std. Err.	z
Constant	3.008	0.060	49.71***
Gender (if male=1, female=0)	-0.291	0.012	-23.06***
Age	-0.082	0.002	-36.44***
Age Square	0.0007	0.000	34.03***
Household Income Group (Basic Category: Lowe Income)			
Lowe-Middle Income	-0.023	0.017	-1.30
Middle Income	0.426	0.0182	23.39***
Upper-Middle Income	0.319	0.022	14.45***
High Income	0.174	0.025	6.88***
Education (Basic Category:Primary or Below)			
Secondary	-0.730	0.028	-25.83***
High school	-0.806	0.035	-22.61***
University	-1.0721	0.0204	-52.33***
Master's degree	-1.4963	0.0301	-49.70***
Doctorate	-1.763	0.179	-9.80***
Employment Status (if working = 1, otherwise = 0)	1.125	0.0148	40.24***
Marital Status (Basic Category:Single)			
Married	-0.396	0.025	-15.64***
Divorced	-0.773	0.054	-14.10***
Widowed	-0.898	0.039	-22.80***
General Health Status (Basic Category:Very Good)			
Good	-0.134	0.025	-5.27***
Fair	-0.484	0.027	-17.85***
Poor	-0.612	0.031	-19.92***
Very Poor	-0.643	0.051	-12.56***
BMI (Basic Category:Underweight)			
Normal Weight	-0.084	0.038	-2.17**
Overweight	-0.184	0.039	-4.66***
Obese	-0.255	0.040	-6.35***
			Wald chi2(23) =
Number of Observations	76196		17967.75
Pseudo R ²	0.4130		prob:0.00

Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Instead of directly interpreting the probit model results, the probabilistic effects of socio-economic and demographic variables on access to healthcare services were analyzed through the marginal effects presented in Table 3.

TABLE 3: MARGINAL EFFECTS OF INDEPENDENT VARIABLES ON ACCESS TO HEALTHCARE SERVICES

Variable	Dy/dx	Delta-method std. Error	Z
Gender (if male=1, female=0)	-0.063	0.0027	-23.20***
Age	-0.018	0.000	-36.79***
Age Square	0.001	0.004	34.27***

Household Income Group (Basic Category: Lowe Income)

Lowe-Middle Income	-0.006	0.0044	-1.30
Middle Income	0.096	0.0043	22.09***
Upper-Middle Income	0.074	0.0051	14.50***
High Income	0.0418	0.0060	6.95***

Education (Basic Category:Primary or Below)

Secondary	-0.175	0.0077	-22.60***
High school	-0.197	0.0099	-19.72***
University	-0.2758	0.0058	-47.28***
Master's degree	-0.4059	0.0087	-46.34***
Doctorate	-0.485	0.0.051	-9.40***

Employment Status (if working = 1, otherwise = 0)

0.245	0.0028	42.91***

Marital Status (Basic Category:Single)

Married	-0.080	0.0046	-17.32***
Divorced	-0.172	0.0136	-12.63***
Widowed	-0.205	0.0096	-21.39***

General Health Status (Basic Category:Very Good)

Good	-0.026	0.0048	-5.45***
Fair	-0.105	0.0053	-19.55***
Poor	-0.137	0.0065	-20.87***
Very Poor	-0.145	0.0124	-11.57***

BMI (Basic Category:Underweight)

Normal Weight	-0.0172	0.0078	-2.21**
Overweight	-0.0388	0.0079	-4.86***
Obese	-0.055	0.0082	-6.69***

Note: Standard errors in parentheses;*** p<0.01, ** p<0.05, * p<0.1

According to Table 3, male individuals have a lower probability of accessing healthcare services compared to females. Another key finding is that age negatively affects healthcare access, but the square of age has a positive effect, suggesting that access decreases up to a certain age and then increases as age progresses. There is a strong positive relationship between income level and healthcare access, with middle and high-income individuals having better access than those with the lowest income.

Higher education levels negatively affect access to healthcare. Compared to individuals with primary or lower education, high school graduates have a 19.7% lower probability of accessing healthcare, and university graduates have a 27.58% lower probability. This decline is even greater for postgraduate education. Single individuals have better access to healthcare than married ones. Health status also impacts healthcare access, as individuals in poor health face more challenges (e.g., transportation, cost) in accessing services. Employed individuals have better access than unemployed individuals. Overweight and obese individuals are less likely to access healthcare compared to those with normal weight, as obesity can limit mobility and healthcare access.

These findings underscore the significant impact of socio-economic and demographic factors, such as income, education, age, and gender, on healthcare access. Addressing these factors could help reduce healthcare access inequalities.

CONCLUSIONS

This study aims to analyze the factors affecting access to healthcare using the probit model with data from the TurkStat Health Survey for the years 2014, 2016, 2019, and 2022. The results of the analysis reveal the impacts of factors such as income level, education level, age, employment status, general health status, and BMI on access to healthcare services. Based on the findings, the primary objective is to provide policy recommendations.

According to the study findings, male individuals are less likely to access healthcare services compared to females. This suggests that women may have an advantage in accessing healthcare. A study by [15] in the United Kingdom found that men seek healthcare services less frequently than women, which is consistent with the current study. It can be inferred that women are more likely to seek healthcare services or are more encouraged to utilize them. This may be due to men's lower interest in healthcare and lower awareness compared to women. Information campaigns on common health issues faced by men, such as heart diseases, diabetes, and types of cancer, could help address this gap. Men's lower access to healthcare suggests that awareness campaigns can encourage regular health check-ups for them.

The analysis indicates that age negatively affects access to healthcare, with older individuals being less likely to utilize healthcare services. This can be attributed to several interrelated factors, including reduced mobility due to aging, chronic illnesses or disabilities, financial constraints stemming from fixed or low incomes that make it difficult to afford treatment and medications, limited digital literacy that hinders the use of online appointment systems or telemedicine, and a lack of family support, which further complicates access to care. To address these challenges, policy measures such as age-friendly healthcare initiatives, expanded mobile health services, enhanced home care options, and increased financial assistance for older adults can play a critical role in improving access.

Higher-income groups have better access to healthcare services than lower-income groups, indicating that financial resources are a key determinant. [6] found that wealthier individuals benefit from greater access based on their income levels. [3] observed improvements after the Health Transformation Program, though income-based inequalities increased. [16] highlighted significant challenges for low-income individuals in accessing healthcare, an issue faced globally. These findings align with the current study. To reduce income-based healthcare inequalities, health insurance coverage should be expanded, and subsidies introduced to reduce costs for low-income groups. Increasing publicly funded healthcare services can also improve access for these groups.

Interestingly, a higher education level negatively affects healthcare access, possibly because more educated individuals use healthcare services less or prefer alternatives (e.g., private healthcare). As education level rises, access to healthcare decreases. Simplifying healthcare services can help more educated individuals better understand their health needs and utilize services. Personalized health plans and guidance could also improve access to accurate information for this group. Employment status positively affects access to healthcare, suggesting that comprehensive health packages could be offered to employees. Incentives like flexible working hours or health leave could help employees allocate time for health check-ups. These findings provide valuable insights for developing health policies and improving access for low-income and low-education groups, which is critical for improving overall health.

Reducing healthcare access inequalities is essential for the general health of the population. Health policies must be evaluated carefully, with steps taken to ensure fairer, more accessible healthcare services. The analysis highlights the importance of addressing factors such as income, education, and age in healthcare access and integrating these into health policies.

This study shows that inequalities in access to healthcare in Türkiye stem from structural factors such as income, education, and regional disparities, and that these issues are also widespread in many low- and middle-income countries (LMICs) with similar socioeconomic structures. Research conducted in countries like India, Brazil, and South Africa reveals that high out-of-pocket health expenditures and insufficient health insurance cause difficulties for low-income groups in accessing

healthcare services [17,18,19]. Türkiye's social health insurance system and Health Transformation Program serve as examples for other developing countries by reducing out-of-pocket expenses and increasing access. However, problems with healthcare access among low-income groups persist. Therefore, the Turkish experience provides an important reference and analytical framework for LMICs to understand and develop solutions for health inequalities.

Furthermore, this study offers significant insights not only for LMICs but also for developed countries. Although health systems in developed countries are generally more comprehensive and resource-rich, disparities in access related to socioeconomic factors such as income, education, age, and gender still persist. The analysis of access barriers and solutions in transitional health systems like Türkiye's can provide different perspectives for policies aimed at reducing health inequalities in developed countries. Considering the growing immigrant populations and vulnerable groups in developed countries, experiences from LMICs can serve as valuable references in developing strategies targeting these populations.

A limitation of the study is the lack of regional data for Türkiye, which prevented an assessment of regional effects on healthcare access. This limits the development of policies to improve healthcare access in rural areas. More healthcare facilities should be established in rural areas, and existing infrastructure should be improved. Future research should explore the differences in healthcare access between rural and urban areas in more depth and develop policies to address the specific barriers in these areas.

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THE IMPACT OF COMPETENCE AND COMPENSATION ON THE PERFORMANCE OF INFECTION PREVENTION AND CONTROL COMMITTEE MEMBERS WITH A PARTICULAR FOCUS ON THE MEDIATING ROLE OF COMPENSATION

Putu Agustin Kusumawati^{1*}, Samdin², Dedy Takdir², Ramadhan Tosepu³, Sudirman Zaid², Takdir Saili⁴, Nurwati², Nasrul², I Putu Sudayasa⁵

1. Concentration of Management, Postgraduate Program of Halu Oleo University, Southeast Sulawesi, Indonesia
2. Faculty of Economics and Business, Halu Oleo University, Southeast Sulawesi, Indonesia
3. Faculty of Public Health, Halu Oleo University, Southeast Sulawesi, Indonesia
4. Department of Animal Science, Faculty of Animal Science, Kendari, Universitas Halu Oleo, Indonesia
5. Faculty of Medicine, Halu Oleo University, Southeast Sulawesi, Indonesia

Correspondence: kputuagustin@gmail.com

ABSTRACT

INTRODUCTION:

The performance of Infection Prevention and Control (IPC) Committee members plays a critical role in ensuring effective healthcare safety protocols. Understanding how competence and compensation influence this performance, with particular attention to the mediating role of compensation, is essential for optimizing healthcare systems and improving outcomes. This study aimed to analyze the effect of competence and compensation on the performance of IPC committee members.

METHODS:

This study was conducted at the Regional General Hospital under the Southeast Sulawesi Provincial Health Office, Indonesia. A sample size of 212 members was determined based on geographical clusters. The data were then analyzed using the PLS-SEM technique.

RESULTS:

The path coefficient for the effect of competence on employee performance is 0.508, with a p-value of 0.000, which is statistically significant. The effect of compensation on employee performance is indicated by a coefficient value of 0.361, with a p-value of 0.000. Additionally, the coefficient value for the mediation effect of compensation between competence and employee performance is 0.242, with a p-value of 0.000.

CONCLUSION:

This study found that competence and compensation significantly and positively affect the performance of members of the Southeast Sulawesi IPC Committee.

KEYWORDS

HAIs, competence, compensation, performance; infection prevention and control committee

INTRODUCTION

Nowadays, quality healthcare has become a global concern [1,2]. In fact, every level of society has now realized the importance and demand for quality in healthcare services. For this reason, several countries have begun to establish various indicators to measure the quality of health services, including the accreditation of healthcare facilities such as clinics, public health centers, and hospitals [1,3,4]. Accreditation of hospitals aims to at least reduce the risk of infection. Infections in healthcare facilities, known as Healthcare Associated Infections (HAIs), are infections acquired by patients during the treatment process. These infections are either not present or have not yet entered the incubation period when the patient is admitted. Included in this category are infections that are acquired in the hospital but only appear after the patient is discharged. In addition to patients, HAIs can also occur in health workers and hospital staff [5,6]. According to a survey conducted in hospitals in the United States, there were 722,000 cases of HAIs in acute care units, resulting in 75,000 patient deaths from HAIs [7]. Meanwhile, several studies have found many cases of HAIs in Indonesia [8–10].

Infection prevention and control (IPC) should not be considered as a separate aspect of the health profession, but as a collection of principles that are crucial to implement in order to reduce the risk of infection for patients and others. Therefore, as an important indicator in improving service quality, every hospital is required to have an IPC committee [6]. In Southeast Sulawesi, all hospitals under the Southeast Sulawesi Provincial Health Office have established an IPC committee, comprising various healthcare professionals including IPC practitioners, IPC nurses, general practitioners, specialists, dentists, room nurses, and other health workers, with a total of 447 members as of March 31, 2023. However, despite this initiative, the performance of these IPC committees appears to have fallen short of expectations. The incidence of infections (HAIs) in Southeast Sulawesi Regional Hospital exceeds the national rate, standing at more than 1%. Furthermore, routine IPC reporting on a quarterly basis has not been implemented, indicating a gap in monitoring and evaluation processes [11].

Infection prevention and control (IPC) is a crucial aspect of healthcare quality [12–14]. All hospitals under the Southeast Sulawesi Provincial Health Office have established IPC committees, comprising various healthcare professionals. However, despite this initiative, IPC committee's performance has fallen short of expectations, with HAIs in Southeast Sulawesi Regional Hospital exceeding the national rate.

The non-optimal performance of IPC likely stems from various factors, with work competence being a significant contributor [14,15]. Work competence encompasses the knowledge, skills, and attitudes necessary for effective task execution. Employees equipped with adequate competencies excel in problem identification, solution implementation, and service standard maintenance. Additionally, competency significantly influences compliance with IPC protocols, a crucial aspect of infection prevention in hospitals [16–18].

Based on this background, this study aims to determine the impact of competence and compensation on the performance of IPC committee members, with a particular focus on the mediating role of compensation

LITERATURE REVIEW

Work competence has been shown to have a positive relationship with employee performance. Competence includes knowledge, skills, and attitudes required to carry out tasks effectively. Research has demonstrated that high competence is directly related to increased productivity and work quality. Employees with strong competencies are better at adhering to infection prevention measures, identifying problems, and maintaining high standards of service.

However, competence alone is not always sufficient to guarantee good performance. Other factors such as motivation, work environment, and psychological well-being also significantly influence performance. Studies suggest that while competence is crucial, it must be supported by good management and effective work systems to maximize its impact.

Another major factor influencing employee performance is compensation. Fair and competitive compensation can increase motivation and productivity. Research shows that financial incentives encourage employees to work harder and more efficiently. However, excessive financial compensation may undermine intrinsic motivation, causing employees to lose interest in their work beyond financial rewards. Thus, an optimal balance between financial incentives and a supportive work environment is necessary for improving performance.

This study examines the impact of competence and compensation on IPC committee members' performance, with compensation acting as a mediating variable. The literature review concludes with the identification of research gaps and the development of a conceptual framework for this study.

METHODS

This research is explanatory in nature, aiming to provide an explanation of the influence (causality) between variables through hypothesis testing. The study was conducted in Regional Public Hospitals under the Southeast Sulawesi Provincial Health Office, Indonesia. The population consisted of IPC members serving in 17 Southeast Sulawesi Regional Public Hospitals, totaling 447 IPC members. The sample size was determined using the Slovin formula with a 5% margin of error, resulting in 212 research samples. A probability sampling technique, specifically cluster random sampling, was used to select the sample. Cluster sampling was chosen because the population could be divided into geographic clusters.

Data collection was conducted through personal visits and online surveys using structured questionnaires. Questionnaire surveys can involve large samples without geographical restrictions. The data collection utilized closed-ended items with a fixed set of answers for respondents to choose from. The instruments used to measure variables were adapted from measures developed by several previous researchers.

Competency variables were measured using KSA-based competency indicators (knowledge, soft skills, hard skills, and attitudes) developed by Huang et al. [21] and Zhang [22]. The knowledge aspect includes understanding IPC protocols, infection control guidelines, and hospital hygiene standards. Soft skills encompass communication, teamwork, and adaptability in clinical settings, while hard skills involve technical expertise in infection prevention procedures. Attitudes were measured based on professional responsibility and commitment to infection control practices. Compensation was measured using indicators developed by Tessema & Soeters [23], covering financial and non-financial aspects. Financial compensation includes salary, incentives, bonuses, and benefits, while non-financial compensation involves recognition, career advancement opportunities, and job security. Employee performance was measured using task performance indicators developed by Koopmans et al. [24]. These indicators include efficiency in carrying out infection prevention protocols, adherence to hospital IPC guidelines, effectiveness in implementing infection control measures, and overall contribution to reducing Healthcare-Associated Infections (HAIs). The questionnaire employed a five-point Likert scale where respondents ranked each item according to 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

To ensure the indicators used in this study are valid and reliable, validity and reliability tests were conducted. The validity test employed included outer loading and convergent validity (AVE). Reliability was assessed using composite reliability and Cronbach's Alpha. The results of these tests are shown in Table 2. Table 2 indicates that valid and reliable indicators as a supporting model have an outer loading value above 0.50, composite reliability above 0.70, and AVE above 0.5. The test results showed that the outer loading and AVE values of all indicators were above 0.5, and both composite reliability and Cronbach's Alpha values were greater than 0.60. Based on these results, with the AVE coefficient above 0.50, and composite reliability and Cronbach's Alpha above 0.60, the overall data can be considered valid and reliable.

After data collection and the completion of validity and reliability tests, the data was analyzed. The analysis employed the PLS-SEM technique and was conducted in three stages: the measurement model evaluation stage, the structural model evaluation stage, and the hypothesis testing stage.

With the identification number 80/KEPK-IAKMI/VI.2023, the Indonesian Association of Public Health Experts' ethics committee in Southeast Sulawesi Province has authorized ethical clearance.

RESULTS

TABLE 1. MODEL FIT TEST

Variable	R ²	Q ²	SRMR
Compensation	0.449	0.218	0.086
Staff Performance	0.634	0.464	

The results of model fit testing presented in Table 1 indicate that the R² value for the effect of work competence on compensation is 0.449. This means that work competence explains 44.9% of the variation in compensation. Meanwhile, the R² value for employee performance is 0.634, indicating that work competence and compensation together explain 63.4% of the variation in employee performance. In addition to the R² criterion, the fit of the model can also be evaluated using the Q-Square (Q²) value. The Q² value is 0.218 for compensation and 0.464 for employee performance, indicating the model's predictive power of 21.8% for compensation and 46.4% for employee performance. Furthermore, model fit can be assessed using the Standardized Root Mean Square Residual (SRMR) indicator. A model is considered to have a good fit if the SRMR value is below 0.10. The SRMR value of the model used in this study is 0.086, which indicates that the research model has a good fit. Overall, based on a review of the model fit criteria, all indicators suggest that the research model has a good level of accuracy.

TABLE 2. RESPONDENTS CHARACTERISTICS

Demography	Category	Total	Percentage (%)
Gender	Male	73	34.43
	Female	139	65.57
Age (Years old)	22 – 31	29	13.68
	32 – 41	93	43.87
	42 – 51	81	38.21
	52 – 61	9	4.25
	62 – 71	0	0.00
Tenure (years)	01 – 10	94	44.34
	11 – 20	100	47.17
	21 – 30	17	8.02
	31 – 40	1	0.47
Employment	Civil servants	179	84.43
	Contract staff	7	3.30
	Honorary Staff	26	12.26
Types of Health Workers	IPC Practitioner	11	5.9
	IPC Nurse	16	7.55
	General practitioner	17	8.02
	Specialist	7	3.30
	Dentist	2	0.94
	Ward nurse	65	30.66
	Other health staff	94	44.34

In Table 2 shows that 73 respondents (34.43%) were male, while 139 respondents (65.57%) were female. The age of respondents ranged from 22 to 53 years, with the largest distribution in the range of 32 to 51 years, accounting for 174 respondents (82.08%). Only 9 respondents (4.25%) were older than 52 years. The tenure of respondents ranged from 1 to

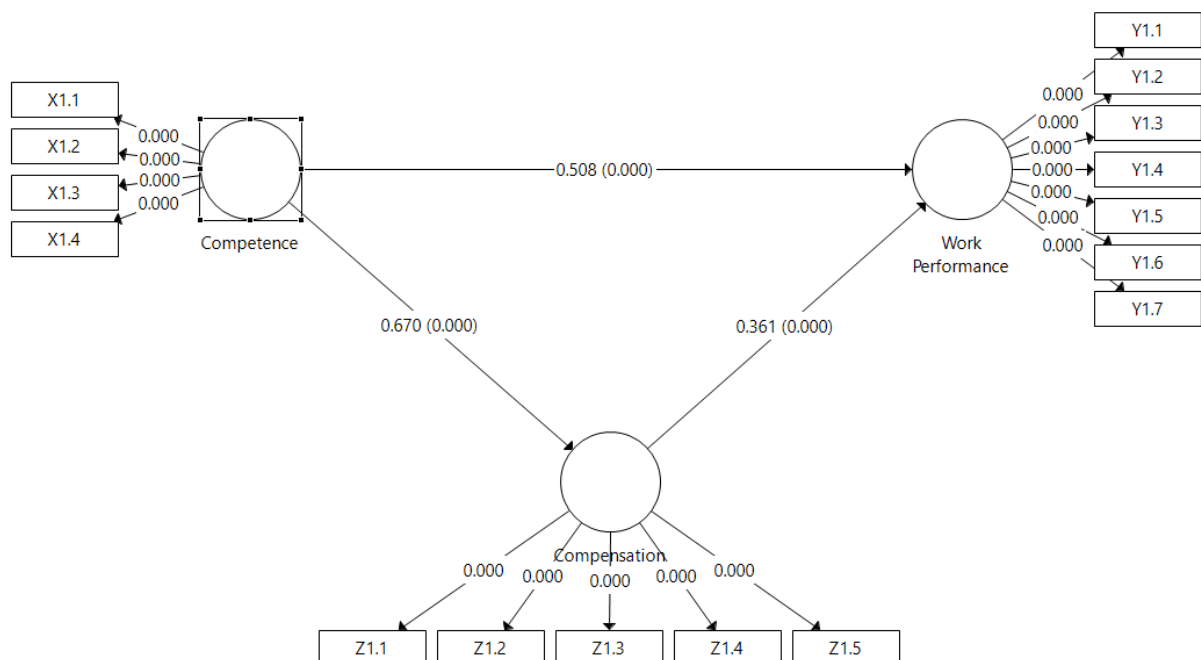
40 years, with the majority (194 respondents) having a tenure of 1 to 20 years. Most of the respondents (179 people, 84.43%) were civil servants. All respondents in this study were health workers who were members of the PPI Committee. The most common types of health workers were ward nurses (65 respondents, 30.66%) and other health workers (94 respondents, 44.34%).

TABLE 3. HYPOTHESIS TEST

	Correlations	Coefficient	t-stat	p-value	Caption
H1	Competence → Staff Performance	0.508	7.963	0.000	Accepted
H2	Competence → Compensation	0.670	16.553	0.000	Accepted
H3	Compensation → Staff Performance	0.361	6.212	0.000	Accepted
H4	Competence → Compensation → Staff Performance	0.242	5.935	0.000	Accepted

Table 3 shows that path coefficient for the effect of competence on employee performance is 0.508, with a p-value of 0.000 ($p < 0.05$). This indicates that the effect of competence on employee performance is positively significant. Similarly, the effect of compensation on employee performance is represented by a coefficient value of 0.361, with a p-value of 0.000, indicating that compensation has a significant positive effect on employee performance. Consequently, hypothesis 3, which states that compensation has a significant positive effect on employee performance, is supported. Additionally, the test results show that increasing competence significantly increases compensation. The coefficient for the effect of competence on compensation is 0.670, with a p-value of 0.000, demonstrating that competence has a significant positive effect on compensation. Therefore, hypothesis 2, which states that competence has a significant positive effect on compensation, is also supported.

FIGURE 1. THE RESULTS OF TESTING THE ROLE OF COMPENSATION AS A MEDIATING VARIABLE OF COMPENSATION IN THE RELATIONSHIP BETWEEN COMPETENCE AND EMPLOYEE PERFORMANCE



In Figure 1 shows that coefficient value is 0.242, with a p-value of 0.000. This indicates that compensation acts as a mediator in the relationship between competence and employee performance. Since the direct relationship between competence and compensation, as well as the direct relationship between compensation and employee performance, is significant, compensation serves as a partial mediator.

DISCUSSION

The results of this study support the hypothesized model and specifically reveal the mediating role of compensation in the relationship between employee competence and performance. Competencies, represented by knowledge, soft skills, hard skills, and attitudes, were found to positively and significantly influence both the compensation and performance of IPC committee members in Southeast Sulawesi. This finding aligns with Becker's Human Capital Theory [25], which posits that investment in knowledge and skills increases an individual's productivity and value in the labor market, subsequently leading to higher compensation. Additionally, it supports Vroom's Expectancy Theory [26], which suggests that employees are motivated to improve their performance if they believe that better performance will result in higher compensation.

This research is consistent with the findings of a study conducted by Martini et al. [14], which showed that employee competency development is closely related to improved performance and compensation. However, other studies have shown different results. For instance, Efendi and Yusuf [15] found that the relationship between competence and performance is not always mediated by compensation. They argue that other factors, such as organizational culture and managerial support, also play an important role in determining employee performance.

Hypothesis testing also helps to understand the effect of compensation on the performance of IPC Sultra Committee members. Compensation refers to any form of payment given to individuals for work performed for the organization. The results of this study indicate that compensation plays a significant role in influencing the performance of committee members. This finding confirms that a good compensation system can improve employee motivation and performance. Vroom's Expectancy Theory [26] is particularly relevant in this context. This theory suggests that individuals will be motivated to work harder if they believe that greater effort will result in better performance, which will eventually be followed by appropriate rewards, including compensation. Therefore, when IPC Sultra committee members feel that they are compensated fairly and in accordance with their contributions, they will be more motivated to improve their performance. Additionally, Adams' Equity Theory [27] also supports this finding. According to this theory, employees compare the ratio of their input (such as effort and competence) to outputs (such as compensation) with others in the organization. If they feel that they receive fair compensation compared to their peers, they will feel motivated and satisfied, positively impacting their performance.

Previous research also supports these findings. For example, a study conducted by Heneman et al. [28] shows a positive relationship between a good compensation system and improved employee performance. Similarly, research by Akbar et al. [29] indicates that competitive and fair compensation can increase employee motivation and performance. However, some studies show different results. For instance, research conducted by Ramli [12] found that in some cases, excessive compensation can reduce employees' intrinsic motivation. They argue that when employees focus too much on extrinsic compensation, they may lose intrinsic interest in their work, which can ultimately negatively impact performance.

The results of hypothesis testing also reveal the mediating role of compensation in the relationship between competence and performance among members of the Southeast Sulawesi PPI Committee. This study demonstrates that high competence, which includes knowledge, skills, and professional attitudes, can significantly improve performance through increased compensation. In other words, compensation acts as a mediator that strengthens the relationship between competence and performance. These findings are supported by Becker's Human Capital Theory [25], which states that investment in individuals' competencies through education and training increases their productivity and value to the organization. This increase in competence is then recognized and rewarded by the organization through increased compensation, which in turn motivates employees to work harder and improve their performance.

LIMITATION

This research has several limitations that warrant further in-depth investigation. Firstly, the study was conducted solely on IPC Committee members in Southeast Sulawesi, which may limit the generalizability of the results to other organizations or

regions. Future research could broaden the sample to include diverse regions and types of organizations to enhance the generalizability of the findings. Secondly, this study employed a cross-sectional design, which may not capture long-term changes in competence, compensation, and performance. Future research should consider using a longitudinal research design to examine how the relationship between competencies, compensation, and performance evolves over time. Additionally, this study did not account for other external factors that could influence performance, such as working conditions, organizational environment, and work culture. Future research could include variables such as working conditions, intrinsic motivation, managerial support, and organizational culture to provide a more comprehensive understanding of the factors affecting performance.

CONCLUSION

This study found that competence and compensation significantly and positively affect the performance of members of the Southeast Sulawesi IPC Committee. Competencies, including knowledge, skills, and attitudes, directly impact performance and also influence performance through increased compensation. Additionally, compensation itself has a significant positive influence on committee members' performance. Furthermore, compensation acts as a mediating variable in the relationship between competence and performance, suggesting that increased competence followed by appropriate compensation can effectively improve performance.

Meanwhile, several implications arise from this research. Organizations, especially the IPC Southeast Sulawesi Committee, need to focus on developing members' competencies through continuous training and education. It is crucial to ensure that the compensation system implemented is fair and competitive to motivate committee members to improve their performance. Decision makers in the health sector should consider increasing budget allocations for training and human resource development programs. They should also review the compensation system to align with employee contributions and competencies. Managers and team leaders in the PPI Committee need to adopt an approach that combines competency development and fair rewards to encourage better performance from their members.

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CONFLICT OF INTEREST

The authors report no conflict of interest.

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AUTHORS' CONTRIBUTION

All authors equally contributed to preparing this article.

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ORGANISATIONAL FACTORS IN RESIDENTIAL AGED CARE FACILITIES INFLUENCING SPECIALISED TEXTURE MODIFIED DIETS

Claudia Sauvage*¹, Sheree Lloyd²

1. Griffith University, Queensland Australia

2. University of Tasmania, Australia

Correspondence: cgs.apd@gmail.com

ABSTRACT

INTRODUCTION

Adherence to specialised diets when prescribed, is critical to support nutritional and general health and well-being for residents of aged care facilities. Understanding the organisational factors that health service and clinical managers action can address the nutritional health of residents of residential aged care facilities.

Objective: Identify the organisational factors that influence the delivery of prescribed textured modified diets in residential aged care facilities.

DESIGN:

A scoping review was conducted using searches across four databases. Papers were screened if they were published after 2014 in peer reviewed articles, in English and covered relevant concepts guided by the research questions. Organisational factors that influenced the delivery of prescribed diets in RACFs was then extracted from the studies that met the selection criteria and a quality assessment performed using the Critical Appraisal Skills Program (CASP) tool.

FINDINGS:

Thirteen articles were included in the scoping review. The studies were observational and predominately qualitative, with one study incorporating a mixed method design. Six dominant themes were identified as significant factors influencing the influence the delivery of prescribed textured modified diets in residential aged care facilities.

CONCLUSION:

Based on the evidence identified in this scoping review, it highlights a significant gap in research that explores the multifactorial, organisational factors that influence the delivery of prescribed texture modified diets in residential aged care facilities. Recent knowledge from the Royal Commission into Aged Care Quality and Safety and the Aged Care Quality Standards can aid residential aged care facilities, tailored specifically to the organisation, can ensure the highest quality of care and standardised practices are provided for accurate and safe delivery of prescribed texture modified diets.

KEYWORDS

Texture modified diets, dysphagia, organisational barriers, residential aged care facilities.

INTRODUCTION

Dysphagia is the medical term for the complication or inability to swallow, classified by the World Health Organisation as both a disease and functioning disability. [1] Diagnosed by an interprofessional team, using tests and x-rays, dysphagia affects 8% of the global population, and presents as heterogeneous observable and non-observable symptoms such as pain or difficulty with sucking, drinking, chewing, eating, controlling saliva and food lodged within the oesophagus or chest. [1-3]

Accurate assessment of dysphagia, specifically the origin and severity are necessary to determine the most appropriate recommendation for the types of texture modified food and fluid thickness [4]. Speech language pathologists (SLP) in Australia and internationally are also referred to as speech language therapists and hereafter will be referred to as SLPs. SLPs study, diagnose a heterogeneous range of communication disorders and specialise in helping individuals experiencing difficulties with swallowing and associated issues. [5] One of the important roles of a SLP, is to prescribe specific texture modified diets (TMDs) [6]. For individuals who suffer from dysphagia, texture modified diets (TMDs), encompassing both food and fluids, are prescribed to aid in reducing risk of adverse events such as aspiration or choking. [1,7,8] Prescribed TMDs are minced, softened, blended, pureed, cut into bite size pieces, or moistened by adding water. [3] Moreover, TMDs include the use of thickened fluids, which facilitates movement of swallowing, therefore enhancing safety. [10]

In 2019, the International Dysphagia Diet Standardisation Initiative (IDDSI) developed a standardised framework for TMDs, including six classifications for food and five for fluid. [8] Previous to the introduction of the IDDSI framework, TMDs created several challenges managing dysphagia, lack of standardisation and description of the modification levels, inconsistency of staff education and knowledge. [9] The incidence of inappropriately managing dysphagia through TMDs can result in increased risk of malnutrition, dehydration, and related weight loss. [3]

Due to age related physiological degradation, in combination with the clinical sequelae of comorbidities, the aged population are at an increased risk of developing dysphagia. [7] Within this demographic, a high prevalence of 40-68% of adults living in residential aged care facilities (RACFs) are affected by dysphagia. [5] Internationally, RACFs are also referred to as nursing homes, however in this study, they will be referred to as RACFs. The multifactorial delivery of TMDs, prescription, menu planning, meal preparation, delivery and mealtime assistance if required requires numerous staff members. Importantly, the clarification of the two staffing categories prominent within this review, professional (SLPs, dietitians and nurses) and frontline (nursing aids, carers, support staff, kitchen staff).

Minimal research has been performed within RACFs, specifically from a staff and resident perspective concerning the operational barriers in which affect the appropriate provision and delivery of prescribed TMDs. [11,18,22,23] Therefore, the aim of this scoping review was to identify the organisational factors that influence the delivery of prescribed TMDs in RACFs. This scoping review is guided by the research question, "what are the organisational factors that influence the delivery of prescribed TMDs in residential aged care facilities?". By understanding the organisational factors health service and clinical managers can respond to address them and improve the outcomes for residents of RACFs in Australia and internationally.

METHODS

This scoping review was conducted by a master's student completing a health project at an ACHSM accredited Australian University under the Supervision of an academic. A scoping review method was utilised and is a beneficial approach to identify the research available, gaps in the literature, types of studies and explain relevant definitions and conceptual boundaries [12]. Furthermore, a scoping review can assist with mapping and synthesising the key theories within the research topic and findings can be applied to inform policy, practice, and future research. [13] This scoping review was conducted through employing Levac et al.'s methodological framework, which adopts six stages (Table 1) [12].

TABLE 1: OVERVIEW OF LEVAC ET AL.'S METHODOLOGICAL FRAMEWORK.

No.	Characteristic	Description
1	Identify the research question	The research identified was to answer the following research question: "what are the organisational factors that influence the delivery of prescribed textured modified diets in residential aged care facilities?".
2	Identify relevant studies	Relevant studies were identified and guided by the research question. This process was in collaboration with an experienced librarian to formulate search terms and identify relevant databases.
3	Study selection	The screening of selected studies, the title and abstract were reviewed, if relevant, the full article was read.
4	Chart the data	Charting of the data, a content analysis was used to draw concepts from each study.
5	Collate, summarise, and report results	Adopting a systematic framework to deliver a thematic summary of the literature.
6	Consultation	Is optional, allows for stakeholder and consumer involvement opportunity, however it is extraneous in this circumstance.

INCLUSION CRITERIA

Stage 2 of Levac et al.'s methodological framework involved the inclusion of studies which explored the organisational impacts of individuals who suffer from dysphagia and have prescribed TMDs, the diagnosis of dysphagia and subsequent prescription of a texture modified diet was required for inclusion. However, if study samples reported that individuals suffered from other conditions and were prescribed TMDs, these were included. Participants were included if they were on normal diets, to explore potential correlations between organisational factors of TMDs compared to normal diets. Furthermore, studies that applied both an interventional and observational methodologies. Studies published later than 2014, peer reviewed articles, English language and addressing relevant concepts were initially screened.

DATA SOURCES

A literature search was conducted including the following databases: CINAHL (Ebsco with full text), SCOPUS, Cochrane, and PubMed. Collaborating with an experienced librarian, the search strategy was constructed utilising the building block and Boolean techniques and shown in Table 2.

TABLE 2: KEY SEARCH STRATEGIES UTILISED.

Key Term	Building Block
Dysphagia	("dysphagia" OR "deglutition disorder")
RACF	("aged care" OR "nursing home")
Organisational factor	(barrier*" OR "challenges")
NB Search blocks were formulated by combining with AND, combining with synonyms and word truncations with OR using both text word and headline.	

The search strategy was tested initially in CINAHL, translated to the other databases. The key terms originated by cross checking search words from related studies, thesauri terms, and suggestions from the librarian. Utilisation of a useful tool for complex and heterogenous evidence, a snowballing search methodology was additionally employed. [14] The final papers for inclusion were imported into Endnote 20 bibliographic software.

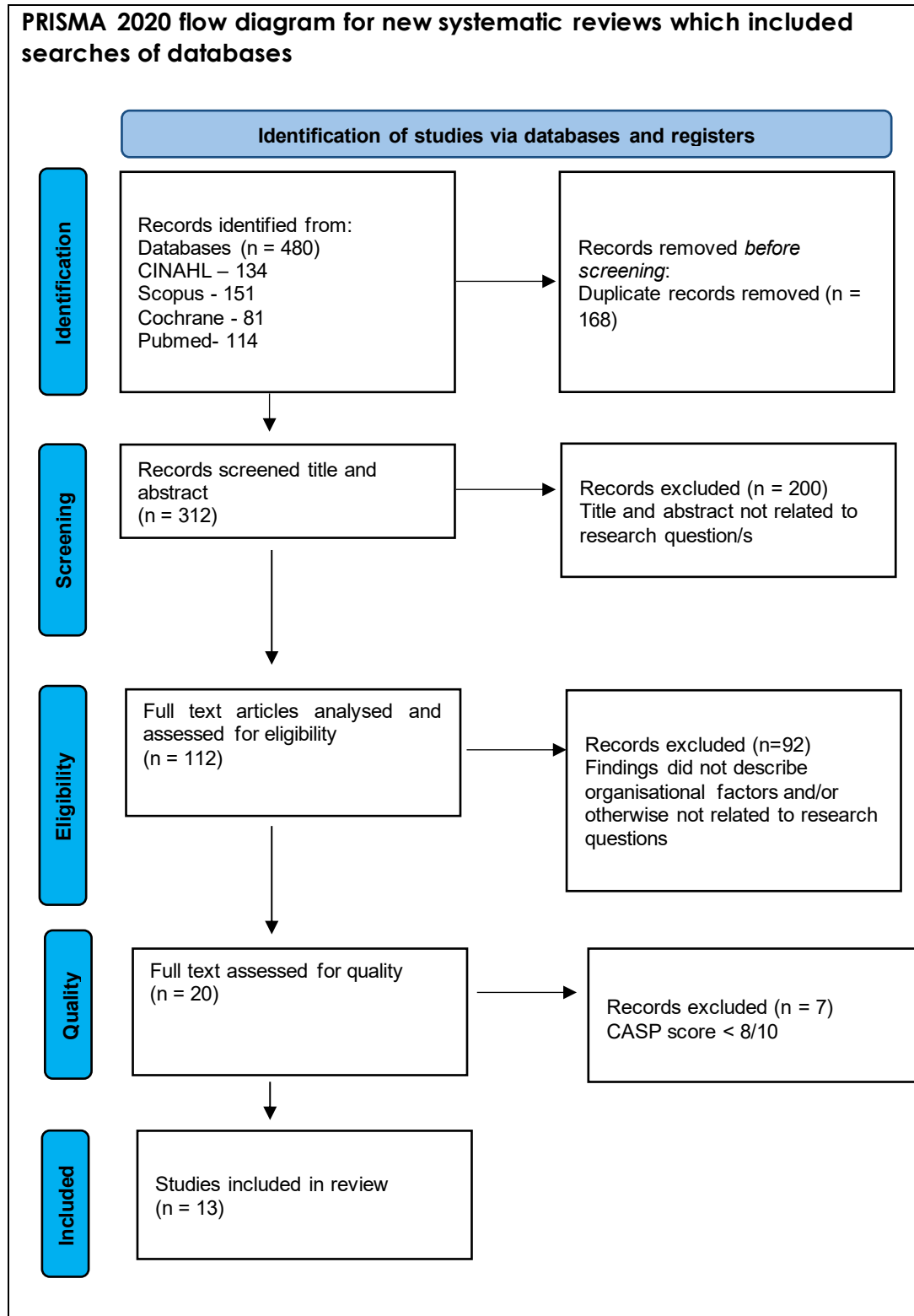
DATA COLLECTION AND ANALYSIS

The researcher extrapolated data from the studies that met the selection criteria. Data items extracted included author(s), publication date, country of publication, objective of the study, research design, quality score and organisational factors influencing TMDs. Critical analysis of the papers involved evaluating the quality of research design using the Critical Appraisal Skills Program (CASP) tool and assessing articles against the ten criteria [15]. The articles that received a standardised rating over 8/10 met the selection criteria. This score was discussed with the author's academic supervisor, a senior university lecturer with a PhD qualifications and experience in Scoping Review methodology. This ensured an appropriate level of study quality were included. Data was collected from the included studies using an Excel spreadsheet. Relevant and applicable data extracted from each paper was analysed and themes and sub themes identified.

RESULTS

The initial search resulted in 480 articles generated from the search strategy, as presented in the PRISMA flow diagram (Figure 1). Initially duplicates were removed, then relevant article titles were screened and the abstracts read, and papers not related to the research question were removed. Full text articles were then analysed and a further 92 papers excluded as the paper findings did not discuss organisational factors related to the topic under study and/or were not relevant to the research question. The CASP appraisal was conducted on 20 articles, with 7 papers excluded as their CASP score was less than 8/10 and after discussion with the academic supervisor. This resulted in 13 articles that were included in the scoping review. The included studies comprised of 12 qualitative, observational studies and 1 interventional study incorporating a mixed method design.

FIGURE 1: PRISMA FLOW DIAGRAM FOR SCOPING REVIEW, ADAPTED FROM REJÓN-PARILLA ET AL. [14] AND PAGE ET AL. [31].



The articles included in the review were based in a broad range of countries, Australia, Norway, Germany, USA, UK, and Canada. A variety of methods were applied in the studies included with varying sample sizes and participants including front-line staff, managers, family members and clinicians (Table 3).

TABLE 3: STUDY DESIGN CHARACTERISTICS OF ARTICLES INCLUDED IN SCOPING REVIEW

Study Design	Article & Ref. Number	Type	Location	Characteristics	Participants
Survey	Burger et al. (2019) [18]	Cross sectional Survey	Germany	National survey Completed on an organisational level	RACFs n= 563
	Garcia et al. (2018) [19]	Longitudinal survey	Kansas State, USA Multiple settings	Multi-site survey Two time periods	Professional & frontline staff N=175
Focus groups/interviews	Austbø- Holteng et al. (2017) [17]	Semi structured focus groups	Norway One RACF	Interviews categorised by individual	Professional & frontline staff n=12
	Keller and Duizer. (2014) [7]	Semi structured focus groups	One province in Canada Multiple RACFs	Interviews n =12, categorised by individual staff group	Professional & frontline staff n= 80
	Pownall et al. (2019) [21]	Semi structured focus groups	Four RACFs within one city in the United Kingdom	Completed by the home care or quality manager within that organisation	Professional & frontline staff n=37 Managers n=8
	Bennett et al. (2014) [25]	Semi structured interviews	Multiple RACFs in rural and metro Australia	Interviews n =10, categorised by individual staff group	Professional & Frontline staff n= 61
	Ilhamto et al. (2014) [20]	Semi structured interviews	Canada 25 RACFs	Interviews n= 25 categorised by individual staff group	Professional & frontline staff n= 48
	Shune and Linville. (2019) [22]	Semi structured interviews	USA Multiple RACFs	Individual interviews	Residents with dysphagia n= 3 Family Member n= 3 Professional & frontline staff n= 15

Study Design	Article & Ref. Number	Type	Location	Characteristics	Participants
	Ullrich and Crichton. (2015) [23]	Semi structured interviews	Australia 2 RACFs	Individual interviews	Residents with dysphagia n= 3 Family Member n= 6 Professional & frontline staff n= 19
	Wang D et al. (2020) [24]	Semi structured interviews	Australia Multiple RACFs	In-depth individual interviews	Residents with dysphagia n=7 Professional & frontline staff n=7
Multiple part designs	Abbey et al. (2015) [16]	Longitudinal three-part study: 1. National survey 2. Menu review 3. Reflective journal	One Australian RACF	Completed on an organisational level 66% metropolitan & 34% rural RACFs	Professional & Frontline staff 1. Survey n= 274 2. Menu review n= 161 3. Reflective journal n= 36
	Bennett et al. (2015) [10]	1. Residential file review 2. Mealtime observation 3. Questionnaire	Two rural Australian RACF		1. Resident review n= 14 2. Mealtime observations n= 41 3. Staff n=29 & Resident n = 14 questionnaire
	Hill et al. (2021) [11]	1. Focus groups 2. Meal audits	One rural Australian RACF	Part 2 conducted to compare the TMD prescribed versus delivered to residents	1. Professional & frontline staff n=11 2. n= 41 audits including 14 residents.

TABLE 4: DESCRIPTION OF DOMINANT THEMES IDENTIFIED IN THE PAPERS RELATING TO ORGANISATIONAL FACTORS

Theme 1 - Autonomy & quality of life		
Subtheme	Article	Description
Resident autonomy	Abbey et al. (2015) [16]	Compromised autonomy of resident's food choices.
	Hill et al. (2021) [11]	Staff were unsure of how to proceed when residents requested food outside of their prescribed TMD.
	Wang et al. (2020) [24]	Decisions made on the corporate level of the organisation resulted in no room for individual variation, leaving staff feeling frustrated with TMDs.
	Garcia et al. (2018) [19]	Staff felt distress with providing meals outside resident's choice and experienced comfort in changing the prescribed TMD more to suit resident's choice.
Lack of choice	Burger et al. (2019) [18]	Not all TMD levels were available. Not as many options on the menu as a normal diet.
	Shune and Linville. (2019) [22]	Not as many options on the menu as a normal diet.
	Keller and Duizer. (2014) [7]	Not as many options on the menu as a normal diet. Staff deviating from the set menu to provide more variety.
	Pownall et al. (2019) [21]	Not as many options on the menu as a normal diet. Staff deviating from the set menu to provide more variety. Multiple instances of compromised quality, provision, and variety of TMD.
Visual presentation	Austbø-Holteng et al. (2017) [17]	Presentation of food caused staff to feel bad about serving specific meals.
	Keller and Duizer. (2014) [7]	Presentation of food caused staff to apologise about serving specific meals, changing meals, or offering more of visually appealing foods.
Dignity & risk	Garcia et al. (2018) [19]	Staff felt that residents should be able to choose their dietary intake despite their prescribed TMD.
	Ullrich and Crichton. (2015) [23]	Risk management is needed to be further explored to balance the risk of the patient consuming foods not prescribed and the wishes of the resident.
	Shune and Linville. (2019) [22]	Conflicts between resident's choice and limitations with risk for the organisation. Risk management is needed to be further explored to balance the risk of the patient consuming foods not prescribed and the wishes of the resident.

Theme 2 Adherence		
Subtheme	Article	Description
Stakeholder acceptance	Garcia et al. (2018) [19]	If caregivers/servers/family members/staff/friends had a negative attitude towards TMD, this would impact on the resident and the adherence to delivering the prescribed TMD. Staff felt a level of comfort modifying the recipe if they perceived it was making the resident happier or meeting their wishes.
	Ilhamto et al. (2014) [20]	Staff expressing negative attitude toward the pureed diet, potentially influencing resident's perception and furthermore their dietary intake.
Stakeholder Acceptance	Shune and Linville. (2019) [22]	Staff's investment and demonstration of acceptance of the TMDs resulted in higher adherence.
Modification of TMD	Abbey et al. (2015) [16]	Kitchen staff interpreted the menu and made modifications as they thought appropriate.
	Bennett et al. (2014) [10]	Poor adherence or regard by staff for the documented prescribed TMD.
	Burger et al. (2019) [18]	Kitchen staff interpreted the menu and made modifications as they thought appropriate.
	Hill et al. (2021) [11]	Staff reported feeling undervalued or "at the bottom" of the organisational hierarchy and had become complacent to keeping the prescribed TMD for residents.
	Ilhamto et al. (2014) [20]	Kitchen staff, due to experience, used the recipe as a starting point and made modifications as they thought appropriate.
	Keller and Duizer. (2014) [7]	Kitchen and nursing staff interpreted the menu and made modifications as they thought appropriate.

Theme 3 - Communication & Documentation		
Subtheme	Article	Description
Inter Staff communication	Austbø -Holteng et al. (2017) [17]	Lack of effective communication between kitchen and nursing/nursing aid/carer staff to deliver accurate prescribed TMD.
	Burger et al. (2019) [18]	Interdisciplinary approach is needed, establishing process and communications between professional and frontline staff.
	Hill et al. (2021) [11]	Communication breakdown between professional and frontline staff Poor handover between professional and frontline staff. Misunderstanding of SLP's recommendations and no opportunity to clarify.
	Shune and Linville. (2019) [22]	Interdisciplinary approach, all team members are supported and included. Breakdown in effective communication is a major barrier.
	Ullrich and Crichton. (2015) [23]	Communication breakdown between professional and frontline staff, especially communicating change.
	Keller and Duizer. (2014) [7]	Communication breakdown between professional and frontline that compromises resident safety.
Poor documentation	Bennett et al. (2015) [25]	Staff not aware of specific mealtime management or prescribed TMD for specific residents. Discrepancies of documentation for updated prescribed TMDs.
	Hill et al. (2021) [11]	Frontline staff reporting resident's files not updated or incorrectly completed. Opportunities for error due to manual data input and multiple documentation to complete.

Theme 4 - Knowledge & Training		
Subtheme	Article	Description
Lack of knowledge	Hill et al. (2021) [11]	Lack of knowledge resulting in lack of confidence in manually thickening fluids to deliver prescribed TMD.
	Ullrich and Crichton. (2015) [23]	Lack of TMD specific knowledge.
	Shune and Linville. (2019) [22]	Lack of knowledge resulted in a correlation with staff's attitudes and beliefs negatively impacting resident's prescribed TMD.
	Wang et al. (2020) [24]	Lack of knowledge and opportunity to increase their specific TMD knowledge.
Lack of training	Hill et al. (2021) [11]	Limited organisational training, this was a driver for confusion and knowledge deficiencies.
	Pownall et al. (2019) [21]	Limited organisational opportunities for training or upskilling in the specific area of TMDs. This access varied across RACFs and there was a lack of standardised training specifically with TMDs.
	Shune and Linville. (2019) [22]	Lack of organisational training.

Theme 5 - Financial, time and Staffing Pressures		
Subtheme	Article	Description
Finances	Bennett et al. (2015) [25]	Impacted of staff shortages and the ability to prepare, deliver, and feed residents.
	Hill et al. (2021) [11]	Staff felt they could not offer recommendations for improving processes due to associated costs it could incur.
	Shune and Linville. (2019) [22]	Staff asked to do more with the visual representation of TMDs despite the budget cuts.
	Wang et al. (2020) [24]	TMDs require more resources and equipment.
	Burger et al. (2019) [18]	TMDs require more resources and equipment.
Time pressure	Burger et al. (2019) [18]	Increased time pressure to prepare, deliver and feed residents requiring high care during mealtime.
	Austbø- Holteng et al. (2017) [17]	Staff reported that assisting residents with TMDs is time consuming and takes away from the capacity to help other residents.

Theme 5 - Financial, time and Staffing Pressures		
	Bennett et al. (2014) [10]	Nurses reported time considerations resulted in AIN or care staff assisting feeding with residents on TMDs.
	Hill et al. (2021) [11]	Staff reported strict time pressures resulted in the opportunities for errors with delivering TMDs.
	Wang et al. (2020) [24]	It was calculated that 6 minutes per resident were allocated to assist with feeding. Work hours are cut for staff due to RACF budget cuts.
Staff shortages	Hill et al. (2021) [11]	Short staff, access to SLPs, limited staff knowledge resulting in staff members discouraged to deliver prescribed TMDs.
	Bennett et al. (2014) [10]	Residents requiring high care during mealtime, this was not observed due to staff resourcing.
	Pownall et al. (2019) [21]	Not enough staff at mealtimes to support residents to safely consume TMD.

Theme 6 - Staff Roles & Responsibilities		
Subtheme	Article	Description
Inconsistent staff roles & responsibilities	Bennett et al. (2014) [10]	Residents being put on TMDs that were not prescribed through SLP.
	Bennett et al. (2015) [25]	A wide range of reported responsibilities from staff members Staff felt responsible for making a prescription of a TMD of a resident if they saw them struggling to chew or cough. Lack of defined consensus of who makes or modifies the prescription of resident's TMD.
	Hill et al. (2021) [11]	Nursing staff reported that the role of SLP's as unnecessary and that they were equipped to make the decision regarding a resident's TMD. Poor knowledge of the specific role of SLPs.
Lack of support from management	Hill et al. (2021) [11]	Feel there is not opportunity to express concerns or question the processes.

DISCUSSION

The aim of this scoping review was to identify the factors that influence the delivery of prescribed textured modified diets in RACFs. Six themes with relevant sub themes were identified within the literature and found to influence the delivery of prescribed TMDs in RACFs.

AUTONOMY & QUALITY OF LIFE

The lack of choice with prescribed TMDs compared to normal diets and the visual presentation was reported to compromise residents' autonomy [7,11,16-19, 21, 22, 24, 25]. Residents refusing to consume their TMD and staff members uncertainty as to how to best balance the resident's wishes with their clinical prescription were described. [11,19] TMDs are recommended to manage dysphagia, however, have been found to be nutritionally insufficient compared to normal diets in terms of their energy, protein, fiber, and micronutrients [27, 28] and puts residents at risk of malnutrition. [23, 27,28] This in combination with residents not wishing to consume their TMD prescribed meals can have significant nutritional consequences. [30] Reported as aesthetically unappealing, the included studies identified that redevelopment to improve the palatability, enjoyment, and visual appearance of TMDs was needed. [17, 18, 20, 22] The reform of meal appearance and utilisation of food molds to improve presentation has been shown to increase the appeal of TMDs and subsequently increased resident consumption. [17,18, 22,30]

Clearly identified throughout the literature was the need for managerial and organisational support to empower residents and staff members to negotiate the difficult pathways of balancing the autonomy of resident with clinical prescriptions and risks to the organisation. [11,22,26,27,30] The law states that if the resident has capacity to make an informed decision regarding consumption of a TMD, understands the associated risks with refusal, TMDs have been communicated and understood then the resident has the right to refuse. [30]. However, in many instances resident cognitive capacity has declined and the next of kin may not be able to make the decision on the resident's behalf. [30]

Guided by the Royal Commission into Aged Care Quality and Safety report and the Aged Care Quality Standards, regarding consumer dignity and choice, consistent implementation of supporting organisational policies and legislations [11,22, 30, 32]. Further exploration of culture change and consistent centralised organisational risk management is needed to assist staff to balance the autonomy, dignity, and risk of residents. [22,25]

ADHERENCE

Several key stakeholders affected the accurate deliverance of prescribed TMDs to residents, including family, friends, and staff. Highlighted within the literature were dominant themes of negative attitudes towards TMDs that influenced resident's attitudes and compliance, and subsequently the nutritional status of residents. This decreased staff's adherence to the production and delivery of prescribed TMDs to residents. [10, 11, 20] Consequently, safety risks, organisational medico legal implications could result from a lack of adherence to the clinically prescribed TMD. [11,17, 20]

The IDDSI, is a standardised framework for TMDs and describes six classifications for food and five for fluid. [8] This evidenced based framework provides organisations with objective, measurable and internationally standardised definition to describe TMDs. The standards can be used to formulate TMDs that can be utilised by all ages, in heterogeneous cultures and care settings. [11] The importance of adopting this international standard, equips organisations to deliver consistent implementation strategies aimed to provide frameworks, reduce confusion, opportunity for errors. [3,11, 17, 21]

Collaboration and consultation with key staff members are integral to changing cultures, attitudes, creating greater buy in, staff self-efficacy and invaluable insight into the barriers and challenges with TMDs. This can aid to improve adherence to the prescribed TMDs and navigate the adoption and standardisation of the IDDSI framework to integrate into specific organisations. [3,18, 22, 23]

COMMUNICATION & DOCUMENTATION

Ineffective staff communication or handover procedures were highlighted within the literature as one of the most prevalent factors for adverse resident incidents and a significant barrier to the accurate delivery of prescribed TMDs. [7,11, 17, 22, 23] the breakdown of communication compromises resident safety and reduces the quality of care provided [7,11, 22, 23] The literature highlighted segregation and ineffective communication between professional and frontline staff [18, 22, 23]. This was especially apparent when changes to TMDs were made, and poor communication resulted in inaccurate delivery of revised prescriptions. Staff were noted to communicate changes within their staff category, but not across the multi-disciplinary team. [7,11, 22] This was highlighted in the literature and related to the misunderstanding of roles, accessibility, and time. These factors have been emphasised with ineffective and accurate documentation of resident's prescribed TMDs. [7,11] Staffing cohesion, with managerial and organisational support fosters a multidisciplinary approach, valuing the role of each staff members. Subsequently promoting more effective open lines of communication to increase resident safety, quality of care provided. [7,17, 22, 25]

KNOWLEDGE & TRAINING

Pivotal for resident safety and quality of care, standardised staff knowledge and training is critical. [11] Lack of training and knowledge are intricately linked, a significant percentage of staff, within the literature, reported that they did not receive any TMD specific training. [11,21, 22, 23] It was found that the lack of training at the organisational level, with staff members calling for onboarding and ongoing training specific to management of TMDs. [11,21, 22, 23] The lack of training affected the lack of knowledge specific to TMDs, leading to discrepancies of standardised knowledge, staff's confidence in managing TMDs and misconceptions of the diets themselves [7,11, 22, 23]. Directed by the Royal Commission into Aged Care Quality and Safety final report, onboarding processes and regular organisational training is needed to equip staff members with the knowledge, confidence, and skills to navigate safe practices with TMDs. [7,11, 23, 30].

FINANCIAL, TIME AND STAFFING PRESSURES

The literature and the Royal Commission into Aged Care Quality and Safety final report highlights that the preparation and delivery of TMDs in RACFs are impacted by limited budget allocations. [11, 17,18, 22, 24, 30] The financial implications of implementing and delivering TMDs are more than normal diets. There are higher costs involved in the equipment required, time to prepare and the time taken to manually feed resident's [10,11,18, 22, 24] These constraints were barriers to offering increased quality, choice, variety and less TMDs being prepared compared to what was prescribed. [11,18, 21,22, 24]

The increased pressure on staff to efficiently run mealtimes conflicted with resident's need for assistance with their TMDs, which resulted in errors in both preparation and delivery [18, 24]. Staff reported that the additional assistance required during mealtimes took away from their capacity to help others and impacted on time and financial resourcing. [11,17, 24] The literature suggests the adequacy of staff resourcing impacts on the standard of care during mealtimes, and the ability for essential staff members to safely assist residents. [11, 21]

In conjunction with the Royal Commission into Aged Care Quality and Safety final report and organisational policies and procedures, analysis and revision of resource allocation is necessary [7,11, 24, 30]. Key stakeholder insights into the needs of the organisation are a key factor to ensure the resources, time and staffing considerations are met to deliver safe and accurate prescribed TMDs. [7,18,17,22, 24, 30]

STAFF ROLES & RESPONSIBILITIES

Perspectives within the literature from staff, family and residents depict ongoing barriers for effective multidisciplinary care, inconsistencies among the standardised roles and responsibilities between what staff believed were included within their role description. [10, 11, 22] Specifically, the role of who prescribed and changed the prescription of TMDs, frontline staff were found to change the resident's diet to a TMD or modify the level of TMD on the spot without SLP consultation. [10,11] This inconsistent understanding of the staffing roles within the multidisciplinary team can result in confusion, inappropriate prescription of TMDs and compromised the safety and quality of care for residents. [10, 11, 22] Breaking down misconceptions, increasing collaboration, clarifying standardised roles and responsibilities can be resolved through the effective onboarding and regular specifically target training of TMDs. [10,11]

IMPLICATIONS FOR PRACTICE

A key purpose of scoping reviews is to identify gaps in the literature, and we have found a distinct gap of knowledge relating to dysphagia management in the literature. A significant number of adults (40-68%) living in RACFs are affected by dysphagia, however there is minimal research investigating the organisational factors that influence the delivery of prescribed TMDs in RACFs [4]. The six key themes highlight the importance of respecting residents' autonomy and quality of life. In managing dysphagia, it is essential to balance dignity and risk by supporting residents' informed choices about their diet. This approach should be more widely accepted, trained, and implemented to enhance their quality of life, even when some risk is involved [11, 24, 25, 27, 30]. Guided by the Royal Commission into Aged Care and the Aged Care Quality Standards, organisations should adopt best practices in introducing texture modified diets alongside balancing the dietary preferences of individuals with recommended dysphagia management [30, 32]. A major gap identified was the lack of specific knowledge and training in dysphagia management. It is recommended that consistent and effective training on the safe delivery of texture-modified diets (TMDs) be included in staff onboarding and provided regularly at an organisational level [7, 11, 22, 23].

Organisational impacts of budget, time and staffing pressures need to be considered to meet the current standards and the growing need to facilitate safe and support residents prescribed a TMD. [7, 11, 18, 22, 25, 30] Overall, a multidisciplinary approach needs to be adopted within RACFs to close the division between professional and frontline staff, this unity will aid to improve the communication and documentation issues that were highlighted, facilitating safer and more accurate delivery of TMDs. [7, 17, 22, 25] This multidisciplinary approach should include collaboration with all stakeholders. Managers can encourage continual review and improvement to dysphagia management practices by seeking feedback and input from staff and providing opportunities to all members of the multi-disciplinary team to share their views. [7, 18, 17, 22, 25] This could minimise the factors of staff's adherence to the standardised preparation of TMDs, increase acceptance, create great investment, allow staff to feel more involved in the decision-making process and feel valued and heard [18, 20, 21]. Lastly encouraging a multidisciplinary approach, allows for staff members to understand the individual and important role each discipline plays, additionally creating clear scope of practices to mitigate confusion of perceived roles and responsibilities. [10, 17, 20, 28] This study offers insights into strategies for addressing key challenges in adherence to texture modified diets in aged care. The findings also suggest areas for future research aimed at reducing the impact of these challenges and improving the accuracy and safety of delivering prescribed texture-modified diets (TMDs).

CONCLUSION

Based on the evidence identified within this scoping review, it highlighted the significant gap in research that explores the multifactorial factors influence the delivery of prescribed TMDs in RACFs. The aim of this scoping review was to identify of the organisational factors that influence the deliver prescribed TMDs in RACFs. Thirteen studies met the inclusion criteria, they were reviewed and analysed. Six themes were highlighted to be dominating factors that addressed the research aim, 1. autonomy & quality of life, 2. adherence, 3. communication & documentation, 4. knowledge & training, 5. financial, time and staffing pressures, 6. staff roles & responsibilities. Given the current and growing prevalence of individuals in RACFs with dysphagia, further research needs to be conducted to investigate the dominant themes identified to improve the accuracy and safety of the delivery of prescribed TMDs. Recent knowledge from the Royal Commission into Aged Care Quality and Safety can aid RACFs, tailored specifically to the organisations can ensure that they are providing the highest quality of care and standardised practices to ensure the accurate and safe delivery of prescribed TMDs.

STRENGTHS & LIMITATIONS

The strength of this study was to identify a gap in the literature in relation to the organisational factors relating to texture modified diets in aged care and informs future research. A systematic review sits at the top of the evidence hierarchy however scoping reviews are increasingly applied to respond to complex questions and where comparing interventions may be possible or relevant [33]. Limitations and strengths in the final papers included. These related to the study design, methodology and participant characteristics of the thirteen studies included within this scoping review. Multiple studies

included numerous RACFS for the settings of their studies, which broadens the scope, depth, and generalisability of the results. [7,10,18-25] Several studies included residents, friends, and family members additionally to staff to gain numerous perspectives of the delivery of prescribed TMD, expanding the strength and richness of data collected. [22, 23] Several studies were completed either within a small geographical area, single site, or same community and this impacts on the generalisability of the study findings. [11,16, 17] Pownall et al. used focus groups that were led by the RACF managers, and this may have compromised participant views due to the relationship with their manager and consequently impacted the objectivity of this study. [21] A noteworthy limitation of the studies was only one study included managerial perspectives and their understanding of the organisational factors impacting upon TMDs [21].

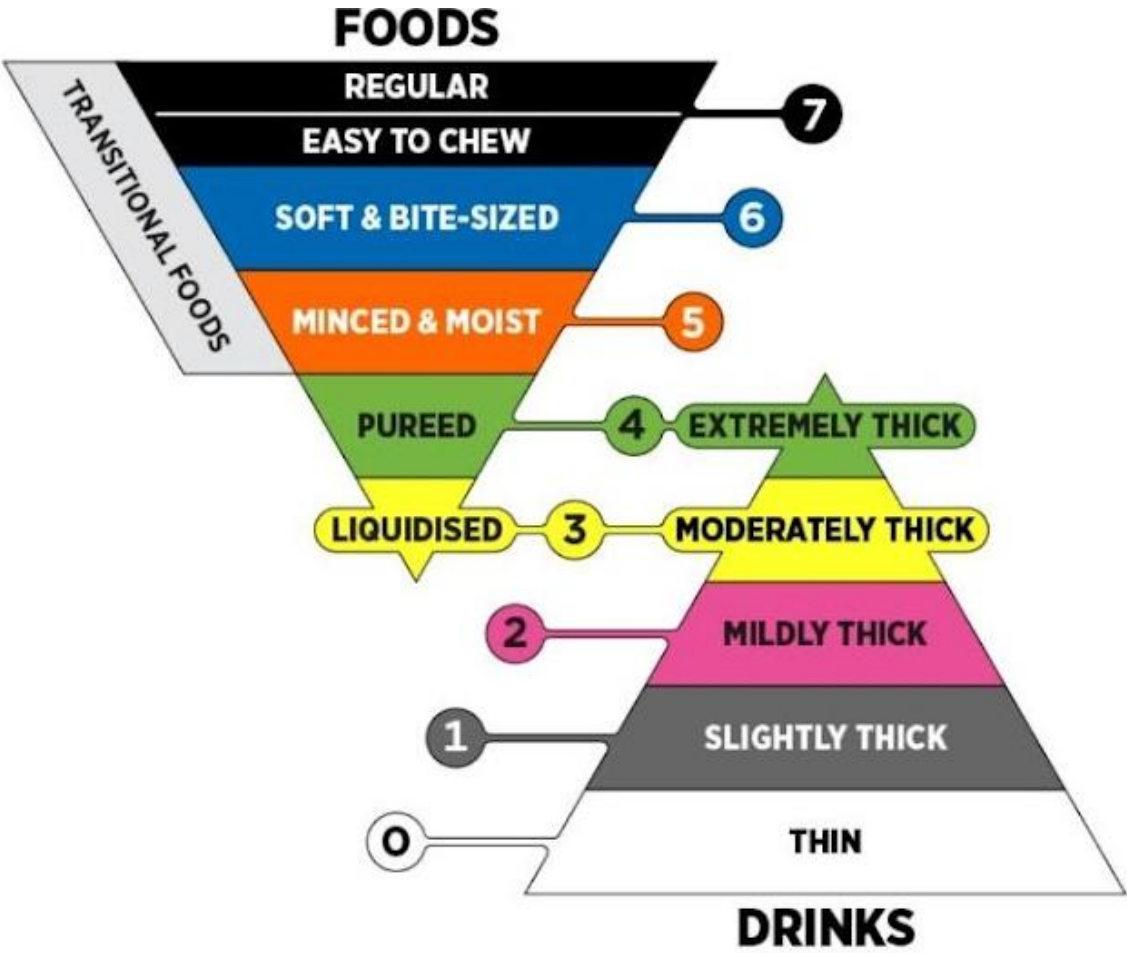
Australian based studies were those most represented in this scoping review and this limits the generalisability of the results to RACFs outside of Australia. The studies within this review included both residents with dysphagia and residents without, this allowed for comparative methods to deduce factors specific to the accurate delivery of TMDs. The studies included were sourced from multiple databases and the full text reviewed when the abstract was ambiguous, to minimise the risk of missing relevant research. A limitation of this review related to the specificity of the topic and the researcher could have excluded studies that could have identified different perspectives relating to the organisational factors related to the delivery of prescribed TMDs. Furthermore, despite a rigorous search, quality and review methodology, relevant studies may have been excluded.

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ADOPTION OF THE “ENOVA SANTÉ” HOSPITAL INFORMATION SYSTEM BY HEAD NURSES IN SOUSS MASSA, MOROCCO

Adam Abassi^{*1}, Elhabib Moukrim¹, Ayoub Oulamine²

1. Higher Institute of Nursing and Health Technology Professions of Agadir, Morocco

2. Faculty of Legal, Economic and Social Sciences of Agadir, Laboratory of Studies and Applied Research in Economics, Ibn Zohr University, Agadir, Morocco

Correspondence: abassi.research@gmail.com

ABSTRACT

The integration of information technologies in the healthcare sector aims to enhance the quality of care, service efficiency, and clinical data management. Within this framework, hospitals in the Souss Massa region (Morocco) have deployed the hospital information system “ENOVA Santé”. Although the perceived benefits of this system are recognized, its adoption remains closely linked to the users' involvement, particularly head nurses, whose role is essential in the deployment, appropriation, and dissemination of this technology within the nursing community. The present study examines the factors influencing the adoption of the “ENOVA Santé” by head nurses in hospitals in the Souss Massa region (Morocco).

A quantitative explanatory design was employed, using a hypothetico-deductive approach based on the UTAUT model. Data were collected through a questionnaire completed by 81 participants and analyzed using the PLS-SEM method via SmartPLS 4 software.

Statistical analysis revealed that effort expectancy and social influence have a positive and significant effect on the intention to adopt ENOVA Santé, which in turn significantly influences the actual adoption of the system. In contrast, performance expectancy and facilitating conditions showed no significant relationship with adoption.

These findings highlight the need to implement targeted strategies, including strengthening user engagement, mobilizing opinion leaders, maintaining strong organizational support, and improving the system's usability and security. While this research is limited to the local context studied, it paves the way for future research at a broader geographical scale and among more diverse populations.

KEYWORDS

ENOVA Santé, head nurses, hospital information system (HIS), Technology adoption, UTAUT

INTRODUCTION

The growing adoption of information technology (IT) has led to significant transformations in many aspects of our daily lives, and in various sectors. The healthcare sector, in particular, is no exception [1]. It's true that the traditional method, based on paper medical records, doesn't allow structured and easy access to important information for decision-makers [2]. Furthermore, faced with the large volume of data produced daily by various hospital services, healthcare institutions

rely on these technologies to improve patient care management [3], thereby enabling the transmission of the right information to the right person at the right time, to improve the quality of healthcare services and optimize processes [4]. IT, particularly Hospital Information Systems (HIS), plays a vital role by offering significant benefits for healthcare staff, patients, and organizations. These benefits include improved performance of healthcare professionals, higher quality of care and increased patient satisfaction, enhanced safety, reduced medical errors and costs, as well as easier access to information and more efficient patient records management [5].

Morocco places particular importance on these technologies, as demonstrated by the reforms initiated by the Ministry of Health, notably through the 2005-2007 action plan, which highlights the need to develop a high-performance HIS [6]. The "Health 2025" plan, structured around three pillars and divided into 25 strategic focus areas, includes 125 actions, with focus area 23 dedicated to the establishment of an integrated national information system (IS) [7]. Similarly, articles 28 and 29 of framework laws 06-22 on the national healthcare system emphasize the importance of digitizing the sector [8]. In this context, hospitals in the Souss Massa region have undertaken the implementation of the "ENOVA Santé" HIS, in order to meet growing needs and create a unified database accessible to all healthcare professionals, in particular head nurses.

However, although these technologies are supposed to meet users' expectations, they are sometimes left unused or abandoned shortly after deployment [9]. Despite perceived benefits, adoption rates remain generally low [10]. In this context, Markus and Keil raise the following question : *«why are some information systems that companies have invested millions of dollars in developing never used or avoided by the very people who are intended to use them ?»* [11].

One of the key factors in the successful implementation of healthcare IT lies in their effective adoption by users [12]. To fully benefit from these tools, appropriate nursing management is essential [13]. In particular, head nurses, who are heavily involved in the IT implementation and management process [14], recognize that plays an important role in their daily practice [15]. Their engagement and leadership also promote the dissemination of this technology within the nursing community [16].

Aware of the decisive role played by head nurses in the use and promotion of HIS within their teams, it is crucial to identify the factors influencing their adoption of HIS in hospitals in the Souss Massa region. To our knowledge, few studies have addressed this topic, and none appear to have been conducted within this specific geographical and organizational context. With this in mind, we formulated the following question:

WHAT ARE THE INFLUENCING FACTORS OF HIS ADOPTION AMONG HEAD NURSES IN HOSPITALS IN THE SOUSS MASSA REGION?

In this context, our study is founded on a simplified version of the Unified Theory of Acceptance and Use of Technology (UTAUT) model [17], offering a robust theoretical framework to predict the key factors influencing HIS adoption. The research focuses on identifying these factors within the specific hospital context under investigation. It also examines the level of adoption among nurses in hospitals in the Souss Massa region, proposes an explanatory model based on the UTAUT, and formulates recommendations to improve adoption.

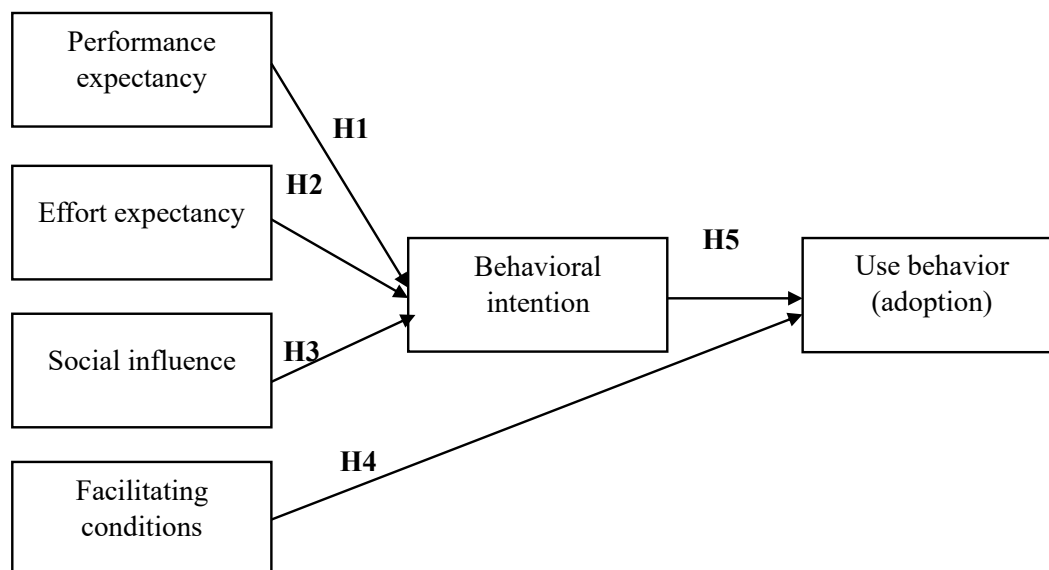
LITERATURE REVIEW AND RESEARCH MODEL

In 2003, Venkatesh and al. developed the UTAUT model to unify eight theories of technology acceptance, including: Theory of Reasoned Action, Technology Acceptance Model (TAM), Motivational Model, Theory of Planned Behavior, a combined TAM-TPB model, Model of PC utilization, Diffusion of Innovations Theory, and Social Cognitive Theory. They identified five main limitations of the previous models: the simplicity of the technologies studied, predominantly student participation, post-decision measurements, cross-sectional designs, and voluntary use contexts. To address these, UTAUT was proposed as a unified acceptance model. It was validated through longitudinal studies in four organizations, showing that it explained around 70% of the variance in usage intention, a result confirmed by data from two other organizations. The model includes four key constructs influencing intention and use: performance expectancy, effort expectancy, social

influence, and facilitating conditions. Behavioral intention directly predicts usage behavior, with gender, age, experience and voluntariness as moderating variables [17].

Given the previously mentioned characteristics, the UTAUT model emerges as a relevant theoretical framework for this study. It enables the examination of key factors influencing the adoption of the by head nurses in hospitals in the Souss Massa region. Figure 1 illustrates the proposed research model, based on a simplified version of the UTAUT model.

FIGURE1 : RESEARCH MODEL



PRESENTATION OF VARIABLES AND HYPOTHESIS FORMULATION:

Table 1 presents the description of the constructs.

TABLE 1: LATENT VARIABLES AND THEIR EXPLANATIONS

Variables	Explanations
Performance expectancy	« The degree to which an individual believes that using the system will help to attain gain in job performance ».
Effort expectancy	« The degree of ease associated with the use of the system ».
Social influence	« The degree to which one perceives that important others believe one should use the system ».
Facilitating conditions	« The degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system ».
Behavioral intention	It is the intention and commitment of an individual to adopt the system.
Use behavior	It is the actual behavior of using the system.

Source: [17]

RESEARCH HYPOTHESES:

H1: performance expectancy will have a positive influence on users' intention to adopt the HIS.

H2: effort expectancy will have a positive influence on users' intention to adopt the HIS.

H3: social influence will have a positive influence on users' intention to adopt the HIS.

H4: facilitating conditions will have a direct positive influence on the adoption of HIS.

H5: the mediating role of behavioral intention will have a significant positive effect on the adoption of HIS by users.

METHODOLOGY:

THE STUDY DESIGN AND METHODOLOGICAL APPROACH:

This is an explanatory study that follows a quantitative hypothetico-deductive approach based on the UTAUT model.

SAMPLING AND TARGET POPULATION:

The target population of our study includes all head nurses of departments and services within the hospitals of the Souss Massa region (this includes nurses, midwives, health technicians, and rehabilitation specialists), representing a total of 101 professionals. Given the relatively small size of the population, an exhaustive approach was adopted, with a response rate of 80.2%, corresponding to 81 respondents.

This choice of target population is justified by easy access to essential resources, specific training on the HIS, and possession of the access codes necessary for its use.

DATA COLLECTION METHOD AND TOOLS:

A questionnaire (paper and online version) for head nurses was structured in three sections. The first introduced the study, its importance, a message of thanks, and a confidentiality statement. The first section covered demographic and professional data (gender, age, specialty, workplace, experience, etc.). The second section focused on HIS-related perceptions and behaviors, based on model variables (Table 2), measured with a 5-point Likert scale. A pre-test with eight experienced HIS users ensured clarity and minimized bias. The survey was distributed in two phases: an initial round followed by a reminder to enhance response rates.

MEASUREMENT OF VARIABLES:

Studies on HIS adoption by head nurses remain limited, based on the original document by the creators of the UTAUT model, as well as studies in a context similar to ours, we were able to rely on carefully considered indicators. The table below presents the variables studied and their items:

TABLE 2: STUDIED VARIABLES AND THEIR ITEMS

Variables	Items	Sources
Performance expectancy (PE)	- PE1: Using the HIS improves my overall work performance - PE2: Using the HIS allows me to do my work more quickly. - PE3: Using the HIS increases my productivity. - PE4: If I use the HIS, I'll have more chances of advancing in my job	[17]
Effort expectancy (EE)	- EE1: My interaction with the HIS would be clear and understandable. - EE2: It would be easy for me to become proficient in using the HIS. - EE3: I would find the HIS easy to use. - EE4: Learning to use HIS is easy for me.	[17]

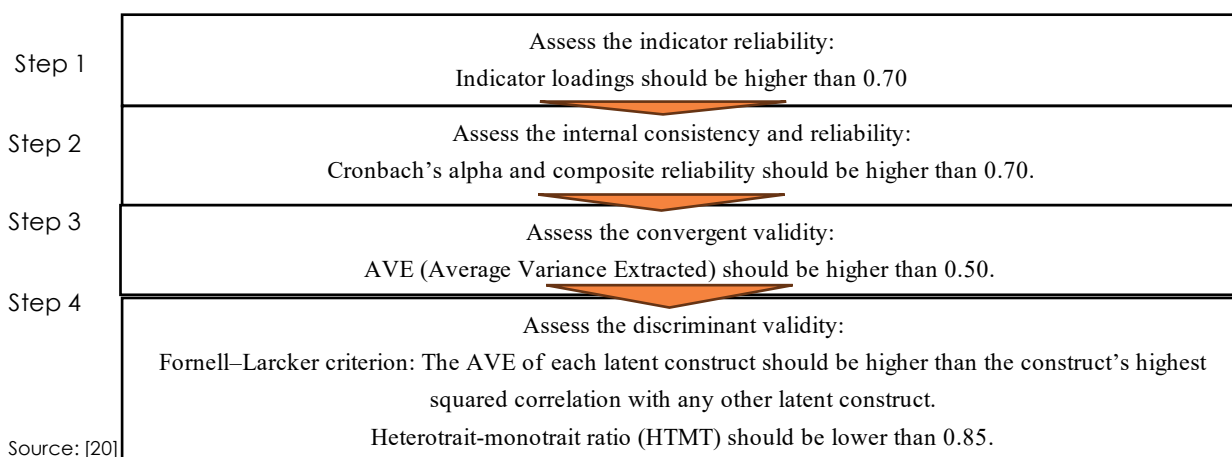
Social influence (SI)	• SI1: People who influence my behavior think I should use the HIS. • SI2: People who are important to me think I should use the HIS. • SI3: My superiors have been very helpful in using the HIS. • SI4: In general, the hospital has supported the use of the HIS.	[17]
Facilitating conditions (FC)	• FC1: I have the necessary resources to use the HIS. • FC2: I could easily access the resources needed to use the HIS. • FC3: I have the necessary knowledge to use the HIS. • FC4: When I encounter problems while using the HIS, someone can help me resolve them.	[17]
Behavioral intention (BI)	• BI1: I intend to use the HIS in the coming months. • BI2: I predict I would use the HIS in the upcoming months. • BI3: I plan to use the HIS in the next few months.	[17]
Use behavior (UB)	• UB1: The HIS service is a pleasant experience. • UB2: I currently use the HIS service. • UB3: I spend a lot of time on the HIS service. • UB4: I will continue to use HIS with conviction.	Adapted from [18 , 19]

TATISTICAL ANALYSIS AND TOOLS USED:

Data analysis was conducted using the PLS-SEM method, chosen because of the small sample size, and the recursive nature of the model, which allows for efficient hypothesis testing. This method follows these steps: first, validation of the measurement model, followed by validation of the structural model [20]. The explanatory analysis was performed using SmartPLS 4 software.

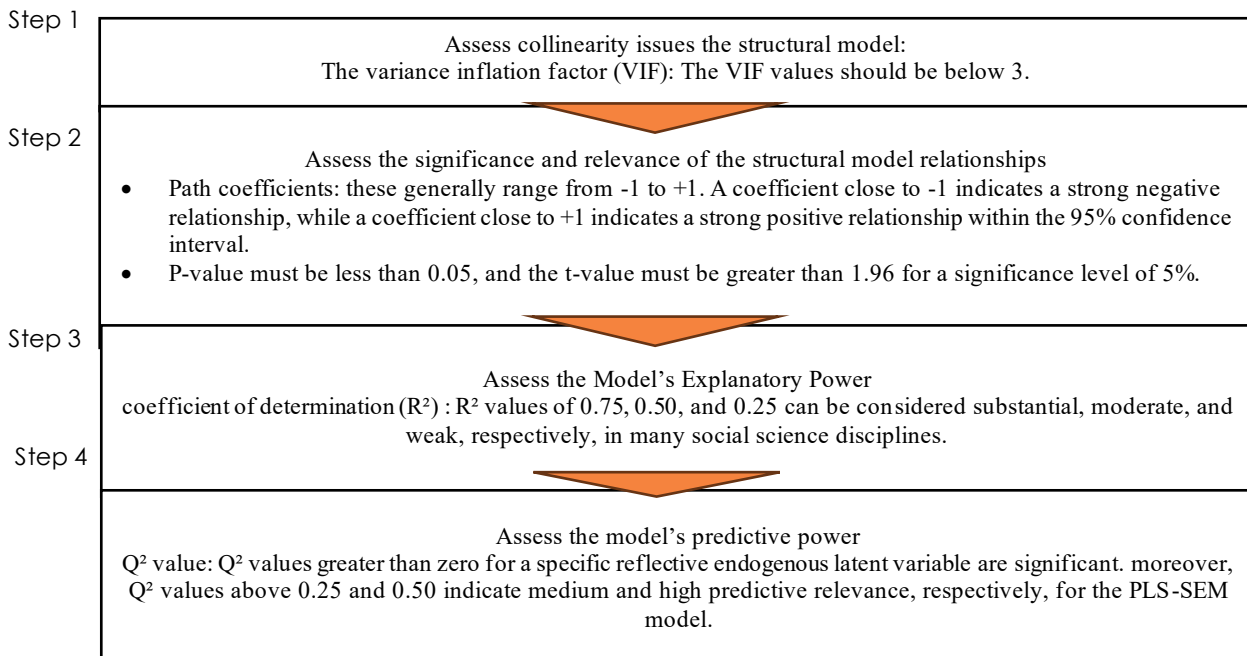
THE STEPS OF THE ANALYSIS AND MODEL VALIDATION CRITERIA: MEASUREMENT MODEL:

FIGURE 2: THE STEPS OF THE MEASUREMENT MODEL EVALUATION PROCESS



STRUCTURAL MODEL:

FIGURE 3: THE STEPS OF THE STRUCTURAL MODEL EVALUATION PROCESS



Source: [20]

PRESENTATION OF RESULTS:

This section begins with a descriptive analysis of the first section of the questionnaire, providing a detailed profile of respondents based on their characteristics, followed by an explanatory analysis of the second section using the PLS-SEM method.

TABLE 3: DEMOGRAPHIC AND PROFESSIONAL CHARACTERISTICS OF RESPONDENTS

Control variable	Demographic and professional characteristics	Frequency	Percentage
Gender	Male	43	53,09%
	Female	38	46,91%
Age	< 25 years old	1	1,23%
	25 to 35 years old	38	46,91%
	36 to 45 years old	30	37,04%
	46 to 55 years old	5	6,17%
	> 55 years old	7	8,64%
Actual use of HIS	Yes	69	85,2%
	No	12	14,8%
Duration of HIS use	<6 months	8	11.6%
	6 months to 1 year	8	11.6%
	1 to 2 years	14	20,3%
	>2 years	39	56.5%
Use of the HIS as Part of the Head Nurses' Attributions	Yes	62	76,54%
	No	19	23,46%

Table 3 presents the results of the descriptive analysis of the participants, revealing a male predominance with 53.09%. The majority of participants are young. Regarding actual use of the HIS, 85.2% of respondents report using it. Among these users, 56.5% have been using it for more than 2 years. Furthermore, 76.65% consider that using the HIS is part of their job.

EVALUATION OF THE MEASUREMENT MODEL:

The evaluation of the measurement model will start with a reliability assessment (factor loadings, Cronbach's alpha and composite reliability). Then, convergent validity will be evaluated using the AVE metric. Discriminant validity will be illustrated by the correlation matrix according to the Fornell-Larcker criterion and the HTMT ratio.

TABLE 4: RESULTS OF RELIABILITY AND CONVERGENT VALIDITY

Variables	Items	Factor loadings	Cronbach's alpha	Composite reliability	AVE
Performance expectancy (PE)	PA1	0.867	0.846	0.896	0.683
	PA2	0.819			
	PA3	0.879			
	PA4	0.733			
Effort expectancy (EE)	EA1	0.856	0.889	0.923	0.750
	EA2	0.822			
	EA3	0.918			
	EA4	0.867			
Social influence (SI)	IS1	0.537	0.700	0.801	0.505
	IS2	0.729			
	IS3	0.707			
	IS4	0.812			
Facilitating conditions (FC)	CF1	0.777	0.706	0.807	0.516
	CF2	0.583			
	CF3	0.851			
	CF4	0.630			
Behavioral intention (BI)	IC1	0.924	0.923	0.951	0.866
	IC2	0.938			
	IC3	0.930			
Use behavior (UB)	CU1	0.873	0.950	0.964	0.870
	CU2	0.955			
	CU3	0.946			
	CU4	0.955			

Table 4 shows the results of the factor loadings. The indicators SI1 (0.573), FC2 (0.583), and FC4 (0.630), although having loadings between 0.40 and 0.70, have been retained, as their removal would negatively affect the reliability and content validity of the model, thus compromising the overall coherence of the model in accordance with the literature recommendations [21]. Cronbach's alpha and composite reliability show values above 0.7, and AVE exceeds the 0.5 threshold, which is considered acceptable.

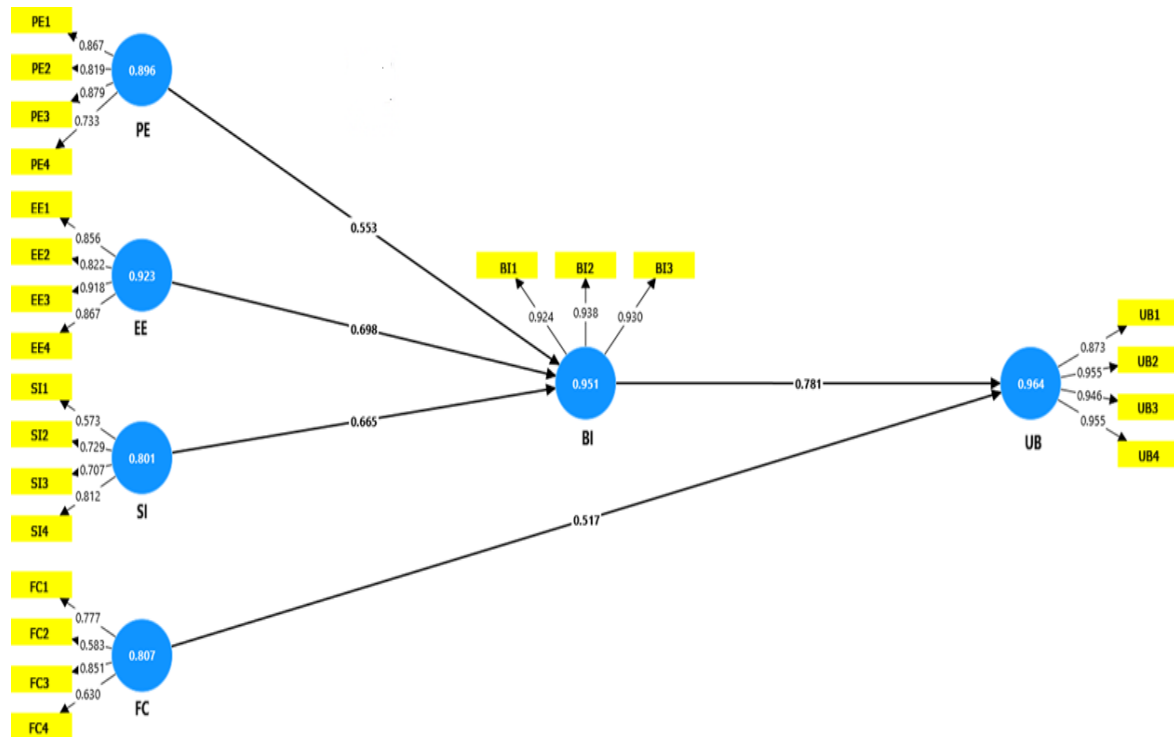
TABLE 5: DISCRIMINANT VALIDITY RESULTS (FORNELL-LARCKER CRITERION)

	FC	UB	EE	BI	SI	PE
FC	0.718					
UB	0.517	0.933				
EE	0.540	0.611	0.866			
BI	0.515	0.781	0.698	0.931		
SI	0.396	0.631	0.587	0.665	0.710	
PE	0.572	0.569	0.636	0.553	0.538	0.827

TABLE 6: RESULTS OF DISCRIMINANT VALIDITY (HTMT RATIO)

	FC	UB	EE	BI	SI	PE
FC						
UB	0.558					
EE	0.644	0.661				
BI	0.560	0.831	0.762			
SI	0.504	0.680	0.636	0.730		
PE	0.634	0.635	0.723	0.609	0.624	

Discriminant validity was validated using two criteria: firstly, the Fornell-Larcker criterion, which shows that the diagonal values (in bold) are higher than the corresponding correlations in the adjacent columns and rows (see Table 5); secondly, the HTMT ratio, which is below 0.85 (see Table 6), thus confirming discriminant validity.

FIGURE 4: MEASUREMENT MODEL

EVALUATION OF THE STRUCTURAL MODEL:

The evaluation of the structural model begins with checking for collinearity issues using the VIF indicator. Then, the significance and relevance of the relationships are assessed by examining the path coefficients, p-values, and t-values obtained through a bootstrap simulation. Following this, the model's explanatory power is evaluated using the R^2 indicator. Finally, the model's predictive power is assessed through the Q^2 indicator.

TABLE 7: COLLINEARITY OF CONSTRUCTS (VIF INDICATOR)

Structural relationships	VIF
Performance expectancy (PE) -> Behavioral intention (BI)	1.806
Effort expectancy (EE) -> Behavioral intention (BI)	1.958
Social influence (SI) -> Behavioral intention (BI)	1.640
Facilitating conditions (FC) -> Use behavior (UB)	1.361
Behavioral intention (BI) -> Use behavior (UB)	1.361

Table 7 presents VIF values below 3, indicating the absence of collinearity issues.

TABLE 8: SIGNIFICANCE AND RELEVANCE OF RELATIONSHIPS BETWEEN LATENT CONSTRUCTS

Hypotheses	Original sample (β)	t-value	p-values	Significance
H1 :PE -> BI	0.081	0.814	0.416	Not supported
H2 : EE -> BI	0.429	3.223	0.001	Supported
H3 : SI -> BI	0.370	3.321	0.001	Supported
H4 : FC -> UB	0.157	1.655	0.098	Not supported
H5 : BI -> UB	0.700	6.339	0.000	Supported

Table 8 shows that all hypotheses are validated, except for hypotheses H1 and H4, which present a P-value greater than 0.05 and a t-value less than 1.96, indicating the absence of statistical significance.

TABLE 9: EVALUATION OF THE EXPLANATORY POWER OF THE STRUCTURAL MODEL (COEFFICIENT OF DETERMINATION R^2)

Endogenous constructs	R-square	R-square adjusted
UB	0.627	0.618
BI	0.590	0.574

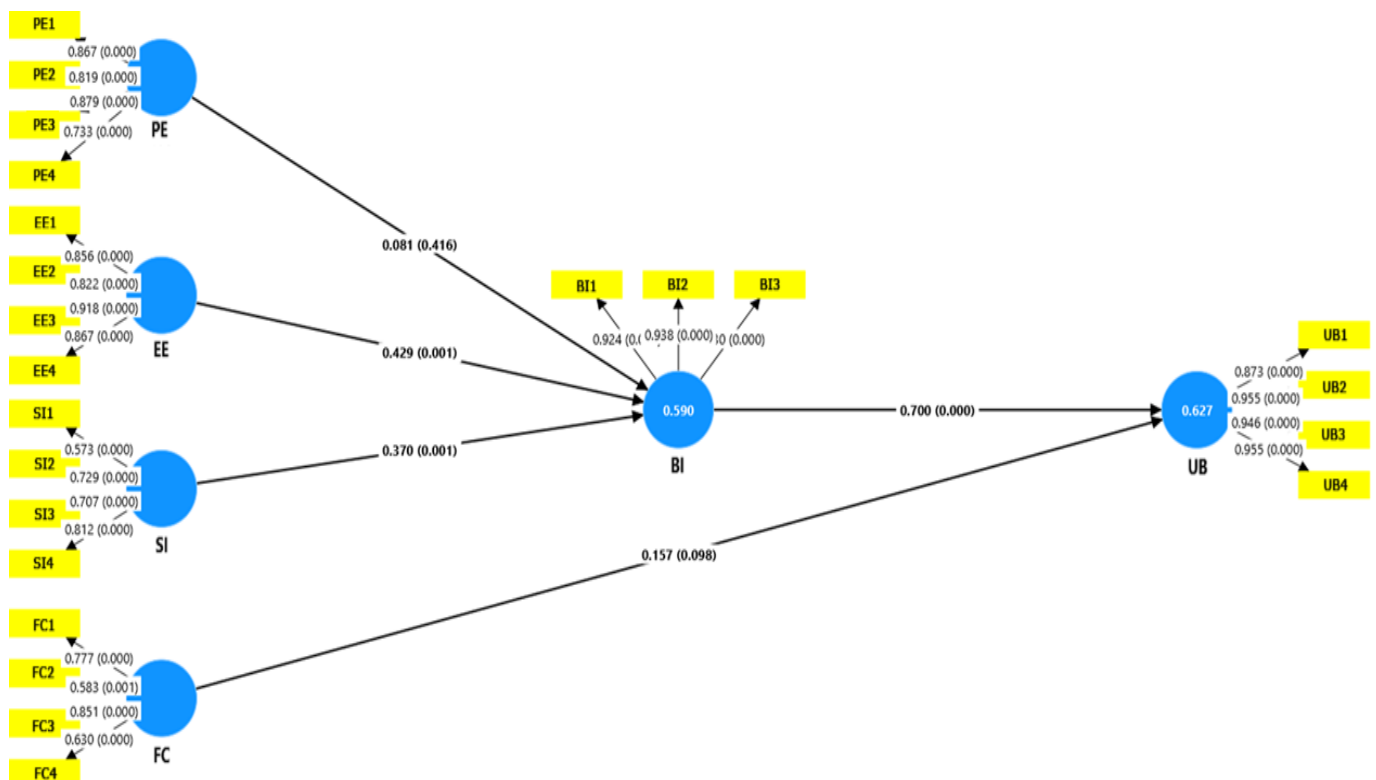
Table 9 presents the results for both constructs, with R^2 values (UB=0.627; BI= 0.590) within a moderate range, and these results are considered acceptable.

TABLE 10: EVALUATION OF THE PREDICTIVE POWER OF THE STRUCTURAL MODEL (CROSS-VALIDATED REDUNDANCY Q^2)

Reflective endogenous construct	Q^2 predict
UB	0.453
BI	0.540

The Q^2 value is obtained using the Blindfolding procedure, which has been replaced in SmartPLS 4 by the PLSpredict procedure. The results illustrated in Table 10 (UB = 0.453; BI = 0.540) reveal a high predictive relevance of the model.

FIGURE 5 : STRUCTURAL MODEL



DISCUSSION

The main objective of our study was to determine the factors influencing the adoption of the “ENOVA Santé” HIS by head nurses in hospitals in the Souss Massa region, using the UTAUT Model.

The results obtained show that performance expectancy does not have a significant influence on intention. This suggests that, for head nurses, the perceived benefits of using ENOVA Santé are not a determining motivating factor. In other words, awareness of the functional advantages of the system seems to play a minor role in their decision to adopt it [22]. These findings are consistent with those of the study conducted by Oumlil and al. (2014), which revealed that users do not attach great importance to the utilitarian aspect of IT [23].

On the other hand, Effort expectancy shows a significant relationship with behavioral intention, indicating that head nurses perceive ENOVA Santé as easy to use and requiring no additional effort. In the healthcare sector, several studies based on the UTAUT model have confirmed this relationship [12], demonstrating that the perception of ease of use plays a decisive role in the adoption of IT [24]. Furthermore, a study conducted in Ethiopia highlights the importance of the effort expectancy in the intention to use systems, particularly in low-resource contexts. It emphasizes the need for decision-makers and healthcare professionals to prioritize the design of ergonomic and intuitive IS in order to simplify their use [25]. These systems must be easy to learn and use, flexible, and allow for clear data management by healthcare staff [26]. Accordingly, training specifically designed for head nurses could help reduce the cognitive load associated with system usage. Moreover, the results indicate that more than half of users (56.6%) are young professionals already familiar with digital technologies. Most also have two years of experience using the HIS, lowering their perceived effort (see Table 3).

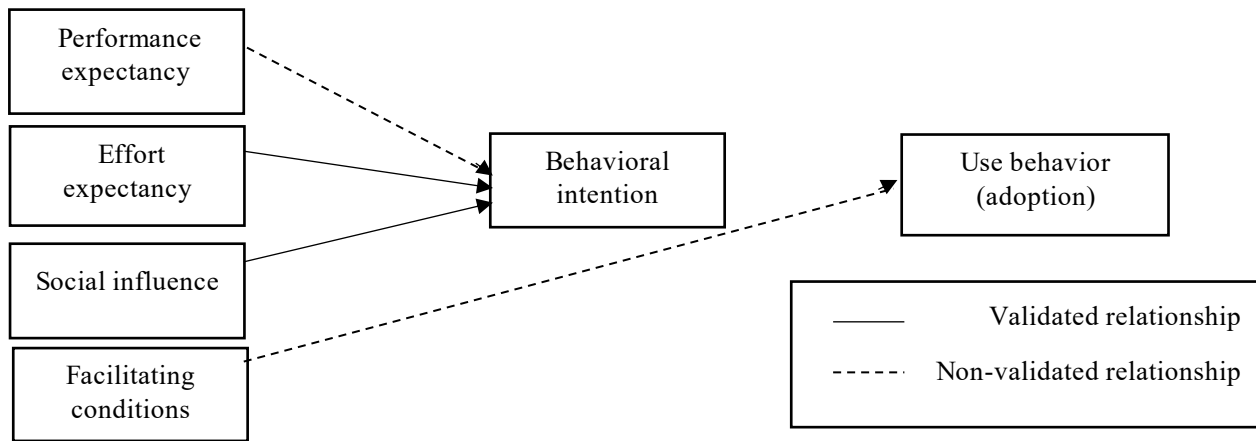
Social influence refers to the extent to which an individual believes that important people around them (colleagues, supervisors, peers, etc.) expect them to use the HIS [17]. The results in Table 8 confirm the positive effect of social influence on intention. Other studies have also shown that the stronger the perceived social influence, the greater the behavioral intention to use IS [27]. In addition, some results indicate that users perceive system adoption as enhancing their professional status compared to their non-user colleagues. This dynamic could be reinforced by institutional support, as hospitals have likely encouraged system use as part of a broader effort to improve the quality of care [28]. According to Venkatesh and al. (2003), social influence plays a key role in a context of mandatory use [17]. In our study, data from table 3 indicate that 76.54% of respondents consider HIS use to be integral to their duties. However, no regulatory text clearly states that the use of the HIS is part of their responsibilities, suggesting voluntary adoption that is nonetheless perceived as mandatory by head nurses. This contradiction could indicate either a lack of clarity in the definition of their duties or an adoption driven by habit or the influence of organizational culture.

With regard to facilitating conditions, these are directly related to adoption and indicate the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system [17]. However, these conditions did not show a positive impact on adoption, as illustrated in the results in Table 8. This suggests that infrastructural support, particularly the availability of an IT system, is not perceived as a key factor. Instead, IT appear instead to be complementary resources in the adoption process [27]. This observation contrasts with previous findings indicating that the more favorable the conditions for using technologies, the greater the likelihood of its adoption and effectiveness [28]. These findings highlight the importance of technical reliability and quality, as well as the ability of technical support services to respond quickly in the event of malfunctions.

Finally, users' intentions demonstrate a strong commitment to adopting the system, as presented in the results (see Table 8). These data are consistent with the work of Ifinedo (2012), who highlights that a high behavioral intention toward IS among healthcare professionals is generally correlated with greater effective adoption of these systems [22]. Similarly, Saxena and al. (2022) indicate that people with a strong intention are more likely to adopt information technologies [29]. Consequently, behavioral intention appears to be a major determinant of adoption [27, 30].

In the light of the results discussed, we present the final theoretical model reflecting the various relationships identified.

FIGURE 6: PRESENTATION OF THE FINAL RESEARCH MODEL



CONCLUSION

The integration of IT is essential for enhancing the quality and efficiency of healthcare services. However, the human factor, particularly head nurses, plays a key role in the adoption of these technologies. The main challenge lies not in the mere acquisition of digital tools, but rather in their governance and the professionals' willingness to adopt them.

This study explored the factors influencing the adoption of the HIS by head nurses in the Souss Massa region of Morocco, using the UTAUT model. To our knowledge, this is the first study conducted in Morocco specifically on the adoption of HIS by head nurses, thus constituting a significant contribution to the scientific literature.

The results indicate that head nurses show a strong intention to use the system, resulting in a high adoption rate of the HIS, with social influence and effort expectancy as determining factors, while performance expectancy and facilitating conditions were not confirmed, due to the specific context. These findings highlight the importance of a comprehensive and contextual approach that integrates several factors for the successful adoption of HIS.

MANAGERIAL IMPLICATIONS:

Based on these findings, practical recommendations were proposed for managers and decision-makers responsible for HIS implementation in the Souss Massa region, structured around four main axes.

Individual factors mainly concern the perceived benefits of HIS use and the personal commitment of users to adopting this technology. To encourage broader adoption, it is important to implement communication strategies highlighting the advantages of the HIS. It is also essential to recognize and motivate healthcare professionals by valuing their contribution and actively involving them in all stages of the process, from implementation to system adjustment, to ensure sustainable engagement. The social factor: related to the social influence of peers and opinion leaders within hospitals, plays an important role in HIS adoption. The active involvement of key figures can create a climate of trust and support for system implementation, especially given the voluntary nature of adoption. The organizational factor is based on the facilitating conditions essential to successful HIS adoption. These include adequate technical support, access to resources, continuous user support, as well as targeted and regular training. Finally, the technological factor highlights the importance of making the HIS accessible and easy to use. This means simplifying the interface and navigation. Prompt resolution of user issues is critical to enhancing system usability. Furthermore, data security and confidentiality must be a priority, to ensure user confidence and compliance with current standards.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

This study presents several limitations. Firstly, the sample studied may limit the generalizability of the results. A future study could include a larger and more diverse sample to enhance external validity, particularly by including different user categories and geographical contexts. Moreover, while the UTAUT has demonstrated its relevance, it exhibits a certain rigidity in its conceptual framework, and does not allow exploration of all determinants of technology adoption. Another limitation is the absence of moderating variables such as age, professional experience, and gender, which are all

recognized in the UTAUT model, since their inclusion would have shed light on the influence of these characteristics on technology adoption.

Despite these limitations, several avenues of research deserve to be explored in order to deepen this study. The use of other methodological approaches (qualitative, mixed, longitudinal...) would also be relevant to explore the factors influencing users' resistance to IS adoption, in order to develop strategies to overcome them. Future research could also consider the extension of the UTAUT model or combining it with other theoretical frameworks to offer a more comprehensive analysis and enrich understanding of the factors influencing HIS adoption.

In light of the above conclusions, it is essential to explore new dimensions that may foster HIS adoption. Future research should focus on all the multidimensional factors (human, organizational, technological, cultural, etc.) influencing this adoption, particularly within the Moroccan healthcare context.

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CONFLICT OF INTEREST

The authors declare that no financial or personal conflicts of interest that could have influenced the work reported in this manuscript.

ETHICAL CONSIDERATIONS:

The study was approved by the administration of ISPITS Agadir, under approval number (2276/ISPITSA/Agadir). This authorization was communicated to the relevant departments. Informed consent was obtained from all participants, and their anonymity and data confidentiality were strictly respected.

AUTHOR CONTRIBUTIONS

AA: study design, literature review, assessment of literature quality, statistical analysis, writing, and revision of the manuscript.

EM and AO: methodological support, manuscript revision, and scientific quality assessment.

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THE INTERPLAY OF ANXIETY, STRESS, AND DEPRESSIVE SYMPTOMS AMONG SEXUAL ORIENTATIONS IN ASIAN POPULATIONS

Passakorn Suanrueang

Department of Health Education and Behavioral Sciences, Faculty of Public Health, Mahidol University, Bangkok, Thailand

Correspondence: passakorn27sr@gmail.com

ABSTRACT

BACKGROUND:

Healthcare management in modern society plays a crucial role in addressing both physical and mental health conditions, with depression being a prominent concern. Stress and anxiety were intercorrelated with depression, which is commonly reported among individuals of both genders. However, few studies have presented results on this interlink based on sexual orientation.

METHODS:

This study involved examining the association between stress, anxiety, and depressive symptoms, and the ability of anxiety and stress to predict depressive symptoms in a sample of 21,972 volunteer participants from Asian countries (Open-Source & Open-Source Psychometrics Project), who self-reported their mental health experiences in questionnaires on an online platform using the DASS-42 self-report questionnaire. Simple and multiple regression analyses were used to examine the interaction between the three emotional states across five sexual orientations.

RESULTS:

Across all five sexual orientations (heterosexual, bisexual, homosexual, asexual, and 'others'), anxiety has been found to be a significant predictor of stress ($R^2=0.68-0.73$) and depressive symptoms ($R^2=0.64-0.72$). Additionally, stress has been shown to be a significant predictor ($R^2=0.79-0.84$) of depressive symptoms. Furthermore, the combination of stress and anxiety was a statistically significant predictor of depressive symptoms in individuals with all five sexual orientations. (Depressive symptoms = $1.26+0.76$ stress + 0.22 anxiety, $R^2=0.66$, $p < .001$). In other words, people with higher levels of anxiety and stress are more likely to develop depressive symptoms.

CONCLUSIONS:

This study confirms that anxiety and stress predict depression not only in a general population but also across sexual minority groups, suggesting that mental healthcare management should combine universal approaches addressing common risk factors and targeted interventions to respond to the unique determinants of mental health in sexual minority populations, especially stigma, discrimination, and social exclusion which differ from those in the general population.

KEYWORDS

depressive symptoms; anxiety; stress; sexual orientations; DASS-42

INTRODUCTION

Healthcare management plays a pivotal role in modern society, encompassing comprehensive care for physical health conditions and the intricate realm of mental and psychological consequences. Among the myriad of mental health challenges affecting individuals worldwide, depression stands out as an unparalleled concern. Many root causes of depression have been reported, particularly psychological distress, namely stress and anxiety.

Stress is an originator and contributor of depression resulting from several determinants, particularly the enduring impact of persistent environmental stressors and the lasting repercussions of traumatic childhood experiences and so forth [1]. Additionally, stress and anxiety are interconnected and result in negative mental health outcomes through behavioral and neural mechanisms [2]. For example, the activity of norepinephrine, on its way from the locus coeruleus, passes to the basolateral amygdala, which is accountable for anxiety that is induced by acute stress [2].

A previous study has indicated a direct and indirect interplay between stress, anxiety, and depressive symptoms [3]. The results showed that stress is a significant psychological pain that is linked to anxiety levels and strongly correlated with depressive symptoms levels with a standardized (β) of 0.43. [3]. A study conducted on a sample of participants from Australia and Norway found that anxiety plays a mediating role between depressive symptoms and stressful events [4]. There is a report indicating that up to 25% of patients visiting general practitioners are diagnosed with both depression and anxiety disorders. Significantly, nearly 85% of patients diagnosed with depression also suffer from anxiety, and 90% of those with an anxiety disorder also meet the criteria for depression [5]. Similar studies have found that approximately 58% of individuals diagnosed with depression in the United States also have comorbid anxiety disorders. Moreover, research conducted by the World Health Organization (WHO) demonstrated the predominant comorbid psychological problems between depression and anxiety among patients seeking primary care [6]. The interlink between anxiety and depression is demonstrated that some characteristics of both psychological distresses are on the same continuum [7].

GENDER EFFECTS

Gender is one of the health determinants that make males and females experience health problems differently [8]. For example, according to the research, male hospitalized patients in Thailand had a lower rate of mood (affective) disorders than females [9], [10]. Another study reported that the prevalence of anxiety and depressive disorders is greater in women than in men, with a ratio of 2:1 observed in individuals aged 15 – 49 years [11]. However, the results of a study demonstrate that there is no significant differentiation between males and females regarding the co-occurrence of anxiety and depressive disorders. This implies that both genders have an equal opportunity to experience anxiety, which may be interconnected with depression [12]. In minority groups, a study of the correlation between stressful life events and depressive symptoms in a 62-person sample of minority groups, including lesbians, gays, and bisexuals people, revealed that stress was markedly connected to depression [13]. Other studies found the same evidence that the self-identifying 876 LGBT individuals had an amount of stress related to coming out that was associated with depression [14]. The relationship between depressive symptoms, anxiety, and stress is a complex one, and recent studies have revealed that there are correlations between these three factors among different sexual orientations. Research has found that anxiety is a significant predictor of stress and depressive symptoms in individuals of all sexual orientations, and that stress also has a significant impact on the development of depressive symptoms. Furthermore, it has been demonstrated that the presence of both stress and anxiety together increases the likelihood of experiencing depressive symptoms. The prevalence of depression, especially major depressive disorders, in Asian populations has been reported; for example, it makes up 7.8 million DALYs in Southeast Asian people [15]. The global prevalence of depression is estimated at nearly 322 million individuals. Approximately 50% of these individuals reside in Southeast Asia and the Western Pacific regions. The prevalence of anxiety disorders and depressive disorders in many countries in Asia was ranked between 3.0 and 4.5% and between 2.9 and 4.4%, respectively [16]. This means that many Asian people are suffering from depression.

As we know from the research evidence, stress, anxiety, and depression are interrelated. Notably, very few studies have presented results of the interlink between three psychological distresses (stress, anxiety, and depressive symptoms) based on sexual orientation. Therefore, this current study aims to examine the relationship between stress, anxiety, and depressive

symptoms among voluntary participants from Asian countries, who are divided into five different sexual orientations by their self-reports. The results of this study will contribute to the understanding of the relationship between stress, anxiety, and depressive symptoms among individuals from Asian countries and demonstrate this relationship in different sexual orientations. This current study highlights the evidence that presents the interconnection between three psychological distress factors: depressive symptoms, anxiety, and stress, divided by five sexual orientations. This evidence can also support informing the healthcare sector and policymakers to take into account that healthcare management for stress and anxiety is crucial in reducing the risk of developing depression.

METHODS

SOURCE OF DATA

This study used secondary data from the Open-Source Psychometrics Project. The data is available and obtained from https://openpsychometrics.org/_rawdata/, which is an online personality test that collects the answers to personality and psychological assessments from voluntary participants around the world who are willing to answer online questionnaires. The DASS-42 has demonstrated strong psychometric properties across diverse populations, including high internal consistency, good convergent and discriminant validity, and robust factorial structure [17]. Moreover, many studies have reported the use of DASS-42 [18], [19], [20].

The collected data did not include personally identifiable information. The data was collected between 2017 and 2019. The study period from 2017 to 2019 was selected because it corresponds with a time frame during which data was collected and available from the Open-Source Psychometrics Project.

Inclusion criteria

The questionnaire was administered in English, and only participants in this study, despite coming from various countries, were included if they had a sufficient understanding of English to complete the questionnaire. The participants were adults aged between 18 and 60 years, from Asian countries, including Afghanistan, Bahrain, Bangladesh, Brunei Darussalam, Cambodia, China, Hong Kong, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Korea, Kuwait, Laos, Lebanon, Macao, Malaysia, Maldives, Mongolia, Nepal, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Sri Lanka, Taiwan, Tajikistan, Thailand, United Arab Emirates, Uzbekistan, and Vietnam. Participants were required to self-identify their gender (male, female, or other) and sexual orientation (heterosexual, bisexual, homosexual, asexual, or other) through an online self-report questionnaire on the Open-Source Psychometrics Project surveys.

Exclusion criteria

This included individuals who were under 18 or over 60 years old, those not from the specified Asian countries, and those who did not complete the online self-report questionnaire or provided incomplete responses of gender, sexual orientation, and country on Open-Source Psychometrics Project surveys.

PROCEDURES

This study uses secondary data that is from the open-source dataset provided in the Open-Source Psychometrics Project via public website. Therefore, the protocols and outcome variables followed the original surveys.

The study employed a 42-item self-report scale of the Depression, Anxiety, and Stress Scales (DASS-42) [21] self-report questionnaire [22], which consisted of 14 items for each variable, and a 4-point Likert-type rating scale (1 = not at all applicable to me, 2 = applicable to me to some degree or some of the time, 3 = applicable to me to a considerable degree or a good part of the time, 4 = applicable to me very much or most of the time) to measure the level of stress, anxiety, and depressive symptoms.

The reliability test of the DASS-42 scales covers three dimensions, including depressive symptoms (0.96), anxiety (0.91), and stress (0.93). The strength of the association of all three dimensions was excellent.

DATA ANALYSIS

The research design utilized simple regression analysis to test the correlations between stress and anxiety, stress and depressive symptoms, and anxiety and depressive symptoms. Additionally, multiple regression was used to test the ability of stress and anxiety to predict depressive symptoms. A summary of the model (the correlation (R^2) and corresponding values), the ANOVA test, the coefficients, the simple regression equation, and the multiple regression equation were analyzed and presented.

ETHICS APPROVAL

This study used publicly available data for research purposes in the form of aggregate datasets (CSV) from the website of the Open-Source Psychometrics Project, which contains anonymous individual information; therefore, ethical approval from a human research ethics committee or institutional review board approval was not applicable.

RESULTS

THE CORRELATION BETWEEN STRESS AND ANXIETY

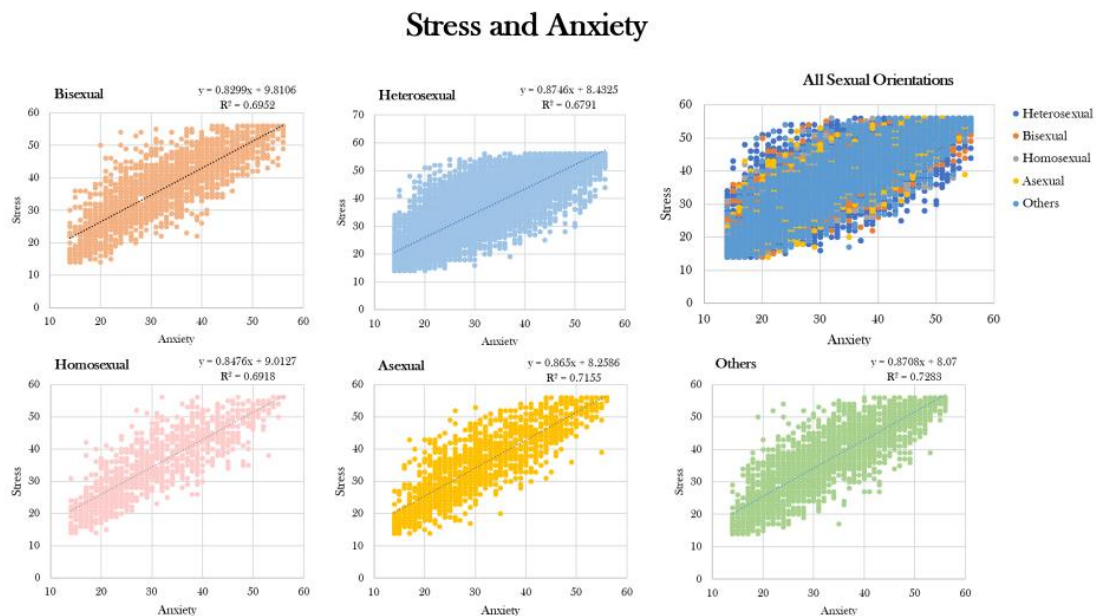
A summary of the model, including the correlation (R^2) and related values, the ANOVA test, the coefficients, and the simple regression equation, is presented in Table 1. Figure 1 illustrates the correlation between the rate of stress and anxiety scores among 21,972 participants, segmented by five sexual orientations, using a dynamic XY scatter plot. Linear regression trendlines, shown in blue, indicate that anxiety and stress are significantly positively correlated (p -value < 0.001) in all five sexual orientations. The results of the analysis show that anxiety is a strong predictor of stress for all five sexual orientations, with a correlation coefficient (R^2) ranging from 0.68 to 0.73.

TABLE 1. THE CORRELATION BETWEEN STRESS AND ANXIETY AND A SIMPLE REGRESSION EQUATION WITH A MODEL SUMMARY AND AN ANOVA TEST BY SEXUAL ORIENTATIONS (N = 21,972)

Sexual orientations	Model summary					ANOVA test	Coefficients	
	N	R	R-Square	Adjusted R-square	Standard Error	F (p-value)	Regression equation	t (p-value)
All	21,972	0.83	0.69	0.69	5.81	49,143.28 ***	$Y = 8.57 + 0.87x$	221.68 ***
Heterosexual	14,937	0.82	0.68	0.68	5.89	31,611.92 ***	$Y = 8.43 + 0.87x$	177.80 ***
Bisexual	2,031	0.83	0.70	0.70	5.71	4,627.34 ***	$Y = 9.81 + 0.83x$	68.02 ***
Homosexual	1,048	0.83	0.69	0.69	5.63	2,348.21 ***	$Y = 9.01 + 0.85x$	48.46 ***
Asexual	1,357	0.85	0.72	0.72	5.69	3,407.84 ***	$Y = 8.26 + 0.87x$	58.38 ***
Others	2,599	0.85	0.73	0.73	5.54	6,960.29 ***	$Y = 8.07 + 0.87x$	83.43 ***

Note: Y = stress, x = anxiety, *** p -value < 0.001

FIGURE 1 THE CORRELATION BETWEEN STRESS AND ANXIETY OF 21,972 PARTICIPANTS, SEGMENTED BY ALL PARTICIPANTS AND FIVE SEXUAL ORIENTATIONS.



THE CORRELATION BETWEEN STRESS AND DEPRESSIVE SYMPTOMS

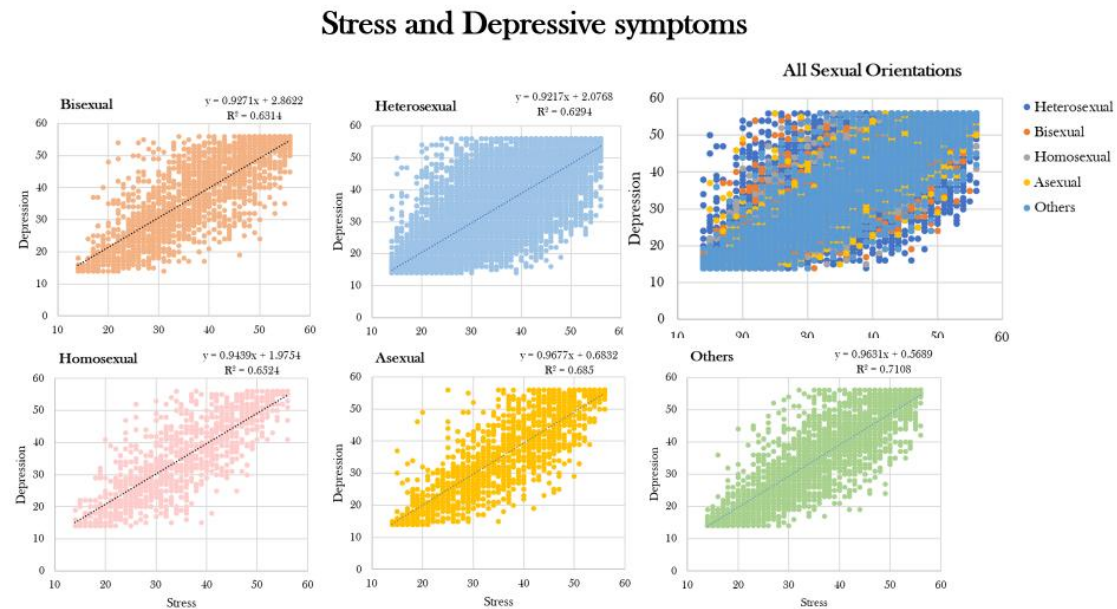
The report of simple regression analysis, including a summary of the model (the correlation (R^2) and related values), the ANOVA test, the coefficients, and the simple regression equation (Table 2). The dynamic XY scatter plot (Figure 2) illustrates the correlation between the rate of occurrence of stress and depressive symptoms scores of 21,972 participants, segmented by five sexual orientations. The blue line shows a linear regression trendline. As can be seen, there was a significant positive correlation (p -value < 0.001) between stress and depressive symptoms in all five sexual orientations. Stress in the equation can predict depressive symptoms in all five sexual orientations with a correlation (R^2) between 0.63 and 0.71.

TABLE 2. THE CORRELATION BETWEEN STRESS AND DEPRESSIVE SYMPTOMS AND A SIMPLE REGRESSION EQUATION WITH A MODEL SUMMARY AND AN ANOVA TEST BY SEXUAL ORIENTATIONS (N= 21,972).

Sexual orientations	Model summary					ANOVA test	Coefficients	
	N	R	R-Square	Adjusted R-square	Standard Error	F (p-value)	Regression equation	t (p-value)
All	21,972	0.80	0.65	0.65	7.22	40,037.21 ***	$Y = 1.82 + 0.93x$	200.09 ***
Heterosexual	14,937	0.79	0.63	0.63	7.35	25,363.53 ***	$Y = 2.08 + 0.92x$	159.26 ***
Bisexual	2,031	0.79	0.63	0.63	7.33	3,476.08 ***	$Y = 2.86 + 0.93x$	58.96 ***
Homosexual	1,048	0.81	0.65	0.65	6.99	1,963.18 ***	$Y = 1.98 + 0.94x$	44.31 ***
Asexual	1,357	0.83	0.68	0.68	7.01	2,945.95 ***	$Y = 0.68 + 0.97x$	54.28 ***
Others	2,599	0.84	0.71	0.71	6.53	6,383.28 ***	$Y = 0.57 + 0.96x$	79.90 ***

Note: Y = depression, x = stress, *** p -value < 0.001

FIGURE 2 THE CORRELATION BETWEEN STRESS AND DEPRESSIVE SYMPTOMS OF 21,972 PARTICIPANTS, SEGMENTED BY ALL PARTICIPANTS AND FIVE SEXUAL ORIENTATIONS.



THE CORRELATION BETWEEN ANXIETY AND DEPRESSIVE SYMPTOMS

A simple regression analysis was conducted, and the results are presented in Table 3, including a summary of the model (correlation coefficient (R^2) and related values), the ANOVA test, the coefficients, and the simple regression equation. The relationship between anxiety and depressive symptom scores for 21,972 participants, divided by five sexual orientations, is shown in Figure 3 using a dynamic XY scatter plot with a linear regression trendline in blue. The analysis revealed a significant positive correlation (p -value < 0.001) between anxiety and depressive symptoms for all sexual orientations. Anxiety was a strong forecaster of depressive symptoms for all five groups, with a correlation coefficient (R^2) ranging from 0.50 to 0.60. This suggests that individuals with higher levels of anxiety were more likely to experience depressive symptoms across all five sexual orientations.

TABLE 3. THE CORRELATION BETWEEN ANXIETY AND DEPRESSIVE SYMPTOMS AND A SIMPLE REGRESSION EQUATION WITH A MODEL SUMMARY AND AN ANOVA TEST BY SEXUAL ORIENTATIONS (N= 21,972).

Sexual orientations	Model summary					ANOVA test	Coefficients	
	N	R	R-Square	Adjusted R-square	Standard Error	F (p-value)	Regression equation	t (p-value)
All	21,972	0.72	0.52	0.52	8.38	24,167.59 ***	$Y = 7.77 + 0.88x$	155.46 ***
Heterosexual	14,937	0.71	0.50	0.50	8.51	15,106.81 ***	$Y = 7.83 + 0.87x$	122.91 ***
Bisexual	2,031	0.72	0.52	0.52	8.40	2,163.32 ***	$Y = 9.83 + 0.83x$	46.51 ***
Homosexual	1,048	0.73	0.53	0.53	8.12	1,183.79 ***	$Y = 8.42 + 0.87x$	34.41 ***
Asexual	1,357	0.76	0.58	0.58	8.12	1,849.89 ***	$Y = 6.44 + 0.91x$	43.01 ***
Others	2,599	0.77	0.60	0.60	7.72	3,827.79 ***	$Y = 6.41 + 0.90x$	61.87 ***

Note: Y = depression, x = anxiety, *** p -value < 0.001

FIGURE 3 THE CORRELATION BETWEEN ANXIETY AND DEPRESSIVE SYMPTOMS OF 21,972 PARTICIPANTS, SEGMENTED BY ALL PARTICIPANTS AND FIVE SEXUAL ORIENTATIONS.

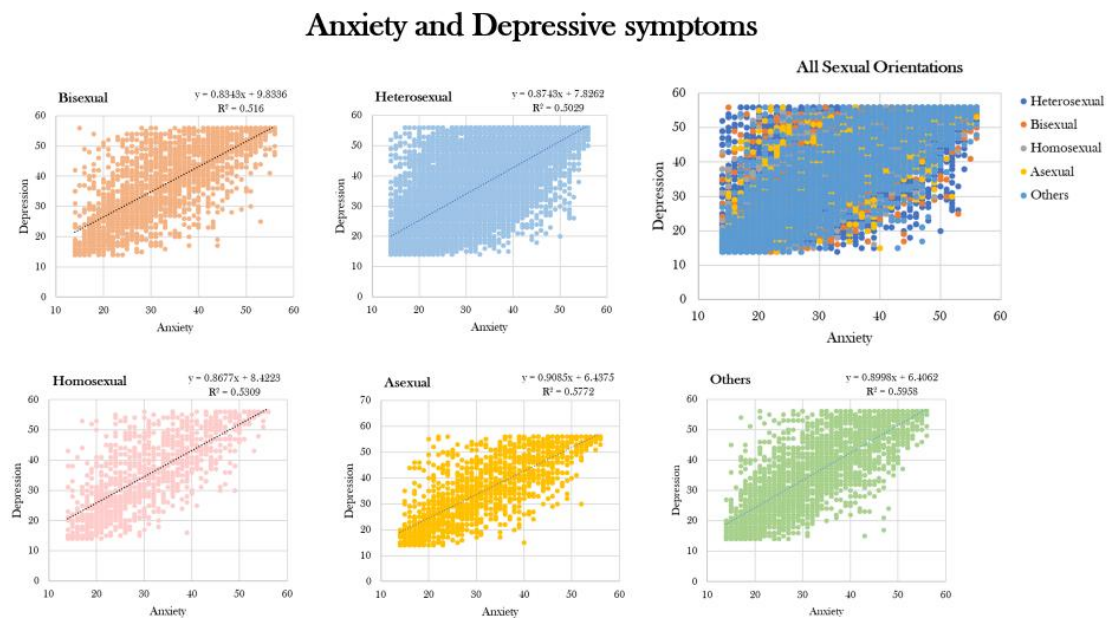


Table 4 presents the results of a multiple regression analysis examining the relationship between stress, anxiety, and depressive symptoms in the five sexual orientations. The summary of the model (the correlation (R^2) and related values), the ANOVA test, coefficients, and multiple regression equation, are provided. The results indicated a significant correlation (p -value < 0.001) between stress, anxiety, and depressive symptoms across all five sexual orientations. The equation suggests that stress and anxiety can predict depressive symptoms with a moderate correlation ($R^2 = 0.64 - 0.72$) for all five sexual orientations. As a matter of fact, those of all sexual orientations with higher levels of stress and anxiety were more likely to encounter depressive symptoms.

TABLE 4. THE CORRELATION AMONG STRESS, ANXIETY, AND DEPRESSIVE SYMPTOMS AND A MULTIPLE REGRESSION EQUATION WITH A MODEL SUMMARY AND AN ANOVA TEST BY SEXUAL ORIENTATIONS (N= 21,972).

Sexual orientations	Model summary					ANOVA test		Coefficients	
	N	R	R-Square	Adjusted R-square	Standard Error	F (p-value)	Regression equation	X1	X2
								t (p-value)	t (p-value)
All	21,972	0.81	0.66	0.66	7.12	20,924.18 ***	$Y = 1.26 + 0.76x_1 + 0.22x_2$	91.76 ***	25.34 ***
Heterosexual	14,937	0.80	0.64	0.64	7.26	13,213.39 ***	$Y = 1.45 + 0.76x_1 + 0.21x_2$	75.02 ***	19.87 ***
Bisexual	2,031	0.80	0.64	0.64	7.23	1,815.62 ***	$Y = 2.49 + 0.75x_1 + 0.21x_2$	26.66 ***	7.60 ***
Homosexual	1,048	0.81	0.66	0.66	6.88	1,027.33 ***	$Y = 1.53 + 0.76x_1 + 0.22x_2$	20.23 ***	5.70 ***
Asexual	1,357	0.84	0.70	0.70	6.87	1,560.81 ***	$Y = 1.16 + 0.76x_1 + 0.25x_2$	23.20 ***	7.49 ***
Others	2,599	0.85	0.72	0.72	6.41	3,352.81 ***	$Y = 1.15 + 0.78x_1 + 0.22x_2$	34.12 ***	9.69 ***

Note: Y = depression, x_1 = stress, x_2 = anxiety, *** p -value < 0.001

DISCUSSION

The results of the simple regression analysis for all five sexual orientations were consistent, revealing that anxiety serves as a strong predictor of stress, stress predicts depressive symptoms, and anxiety also predicts depressive symptoms. This suggests that individuals: 1) reporting higher levels of anxiety tend to report higher levels of stress; 2) those with higher levels

of stress are more likely to experience depressive symptoms; and 3) those with higher levels of anxiety are more likely to experience depressive symptoms. In addition, the mix of stress and anxiety had a significant statistical correlation with the development of depressive symptoms in people of any of the five sexual orientations.

This current study investigates the connection between three psychological distresses in within a sample of people who identify with specific sexual orientation. However, in scientific research exploring people living with health conditions, such as heart failure patients [23], [24], maternal conditions like postpartum weight retention [25], people living with cancer [26], and substance abusers [27], [28], and people living with positive detectable HIV [29], there is the same evidence of a comorbid relationship between stress, anxiety, and depression. All five sexual orientations show the same positive predictive value for anxiety and stress on depression. However, when deeply investigate, some studies report that sexual minority populations report a higher risk of these three than heterosexual individuals. For example, lesbians [30], bisexual women, and gay men [31].

From the perspective of psychoneuroendocrinology, the interesting evidence demonstrates a correlation between stress and depression, in particular the activities in the brain and hormones related to them. Prolonged or chronic stress is able to result in excessive brain activity and is associated with the intercorrelation between the hypothalamus, pituitary gland, and adrenal glands (HPA) [1]. When the HPA is hyperactive, it leads to the release of high levels of stress hormones, namely "cortisol", which may cause depression [1], [32]. Hypersecretion of cortisol was discovered in approximately half of the depressive patients in a study [32]. Anxiety and depression have a strong bond, as indicated by research evidence. Approximately one in four patients in general medical practice has a comorbidity between anxiety and depression. Around 85% of depressive patients reported experiencing anxiety symptoms. Likewise, approximately 90% of patients with anxiety disorders also exhibit symptoms of depression [5]. Similarly, in a study in the Netherlands, 75% of individuals diagnosed with a depressive disorder currently have an anxiety disorder. Similarly, 81% of individuals currently diagnosed with an anxiety disorder also have a current depressive disorder [33].

From the evidence, it can be concluded that anxiety, stress, and depression present a strong interconnection with the same results in various groups of people, including those with different sexual orientations, the general population, non-clinical groups, and people affected by negative health outcomes. However, the prevalence and severity of these conditions may be higher among certain clinical populations compared to the general population.

IMPLICATIONS AND ACADEMIC SUGGESTIONS

The current study's evidence indicates the significant interplay of anxiety and stress on depressive symptoms. Consistently, a strong correlation between these three psychological distresses is found in all five sexual orientations (heterosexual, bisexual, homosexual, asexual, and others). This is able to confirm that anxiety and stress significantly predict depression within these groups, but it is important to contextualize these findings within broader population research. Previous studies have demonstrated that psychological distress patterns are prevalent across general populations, regardless of sexual orientation. The confirmation of similar patterns within sexual minority populations underscores that while this group share common mental health challenges with the general population, the findings highlight the need for tailored mental health interventions sensitive to the unique experiences and stressors experienced by minority individuals.

Therefore, in terms of mental healthcare management, it is necessary to further investigate potential contributing factors and develop interventions or approaches to promote healthy mental health for individuals of all sexual orientations. Conducting more studies in different countries, cultures, social contexts, and so on, to gain a better understanding of the specific factors that contribute to the development of these mental health issues among different sexual orientations. Moreover, developing targeted interventions for individuals of different sexual orientations that address the unique stressors and experiences that they may face requires understanding the specific mental health needs of individuals of different sexual orientations. There are many healthcare management strategies to reduce stress and anxiety and lower the risk of depression. For example, screening and recognizing the signs of stress and anxiety and seeking help early intervention. Stress management should be promoted in groups of people who are suffering from stress and related symptoms. Additionally, many therapeutic interventions including, mindfulness and meditation, healthy lifestyles,

identifying triggers of psychological distress, and so on, should be promoted through health education and health promotions. Furthermore, developing support groups, group counseling, and community programs for people of different sexual orientations is an intriguing approach to assisting them in coping with stress and anxiety and diminishing their risk of developing depression or depressive disorders.

LIMITATIONS

The online questionnaire for the DASS-42 of this study is the English version and is only available on the online platform. Accordingly, all the data collected came from participants who had English proficiency and could access the website. The participants who were unable to access the website and had difficulty understanding and communicating in their English language skills were excluded from this study.

CONCLUSION

The research has demonstrated that anxiety plays a major role in the development of both stress and depressive symptoms. Additionally, stress has been identified as a crucial contributor to the onset of depressive symptoms. Furthermore, research has established that the co-occurrence of stress and anxiety increases the likelihood of experiencing depressive symptoms across all five sexual orientations. Healthcare management strategies are crucial approaches that should be planned; in particular, minimizing stress and anxiety can help reduce the risk of developing depression. Anxiety and stress are key factors that contribute to depressive symptoms. It should, therefore, be necessary to explore the underlying factors contributing to psychological distress among individuals with different sexual orientations. This could include conducting studies in various countries, cultures, and social contexts to gain a more comprehensive understanding of the unique challenges faced by these individuals.

ABBREVIATIONS

DASS-42 = The Depression, Anxiety, and Stress Scale with 42 items

HPA = The hypothalamus, pituitary gland, and adrenal glands

R² = R-square

HIV = Human Immunodeficiency Virus

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APPLICABILITY OF THE “5S MANAGEMENT METHOD” FOR QUALITY IMPROVEMENT AT HEALTH CARE FACILITIES IN INDIA

Aesh Katiyar, Jay Rajeshkumar Patwa*, Nikhil Chavda

Dr. N. D. Desai Faculty of Medical Science and Research, Dharmsinh Desai University, Nadiad, India

Correspondence: drjpatwa@gmail.com

ABSTRACT

INTRODUCTION:

The 5S management method, originally developed in Japanese industries for quality improvement, has since been adopted in healthcare settings worldwide. Several developing countries have reported positive outcomes from its implementation in healthcare, including improved workspace organization, enhanced environments, better compliance with regulations, and increased patient satisfaction. This study aimed to assess the applicability of the 5S management method for quality improvement in tertiary-level healthcare facilities and to evaluate the changes brought about by 5S in the workplace, including both process and outcome measures of healthcare services.

METHODS:

This mixed-methods study was conducted in twelve departments across the two largest tertiary hospitals in Nadiad, Gujarat, from July 2023 to December 2023. Quantitative data served as the primary component, supplemented by qualitative data. A structured 5S audit checklist and semi-structured interviews were used for baseline assessment, external evaluation, and qualitative data collection, respectively.

RESULTS:

Following 5S implementation, the mean scores increased in all twelve departments, with statistically significant improvements in most cases. The mean 5S score in the private hospital increased by 30.99%, while that of the government hospital increased by 43.39%. Post-implementation, turnaround time decreased for case registration, pharmacy, and emergency room services while laboratory efficiency improved, accompanied by reductions in medical errors and hospital-acquired infections. Qualitative analysis identified key themes such as enhanced work environments and improved quality of services.

CONCLUSION:

The study shows that implementing the 5S management method effectively improves work environments, efficiency, quality, and staff satisfaction in both government and private tertiary healthcare facilities in India; sustaining these improvements is essential for long-term success.

KEYWORDS

5S management method, health management, quality improvement, health care, lean, tertiary hospital

INTRODUCTION

Health is the basic human fundamental right. The right to quality health care has been a priority since the WHO constitution (1946), continuing through the millennium development goals (MDGs) to the latest sustainable development goal (SDG) target 3.8.[1–3] It is clearly evident that globally, the focus is on providing quality healthcare services as efficiently as possible.

In India, the healthcare system differs on many levels, such as private versus government, or urban versus rural healthcare systems. The budget for healthcare expenditure is relatively low, which affects infrastructure, resources, quality, the number of patients accessing healthcare, and the training of healthcare staff. Despite these challenges, India has made significant progress in improving its healthcare delivery system over the past decade. The emphasis is gradually shifting from providing a greater quantity of healthcare services to ensuring higher quality. The quality of healthcare depends on various factors, including economics, resources, infrastructure, management, and location. The quality of care includes organizational factors such as appearance, better patient outcomes and safety, improved efficiency of public healthcare, reduced waiting times before being served, and reductions in medical errors, in addition to clinical practice. The Government of India has introduced various standards and accreditations such as the national quality assurance standards (NQAS), the Kayakalp award scheme, the LaQshya program, national accreditation board for hospitals and the healthcare providers (NABH), and the Indian public health standards (IPHS) to improve the quality of the healthcare system.[4–6]

Globally various methods have been deployed to provide quality healthcare efficiently. The 5S management method is one such approach. The 5S management method was originally implemented by manufacturing industries in Japan during the 1980s for quality improvement. 5S stands for five Japanese words: "Seiri, Seiton, Seisou, Seiketsu, and Shitsuke," which translate to "Sort, Set in order, Shine, Standardize, and Sustain" in English.[7,8] "Sort" refers to the separation and removal of unwanted and unnecessary items from the work area. "Set in order" means organizing items so that every staff member can find what is required with minimal effort. "Shine" refers to maintaining cleanliness in the workplace. "Standardize" means achieving a high level of standardization in all activities carried out in the first three Ss, using checklists and standard operating procedures (SOPs). "Sustain" refers to maintaining all these practices over the long term.

Due to a lack of resources, disorganized work environments, and poor management, healthcare workers often become frustrated, make unintentional mistakes, and lose interest in patient care. The 5S management method is a cost-effective, participatory approach that workers can implement to increase productivity by creating and maintaining a clean and tidy workplace.[8] Eventually, the 5S method was applied in non-production settings such as offices and healthcare facilities worldwide.[9] The impact of the 5S management method in the healthcare sector has been documented in many countries, including the United States [10,11], India [12–14], Jordan [15], Sri Lanka [16], and Senegal [17], although other lean tools and methods were often used alongside the 5S method. Observed changes as a result of these interventions included improved working processes, increased physical space, elimination of safety violations, improved regulatory compliance, improved clinical indicators of safety, increased time with patients, and improved patient satisfaction. [11,12,15,16]

Despite encouraging results from the 5S method in various low- and middle-income nations, only a handful of studies have explored its applicability in Indian healthcare facilities. No qualitative research has been conducted in India to examine staff members' perceptions and opinions regarding the 5S management method. To fill this evidence gap, the present study was carried out at resource-constrained government and private tertiary healthcare facilities, with the aim of studying how the implementation of 5S creates changes in the workplace, including processes and outcomes of healthcare services, and to conduct a comparative analysis between both types of facilities.

METHODS

STUDY DESIGN:

The present study used a mixed-methods design, with quantitative data as the primary component and qualitative data as the secondary component.

STUDY SETTING & PROCEDURE:

The study was conducted in the two largest tertiary hospitals in the city of Nadiad, Gujarat, between July 2023 and December 2023. One hospital was a government facility (Civil Hospital), and the other was a private facility. After obtaining permission from the institutional ethical committee (letter No. NDDFMSR/IEC/2023/03/05 dated 14/06/2023) and the superintendents of both hospitals, data were collected. The detailed methodology is shown in Figure 1.

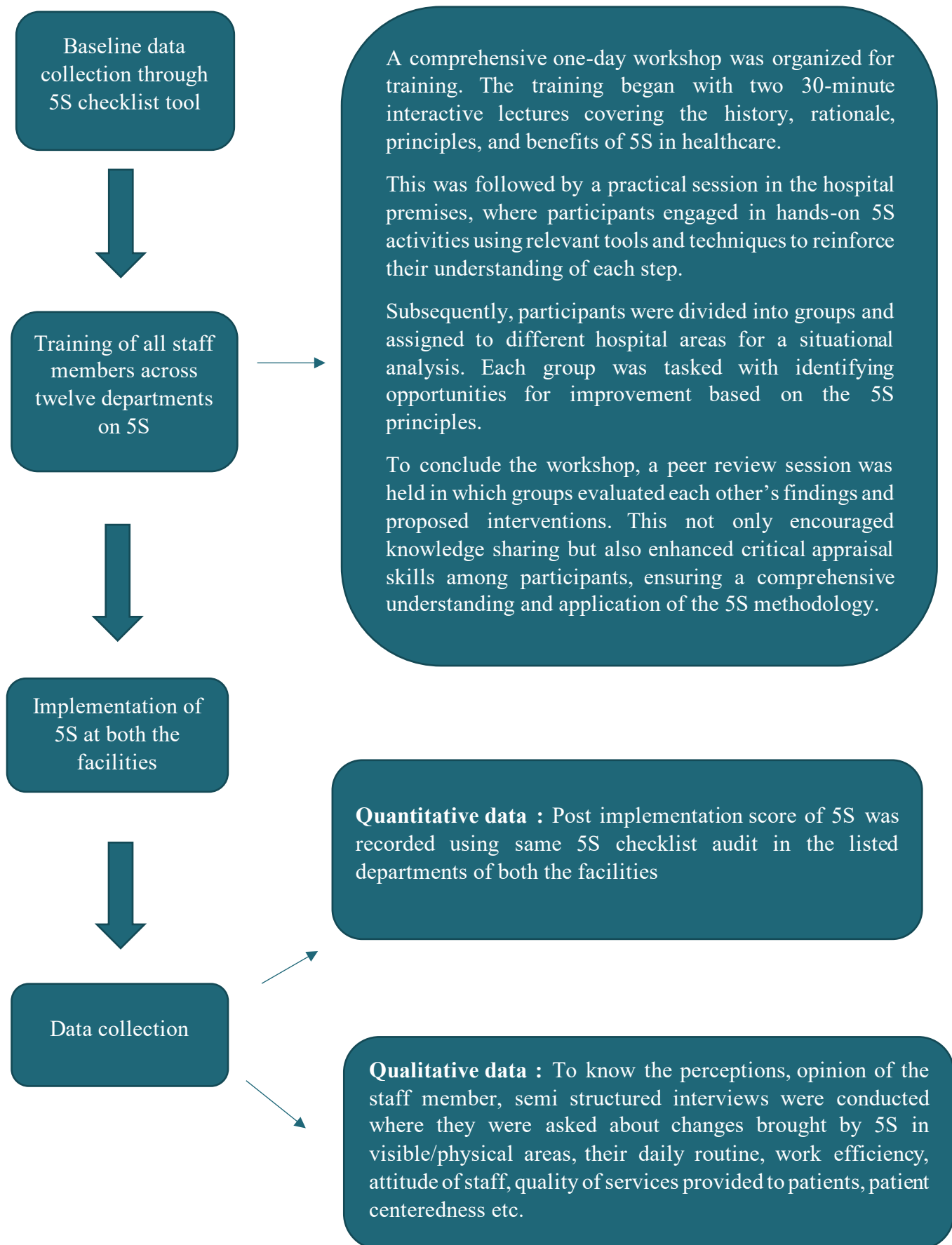
A structured 5S audit checklist was used for baseline assessment and external evaluation. Twelve departments of both the facilities were included in the study such as pharmacy, emergency room, pathology laboratory, male medicine ward, labour room, operation theatre, blood bank, biowaste management, registration room, outpatient department (OPD), imaging centre, and central sterile supply department (CSSD). Each question was assessed through personal observation, and a score from 1 to 5 was given. Scoring was in descending order: 5 for excellent, 4 for good, 3 for average, 2 for poor, and 1 for very poor performance. Baseline data on average turnaround time, incidence of materials going out of stock, medical errors, and other parameters were also noted. Baseline data collection was followed by training for staff members (laboratory technicians, pharmacists, and nursing in-charges) regarding 5S implementation in their respective departments at both hospitals. After a two-month gap following the training, post-implementation data were collected using the same 5S checklist. The fifth S (sustain) was assessed at the end of six months. Collected data were compiled in Microsoft Office Excel 2010 format and analyzed using Epi Info software version 7. Appropriate tests, such as paired and unpaired t-tests, were applied. A p-value of <0.05 was considered statistically significant.

For qualitative data, verbal consent was obtained from staff members prior to interviews, which were recorded for later analysis. Semi-structured interviews were conducted with staff members from departments that had participated in the 5S program, based on their availability. Interview questions focused on the impact of the 5S program on parameters such as work environment, staff attitudes and behaviors, efficiency, workplace satisfaction, and quality of services. Contradictory views and negative opinions about the 5S program were also noted. For qualitative data analysis, interviews were transcribed verbatim, followed by a thematic approach, and the process tracing method. The principal investigator conducted the interviews, transcription, translation, and theme analysis independently, following the six stages described by Braun and Clarke.[18] The investigator was fluent in Hindi, English and Gujarati. Both investigators reviewed their preliminary analyses and agreed on theme definitions and a common thematic and sub thematic structure.

FIGURE 1: FLOW OF METHODOLOGY

Phases of Methodology

Activities carried out



RESULT

TABLE 1: DEPARTMENT-WISE MEAN 5S SCORING OF GOVERNMENT & PRIVATE HOSPITAL (OUT OF 5)

Name of the department	Hospital Type	S1		S2		S3		S4		P value
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Pharmacy	Private	3.67	4.33	1.75	3.00	3.00	4.33	3.67	4.00	< 0.05
	Civil	4.00	4.67	2.50	3.75	2.33	3.67	4.00	4.00	< 0.05
Pathological lab	Private	3.00	4.25	3.00	3.80	4.00	4.50	3.00	4.33	< 0.05
	Civil	2.75	4.25	2.20	3.20	2.00	3.00	2.75	4.00	< 0.01
Emergency	Private	2.50	4.25	3.40	4.40	3.40	4.20	2.50	3.00	< 0.05
	Civil	3.25	4.50	3.00	3.80	3.00	4.20	3.25	4.00	< 0.05
Labour room	Private	2.50	4.00	3.00	4.00	3.00	4.00	2.50	4.00	< 0.05
	Civil	2.75	4.25	2.83	4.17	3.40	4.40	2.75	4.00	< 0.05
Male medicine ward	Private	2.25	4.00	2.83	4.00	3.00	4.20	2.25	4.00	< 0.01
	Civil	3.75	4.50	3.00	4.17	3.20	4.40	3.75	4.00	> 0.05
Operation theatre	Private	2.50	4.25	3.40	4.20	4.60	5.00	2.50	4.00	> 0.05
	Civil	2.75	4.00	3.40	4.20	4.60	5.00	2.75	4.00	< 0.05
Blood bank	Private	4.00	4.75	1.40	3.20	3.75	4.50	4.00	4.67	< 0.05
	Civil	2.50	4.00	2.00	3.40	2.00	3.50	2.50	4.00	< 0.001
Biowaste management	Private	4.33	4.67	2.33	3.00	4.25	4.50	4.33	4.00	> 0.05
	Civil	3.00	3.67	2.67	3.00	1.75	3.00	3.00	4.00	< 0.05
Registration room	Private	2.67	4.33	2.00	3.00	3.25	4.50	2.67	3.50	< 0.05
	Civil	2.67	3.67	3.50	4.50	1.25	2.50	2.67	3.00	< 0.05
OPD	Private	3.00	4.00	2.60	4.20	3.40	4.40	3.00	4.00	< 0.05
	Civil	2.75	3.50	2.40	3.40	1.60	3.00	2.75	3.00	< 0.05
Imaging centre	Private	2.75	3.75	3.00	4.20	3.40	4.40	2.75	4.00	< 0.05
	Civil	2.75	3.50	2.20	3.40	2.40	3.20	2.75	3.00	< 0.05
CSSD	Private	4.33	4.67	3.00	3.67	4.50	4.75	4.33	4.00	< 0.05
	Civil	3.00	4.33	1.33	3.33	2.25	4.25	3.00	4.00	< 0.05

Table 1 shows the department-wise mean 5S scores for government and private hospitals before and after 5S implementation. In almost all departments, the mean 5S score increased after implementation. The difference between pre- and post-5S implementation was statistically significant in the majority of departments in both government and private hospitals (p-value <0.05).

FIGURE 2: COMPARATIVE ANALYSIS OF THE IMPACT OF 5S IN GOVERNMENT AND PRIVATE HOSPITALS (SCORE OUT OF 5)

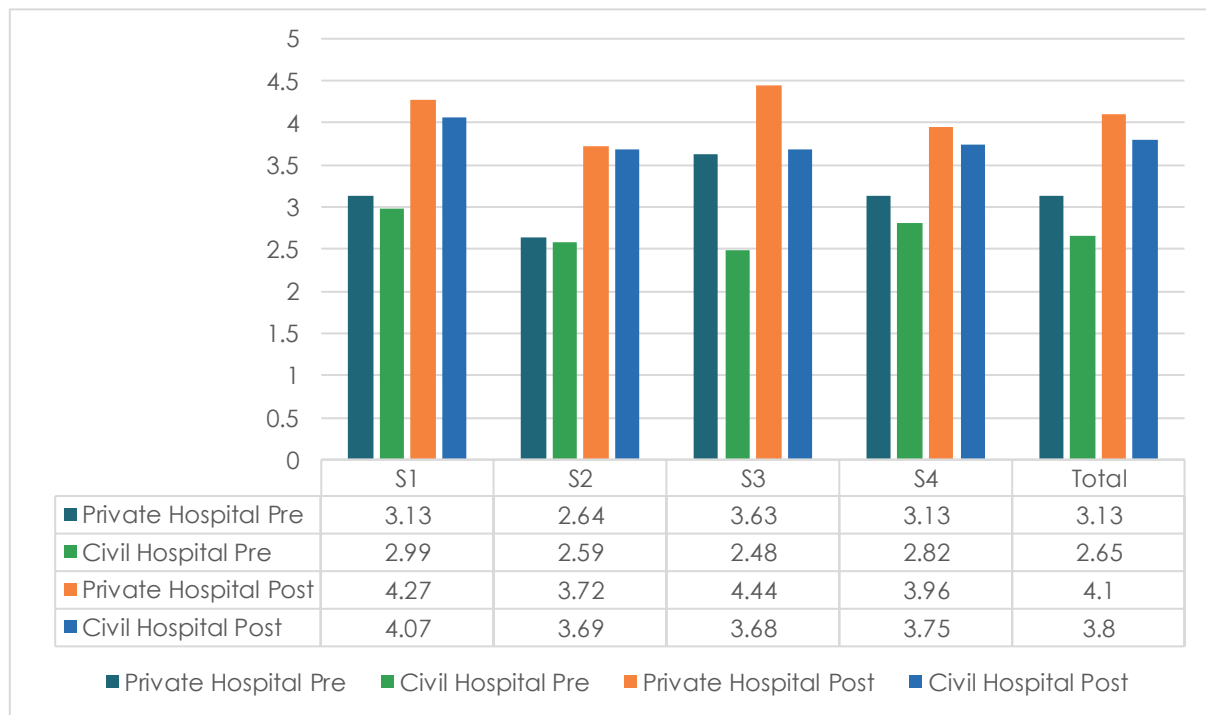


Figure 2 shows a comparative analysis of the impact of 5S in government and private hospitals. The mean 5S score in the private hospital increased by 30.99%, while that of the government hospital increased by 43.39%. Despite the 43.39% increase in the government hospital's 5S score, its mean score still lagged the private hospital mean score. However, the difference between the government and private hospital mean scores was not statistically significant ($p>0.05$). The mean score for the fifth S (sustain) was 3.8 in the private hospital and 3.5 in the government hospital.

TABLE 2: OUTCOME OF 5S IMPLEMENTATION AT TERTIARY LEVEL HEALTHCARE CENTRE

Department	Process changed as per 5S Implementation	Outcome
Pharmacy	Visual control methods adopted by displaying look alike, sound alike drug list	Prevented mix-up of drugs while dispensing and avoided potential medical errors in government hospital
Pharmacy	Drug storage done systematically by arranging it alphabetically from earlier department wise storage	Average turnaround time (TAT) to find and dispense medication reduced drastically by 35% in private hospital
Blood bank	Colour coding system adopted for timely alert to replenish reagents	Incidence of reagents went for out of stock reduced significantly
Emergency Room	Tagging system developed to differentiate working/empty oxygen cylinder	Average turnaround time (TAT) to find working cylinder reduced by 52% and 46% respectively in private & government hospital
Laboratory	Reagent stored according to the frequency of use and colour coding system adopted for timely alert to replenish reagents	Able to manage same number of samples in 24% time than previously. Incidence of reagents went for out of stock reduced
Case Registration	Removed obsolete and unwanted items from the desk	Average turnaround time (TAT) for a patient in a waiting queue reduced by 12% and 19% respectively in private and government hospital
Medicine Ward	Implemented sort, set in order, shine and standardization	Hospital acquired infection rate has come down by 32 per cent and 41per cent

Table 2 shows the outcomes of 5S implementation in various departments. After 5S implementation, turnaround time was significantly reduced in the pharmacy, emergency room, and case registration window. The incidence of reagents going out of stock was significantly reduced. Medical errors and hospital-acquired infection rates were also significantly reduced, while laboratory staff were able to manage samples more efficiently.

QUALITATIVE DATA ANALYSIS

TABLE 3: THEMATIC STRUCTURE OF QUALITATIVE ANALYSIS FOR 5S IMPLEMENTATION

Theme	Subtheme
1) Work environment	a) Visual appearance b) Safety of staff
2) Quality of service	a) Efficiency b) Patient centredness

Table 3 shows theme and subtheme structure of 5S implementation.

WORK ENVIRONMENT

One of the themes in the qualitative analysis was a change in the work environment after 5S implementation, with subthemes of visual appearance and staff safety.

a) Visual Appearance

One nurse reported, "Earlier, my workplace used to be completely messy – so many forms, files and what not. Even I used to dislike such an unpleasant work environment. Now, after implementing 5S, I have found more place to work, as everything is stored in an organized way. Not only that, but this visual change has also brought a positive work environment."

b) Safety of Staff

Another nurse said, "Sometimes, there is an accidental spillage on the floor by patients, relatives, or staff members, which endangers safety. But due to 5S management, there is a spillage box and a proper cleaning product checklist, which help us to clean everything at the right time."

QUALITY OF SERVICE

Another theme identified was quality of service, with subthemes of efficiency and patient satisfaction.

a) Efficiency

One pharmacist reported, "Earlier, there used to be complete chaos and a long queue outside the pharmacy counter to collect medicines. Now, after 5S implementation, we are dispensing medicines much faster, resulting in shorter queues."

b) Patient-centeredness

One head nurse reported, "New nursing staff always had confusion about similar pronounced drugs (e.g., diclofenac and dicyclomine) or similar-looking vial boxes. There was always a threat in our minds that, by mistake, they might infuse the wrong drug into a patient. But now, with the help of 'look-alike and sound-alike drug list,' they are managing patients confidently without any errors."

DISCUSSION

The present mixed-methods study was conducted in the two largest tertiary hospitals in the city of Nadiad, Gujarat. One was a government hospital (Civil Hospital), and the other was a private facility. In the present study, baseline data were collected at both facilities, followed by 5S training. Post-implementation data were collected to study how 5S implementation creates changes in the workplace, including processes and outcomes of healthcare services. Twelve departments from both facilities were included in the study.

Table 1 shows the department-wise mean 5S scores for government and private hospitals before and after 5S implementation. It is evident from the results that, after 5S implementation, the mean score increased in almost all departments. The difference between pre- and post-5S implementation was statistically significant in the majority of departments (p -value < 0.05). Our study findings are consistent with those of Pandya et al. and Patwa et al. [13,14] Although both studies were conducted at different urban health centres rather than in different hospital departments, both reported a significant increase in mean scores after 5S implementation.

Figure 2 compares 5S impact in government and private hospitals. The mean 5S score rose by 30.99% in the private hospital and by 43.39% in the government hospital, likely because the government hospital's lower baseline score allowed more room for improvement. However, the difference in mean 5S scores between government and private hospitals was not statistically significant ($p > 0.05$), and no previous studies comparing 5S scores in these settings were found.

Table 2 shows the outcomes of 5S implementation in various departments. In our study, the average turnaround time (TAT) to find and dispense medication was reduced by 35 per cent in the private hospital after 5S implementation. Similar findings were reported by Al-Araidah et al. in an inpatient pharmacy in Jordan, which reported a saving of more than 45 per cent in the drug dispensing cycle time. [15] Laboratory staff were able to save 24% of their time while running the same number of samples after 5S implementation. Similar findings were reported by Rutledge et al. at a tertiary care hospital laboratory in the USA, which reported improved turnaround time with a 20% increase in laboratory testing volume. [10] In the present study, hospital-acquired infection rates decreased by 32% and 41% in the private and government hospitals, respectively. Similar findings were reported by Withanachchi et al. at a women's hospital in Colombo, Sri Lanka, which reported a 52% and 33% reduction in post-caesarean section infection rates and in stillbirth rates, respectively. [16] In the present study, the average turnaround time to find a working cylinder was reduced by 52% and 46% in the private and government hospitals, respectively. Similar findings were reported by Ikuma and Nahmens in the USA, which reported that goals related to regulatory compliance, ergonomics, or safety were achieved in all departments. [11]

Table 3 shows the thematic structure of qualitative analysis for 5S implementation. In the present study, work environment and quality of services were the main themes, with visual appearance, safety of staff, efficiency, and patient-centeredness as subthemes. Similar findings were reported by Kanamori et al. in Senegal, which identified work environment, staff attitude and behavior, quality of services, efficiency, patient-centeredness, and safety as key domains. [9] From the above findings, it can be concluded that, irrespective of geographic location, type of hospital, or department, our study findings are consistent with previous findings, suggesting positive outcomes following 5S implementation.

LIMITATION OF STUDY:

The current study was conducted only in twelve departments of two large tertiary hospitals in a single city. Although the results are positive, before generalizing them, large-scale studies in hospitals across multiple cities and departments over a longer period need to be conducted in the future to bring about much-needed changes in the management system.

CONCLUSION

The present mixed-methods study demonstrates that the 5S management method is applicable and effective for quality improvement in both government and private tertiary healthcare facilities in India. Implementation of the 5S method leads to improved work environments, increased efficiency, better patient outcomes, and enhanced staff satisfaction. Sustainability of such a method is the key to achieve long term desired outcomes.

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DECLARATION OF CONFLICTING INTEREST

The authors declare that there is no conflict of interest.

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KNOWLEDGE, BARRIERS, AND MANAGEMENT IMPLICATIONS OF MAINTAINING HOSPITAL INFORMATION SYSTEM (HIS) AMONG STAFF NURSES IN UTTAR PRADESH, INDIA

Umme Ruman, Seema Rani*, Uzma Anjum

Rufaida College of Nursing, Jamia Hamdard, New Delhi, India

Correspondence: seema9rani@yahoo.co.in

ABSTRACT

BACKGROUND:

Hospital Information Systems (HIS) are essential tools in hospital management, enabling nurse leaders and administrators to access accurate patient data, monitor performance, and make informed decisions that enhance care quality and operational efficiency. By supporting both clinical and managerial decision-making, HIS strengthens strategic planning, resource allocation, and coordination across departments.

AIM:

To assess the knowledge, to find out the barriers regarding Hospital Information System (HIS) among the staff nurses and to find out the association between the barriers faced by staff nurses in maintaining Hospital Information System (HIS) with their selected demographic variables in a selected hospital of Uttar Pradesh, India.

METHOD:

A quantitative research approach was adopted for the study with cross sectional research design was conducted in selected hospital of Uttar Pradesh, India. The study was conducted among 250 staff nurses. A structured knowledge questionnaire was used to assess the knowledge of staff nurses and structured rating scale was used to find out the barriers among staff nurses.

RESULT:

The findings revealed that 59.6% of staff nurses had adequate knowledge about HIS. Regarding barriers, 66.8% experienced moderate barriers, 17.6% experienced major barriers, and 15.6% experienced mild barriers and significant associations were found between barriers and any training attended related to HIS use ($p=0.007$) and any special training attended related to computer use ($p=0.007$), whereas with other demographic variables, no significant association was shown.

CONCLUSION:

The study concluded that a large proportion of staff nurses had inadequate knowledge and faced barriers in maintaining Hospital Information System (HIS). These findings have practical and policy implications for hospital administrators, highlighting the need for structured and continuous HIS training programs, supportive policies, and adequate resource allocation to ensure effective and sustainable system use.

KEYWORDS

hospital information system, barriers, staff nurses, knowledge.

INTRODUCTION

A Hospital Information System (HIS) refers to an integrated platform that enables hospitals to collect, store, process, and disseminate information efficiently. It typically encompasses clinical, organizational/financial, and personnel management divisions. HIS supports optimal treatment outcomes by streamlining clinical workflows, improving care coordination, and enhancing data-driven decision-making.[1]

Hospital Information Systems (HIS) also significantly enhance care coordination among health professionals by ensuring that essential patient data such as clinical history, laboratory test results, radiographic images, and other diagnostic information is readily available at the point of care. For example, lab technicians and radiologists can instantly access and disseminate test reports and imaging, facilitating streamlined clinical workflows and interprofessional collaboration. The increasing adoption of HIS is driven by the pressure to manage growing patient volumes and complex care pathways, as digital information ecosystems supported by HIS improve the generation, updating, exchange, and continuity of data across the patient journey.[2]

The Hospital Information System (HIS) is an essential mechanism for managing information and documentation in healthcare settings, equipped with various features that have the potential to transform hospital services dramatically. HIS saves valuable time, allowing healthcare providers to make faster, informed decisions regarding patient treatment. [3] Despite the availability of these advanced systems, nurses are not fully utilizing Hospital Information Systems (HIS) to document the care they provide to patients.[4]

This study is guided by the Technology Acceptance Model (TAM), which explains how perceived usefulness and ease of use influence the adoption of new technologies, such as Hospital Information Systems (HIS). This model provides a useful lens to assess both knowledge and the barriers staff nurses face in HIS usage.

There are not enough studies in regard to assess the knowledge and find out the barriers among staff nurses in maintaining Hospital Information System therefore this study aimed to assess the knowledge and barriers among staff nurses, through cross-sectional research design. The primary objective of the study was to assess the knowledge and to find out the barriers in maintaining HIS among staff nurses and the secondary objective was to find out the association between the barriers faced by staff nurses in maintaining Hospital Information System (HIS) with their selected demographic variables.

MATERIAL AND METHOD

STUDY SETTING AND DESIGN:

Between June and December 2024, we conducted a study by using a descriptive cross sectional research design in a selected hospital of Uttar Pradesh, that focused on the knowledge and barriers among staff nurses. A non-probability convenience sampling technique was adopted due to operational constraints in the clinical environment, such as varying nurse shift schedules, high workload periods, and the need to collect data without disrupting patient care. This approach was practical for accessing participants during their availability and enabled inclusion of actively practicing nurses across multiple departments. To minimize potential selection bias, we invited all eligible nurses present during the data collection period, ensured representation from all shifts, and avoided selecting only those personally known to the researchers. While this method limits broader generalization, it provided relevant, real-world insights into HIS-related challenges in routine hospital practice.

STUDY POPULATION:

Our target population was the staff nurses in a selected hospital of Uttar Pradesh.

SAMPLE SIZE AND SAMPLING PROCEDURE:

Sample comprised of staff nurses working in a selected hospital of Uttar Pradesh, India. We determined the sample size using Rao software, considering a 95% confidence level and 5% margin of error, and therefore selected 250 staff nurses working in a selected hospital of Uttar Pradesh. Eligible nurses were informed about the study through departmental meetings and notice board announcements, and those willing to participate were approached in person and provided with detailed study information before obtaining written informed consent.

STUDY PROCEDURE

The study was commenced after getting approval from the administrative authority of the selected hospital and Ethics committee.

The purpose of the study was explained to participants, and written informed consent was taken. The sociodemographic details (age, gender, educational qualification, total working experience, area of work, designation, any special training attended related to HIS and any special training attended related to computer use) were collected through a semi structured questionnaire. The structured tool was developed by a researcher to assess the knowledge and barriers related to HIS among staff nurses, and was subjected to validation by a multidisciplinary panel comprising subject matter experts from Nursing, Healthcare and Pharmaceutical Management, Information Technology and Hospital Administration, who reviewed the content for relevance, clarity and adequacy in measuring the intended variables.

MAIN OUTCOMES

The main outcomes of this study were the assessment of the knowledge and to find out the barriers in maintaining Hospital Information System (HIS) among the staff nurses. For this purpose, the structured knowledge questionnaire was used to assess the knowledge of staff nurses in maintaining HIS among staff nurses and structured rating scale was used to find out the barriers in maintaining HIS among staff nurses. It is a valid and reliable tool, the content validity was established through expert validation by a multidisciplinary panel comprising subject matter experts from Nursing, Healthcare and Pharmaceutical Management, Information Technology and Hospital Administration, who reviewed the content for relevance, clarity and adequacy in measuring the intended variables. The reliability of tool was assessed using Cronbach's Alpha, yielding coefficients of 0.80 and 0.90 for the respective sections, indicating high internal consistency. Structured knowledge questionnaire that sought to gather information regarding knowledge of staff nurses comprised of 20 questions. Structured rating scale that sought to gather information regarding the barriers among staff nurses comprised of 30 questions. The scale was divided into 3 categories that is organizational barriers, hardware barriers and human barriers and scored on a liked scale of 0 to 4.

STATISTICAL ANALYSIS

We employed descriptive and inferential statistics, such as frequency, percentage, mean and standard deviation to describe the socio demographic characteristics, knowledge of staff nurses and barriers regarding HIS among staff nurses. To find out the association between the barriers faced by staff nurses in maintaining Hospital Information System (HIS) with their selected demographic variables, Chi square / Fisher's Exact Test was used. The criteria for statistical significance were set at $P < 0.05$. For the purpose of statistical analysis, statistical package for the social sciences (SPSS) 26.0 software was used.

STUDY VARIABLES

We selected the study variables based on previous researchers about factors associated with the HIS.

We considered the following socio demographic variables: age, gender, educational qualification, total working experience, area of work, designation, any special training attended related to HIS and any special training attended related to computer use

DATA COLLECTION

Method used for data collection in the study was through paper and pencil method and face to face interaction. For this, we employed Questionnaire for demographic profile. For assessing the knowledge and barriers of staff nurses a structured tool was used.

RESULTS

TABLE 1: FREQUENCY AND PERCENTAGE DISTRIBUTION OF SAMPLES AS PER THEIR DEMOGRAPHIC CHARACTERISTICS (AGE, GENDER, EDUCATIONAL QUALIFICATION, WORKING EXPERIENCE). N=250

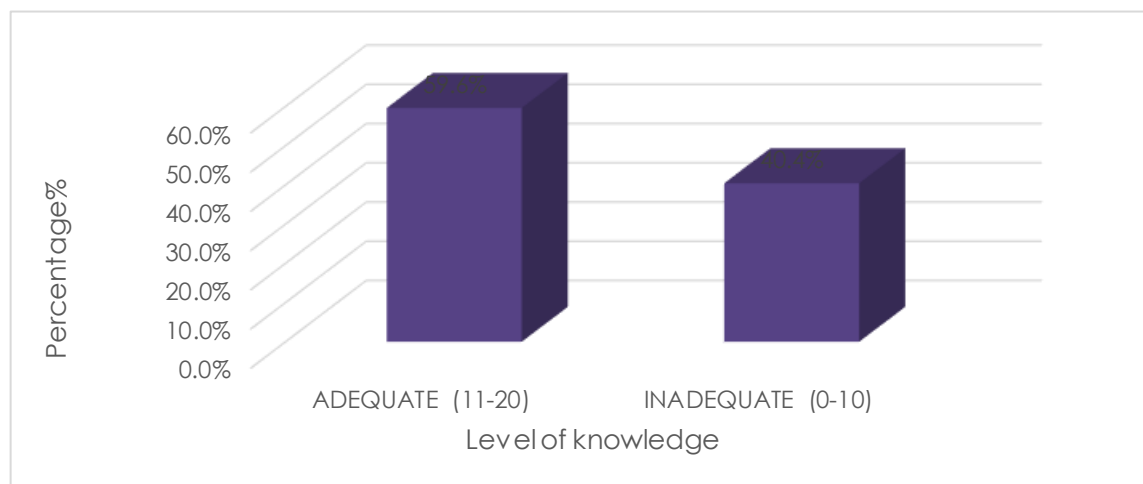
S. No.	Sample characteristics	Frequency (f)	Percentage (%)
1	Age (in years)		
	20-29	173	69.2
	30-39	39	15.6
	40-49	26	10.4
	≥ 50	12	4.8
2	Gender		
	Male	45	18
	Female	205	82
	Transgender	0	0
3	Educational Qualification		
	Diploma in Nursing	136	54.4
	Bachelor's Degree in Nursing	100	40
	Master's Degree in Nursing	12	4.8
	Others (ANM, etc.)	2	0.8
4	Total working experience including previous organization in years		
	1-5	157	62.8
	6-10	57	22.8
	More than 10	36	14.4
5	Area of work		
	Emergency Department	18	7.2
	ICU	36	14.4
	Medical surgical unit	76	30.4
	OPD	14	5.6
	Others (ortho, gynae, etc)	106	42.4
6	Designation		
	Nursing officer	216	86.4
	Ward in charge	34	13.6
	ANS/DNS	0	0
7	Any special training attended related to HIS		
	Yes	210	84
	No	40	16
8	Any special training attended related to computer use		
	Yes	210	84
	No	40	16

THE DEMOGRAPHIC DATA PRESENT IN TABLE 1 SHOWS:

Most of the respondents 173(69.2%) were in age group of 20-29 years. In relation to the educational qualification, most of the respondents i.e., 136(54.4%) were Diploma in Nursing. Regarding total working experience including previous organization, more than half of the respondents, 157(62.8%) had working experience of 1 -5 years.

Regarding areas of work, most of the respondents 106(42.4%) work in other areas that is orthopedics, gynecology etc. Regarding designation, majority of respondents 216(86.4%) are Nursing Officers. With regard to any special training attended related to HIS, majority of respondents 210(84%) have attended training related to HIS. With regard to any special training attended related to computer use, majority of respondents 210(84%) have received training related to computer use.

FIGURE 1: BAR DIAGRAM SHOWING THE PERCENTAGE DISTRIBUTION OF STAFF NURSES BY THEIR LEVEL OF KNOWLEDGE REGARDING HOSPITAL INFORMATION SYSTEM.



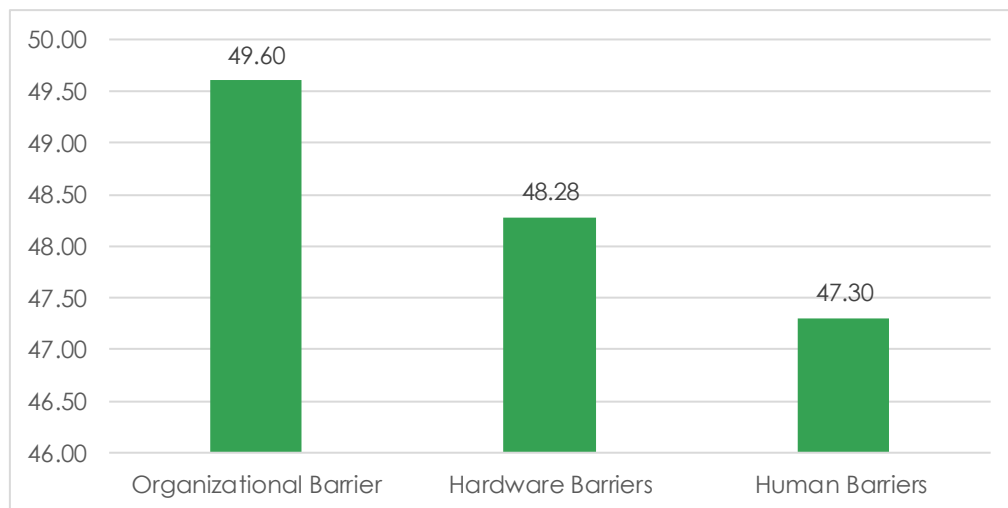
The data presented in Figure 1 shows that a large proportion of staff nurses 149(59.6%) had adequate knowledge and on the other hand, 101(40.4%) had inadequate knowledge regarding Hospital Information System.

TABLE 2: FREQUENCY, PERCENTAGE, MEAN, MEDIAN, STANDARD DEVIATION (S.D) AND RANGE OF OBTAINED SCORES OF STAFF NURSES N=250

Category of the barrier	Frequency (f)/ Percentage	Mean and (S.D)	Median	Range of obtained score
Major barrier	44 (17.6)	58.07 ± 20.48	59	2-100
Moderate Barrier	167 (66.8)			
Mild Barrier	39 (15.6)			
No Barrier	0			

The data presented in Table 2 shows that 167(66.8%) staff nurses experience moderate barriers, 44 (17.6%) experience major barriers, while 39 (15.6%) experience mild barriers. Notably, none of the participants experienced the absence of barriers 0(0.0%), with a mean score of 58.07 with median of 59. The score ranged from 2-100. The Standard Deviation (SD) was 20.48.

FIGURE 2: BAR DIAGRAM SHOWING MEAN PERCENTAGE DISTRIBUTION OF RANKING OF BARRIER CATEGORIES IN MAINTAINING HOSPITAL INFORMATION SYSTEM AMONG STAFF NURSES.



The data presented in Figure 2 reveals that 49.60% staff nurses face barriers related to Organization, 48.28% face related to Hardware and 47.30% face related to Human.

TABLE 3: ITEM WISE MEAN AND RANK ORDER OF ORGANIZATIONAL BARRIER, HARDWARE BARRIER AND HUMAN BARRIER AMONG STAFF NURSES N=250

Organizational Barrier	Mean	Rank
Limited time during shifts to update patient records on the system	2.388	I
Lack of time under clinical pressure	2.328	II
Lack of clarity in hospital information system policies and procedures	2.152	III
Lack of coordination between IT department and nursing staff	2.06	IV
Lack of proper training on hospital information system	2.024	V
Inadequate nursing staffing levels affecting the use of the system	1.968	VI
Poor communication regarding updates and changes to the system	1.92	VII
Inadequate feedback mechanism for reporting issues with the system	1.792	VIII
Lack for proper incentives for effectively using the system	1.68	IX
Insufficient technical support for system-related issues	1.528	X
Hardware Barrier	Mean	Rank
System downtime from hardware failure delaying patient care	2.204	I
Frequent interruptions in my work due to hardware issues (e.g., frozen screens, system crashes)	2.116	II
Insufficient system availability in the unit to maintain patient information efficiently	2.016	III
The hardware (e.g., barcode scanners, printers) frequently malfunctions during work hours	1.984	IV
Systems are often outdated and slow	1.936	V

The network connection often fails while accessing the Hospital Information System	1.912	VI
The current hardware setup is insufficient for the demands of the Hospital Information System	1.852	VII
Complex and difficult to use system interface	1.844	VIII
Difficulty of access to information	1.768	IX
The hospital does not provide adequate technical support for resolving hardware issues quickly	1.68	X
Human Barrier	Mean	Rank
Time consuming work with HIS	2.264	I
Difficulty in balancing clinical and HIS responsibilities	2.244	II
Reduced communication with other healthcare personnel	2.06	III
Lack of role clarity regarding HIS responsibilities	1.98	IV
Negative attitude of colleagues towards HIS	1.848	V
Uncertainty regarding the system's utility	1.832	VI
Lack of interest to work with computer	1.72	VII
Lack of sufficient skill for working with computer	1.712	VIII
Resistance to switching from manual to computerized systems	1.636	IX
Reduced communication with patients	1.624	X

The data in Table 3 shows that the topmost organizational barrier in maintaining Hospital Information System among staff nurses was limited time during shifts to update patient records on the system mean score (2.388), lowest organizational barrier in maintaining Hospital Information System among staff nurses was insufficient technical support for system-related mean score (1.528), and the topmost hardware barrier in maintaining Hospital Information System was system downtime from hardware failure delaying patient care mean score (2.024) and lowest hardware barrier in maintaining Hospital Information System among staff nurses was the hospital not providing adequate technical support for resolving hardware issues quickly mean score (1.68), the topmost human barrier in maintaining the Hospital Information System was time consuming work with HIS mean score (2.264) and lowest human barrier in maintaining Hospital Information System among staff nurses was the reduced communication with patients mean score (1.624).

TABLE 4: CHI SQUARE TEST/ FISHER'S EXACT TEST SHOWING ASSOCIATION BETWEEN THE BARRIERS IN MAINTAINING HOSPITAL INFORMATION SYSTEM AMONG STAFF NURSES WITH THEIR SELECTED DEMOGRAPHIC VARIABLES.

Demographic Data		Barriers Score			df	Chi square/ Fisher Exact Test	P value
Variables		Major Barrier	Moderate Barrier	Minor Barrier			
Age	20-29 years	32	119	22	6	7.311 (Fisher)	0.293
	30-39 years	9	22	8			
	40-49 years	2	17	7			
	≥ 50 years	1	9	2			
Gender	Male	10	25	10	2	3.248	0.197
	Female	34	142	29			
	Diploma in Nursing	28	88	20	6	4.628 (Fisher)	0.592

Educational Qualification	Bachelor's Degree in Nursing	15	70	15			
	Master's Degree in Nursing	1	8	3			
	Others	0	1	1			
Total Working Experience including previous organization in years	01 – 05	31	104	22	4	2.154	0.707
	06- 10	7	39	11			
	More than 10	6	24	6			
Area of work	Emergency Department	3	11	4	8	13.041 (Fisher)	0.110
	ICU	4	28	4			
	Medical Surgical Unit	14	57	5			
	OPD	1	10	3			
	Others	22	61	23			
Designation	Nursing Officer	40	143	33	2	0.952 (Fisher)	0.621
	Ward In charge	4	24	6			
Any special training attended related to HIS use	Yes	38	133	39	2	9.973	0.007*
	No	6	34	0			
Any special training attended related to computer use	Yes	38	133	39	2	9.973	0.007*
	No	6	34	0			

p ≤ 0.05, significant *

The data in Table 4 shows that there was a significant association between the barriers in maintaining the Hospital Information System among staff nurses with variable any special training attended related to HIS use (p= 0.007) and any special training attended related to computer use (p= 0.007) as per p ≤ 0.05 level of significance.

DISCUSSION

The present study assessed knowledge in maintaining Hospital Information System among staff nurses. The present study revealed that 59.6% of staff nurses had adequate knowledge. This suggests that more than half of the staff nurses possess sufficient level of knowledge on the Hospital Information System. On the other hand, 40.4% had inadequate knowledge, indicating that significant portion of sample subjects have limited knowledge regarding Hospital Information System.

The mean knowledge score of staff nurses were 11.00 with median of 11.00. The Standard Deviation was 3.72, reflecting moderate variability in knowledge levels. Consequently, the findings of the present study were consistent with the cross-sectional study findings conducted by Punita et. Al [5] conducted a study to evaluate the knowledge and attitudes of nursing staff toward the use of a Hospital Information System (HIS) in a specific tertiary care hospital in North India. A significant finding of the study was that fewer than half of the staff answered each question correctly regarding HIS usage.

The present study found that staff nurses experienced several barriers in maintaining Hospital Information System. The present study revealed that 66.8% of staff nurses experience moderate barriers, 17.6% experience major barriers, while 15.6% experience mild barriers. Notably, none of the participants experienced the no barriers 0(0.0%). It was noted that staff nurses face 49.60% barriers related to organization, 48.28% related to hardware barriers and 47.30% related to human barriers.

The staff nurses experience moderate barriers in maintaining Hospital Information System with a mean score of 58.07 with median of 59. The Standard Deviation (SD) was 20.48 indicates a significant variation in the responses and these findings are consistent with the findings of the previous research by Keshvari Mohammad. et. al [6] which aimed to explore the barriers for the use of Information Systems in a hospital. They found that the main challenges were organizational factors, hardware factors, and knowledge factors, where knowledge factor being the most important factor. The study showed that knowledge factors were the biggest obstacle to effectively using Information Systems.

Consistent to this study, a cross-sectional learning was conducted by Leila et. al [7] to investigate the challenges of using Information System from the nurse perspective They found that the most significant challenges were related to the human environment and human factors.

The present study also revealed the significant association between the barriers in maintaining a Hospital Information System among staff nurses with variables of any special training attended related to HIS use ($p= 0.007$) and any special training attended related to computer use ($p= 0.007$) as per $p \leq 0.05$ level of significance. There was no significant association of barriers in maintaining Hospital Information System among staff nurses with other variables (age, gender, educational qualification, total working experience including previous organization in years, area of work, and designation).

Consistent to this study, a cross-sectional study was conducted by Leila et.al [7] to investigate the challenges of using Information System from the nurse's perspective with the findings that there was no significant association between variables of participants (age, job, educational degree, work experience in the healthcare environment), but there was a significant association between experience with HIS and the mean score assigned to human challenges.

The findings of this study have meaningful implications for nursing leadership and hospital administrators. The identified barriers particularly those related to organizational and human factors- highlight the need for structural interventions. To enhance the effective use of Hospital Information Systems, managers should considers implementing structured and ongoing training programs for nursing staff, improving coordination between IT and nursing teams, and ensuring adequate technical support.

The findings of the present study are supported by other studies conducted in similar settings. A study by Keshwari et al. [6] in Iran reported that organizational and hardware issues were the main challenges in using HIS among healthcare professionals. Similarly, Ahmadian et al., [7] also from Iran, identified human- related and environmental barriers as key factors affecting HIS usage among nurses. These results align with the present study and show that such barriers are common in clinical settings beyond India.

In addition, a study conducted in Saudi Arabia by Alasmay et al. [8] reported that electronic health records were not well integrated into clinical practice, and poor communication existed between the IT departments and nursing teams. A study from Nigeria by Ogunyemi et al. [9] reported similar challenges, including lack of formal training, limited computer access, poor network infrastructure, and system design problems. A qualitative study from China by Zhou et al. [10] revealed that nurses experienced difficulty using the system, frequent errors, and fragmented information, which reduced their willingness to adopt HIS. These findings confirms that barriers in HIS implementation are not limited to India but are commonly reported in many countries.

IMPLICATIONS

- Provide ongoing HIS and computer training, encourage peer support, and promote feedback to improve system use. Nursing leaders should monitor HIS challenges and address them.
- Integrate practical HIS training and digital literacy in nursing programs, with strong collaboration between schools and hospitals.
- Include HIS training in orientation, assign mentors, monitor HIS use, and work with IT to enhance system usability.
- Conduct further studies on HIS challenges and its impact on patient care across varied settings.

LIMITATIONS

- The study was conducted in a single hospital, which may limit the generalizability of the findings to other healthcare settings, especially those with different resources, infrastructure, and HIS implementation maturity.
- The data collection process was time-consuming, as many nursing staff members were often engaged in patient care responsibilities or restricted by their shift schedules, which may have affected participation and response rates.
- Since the data was collected through self-reported measures, there is a possibility of recall bias or social desirability bias, which may have influenced the accuracy of responses.

RECOMMENDATIONS

Based on the findings, the following recommendations are offered for future research:

- The study used descriptive cross-sectional design, further the study can also be done incorporating qualitative components.
- The sample size of study was 250 so the study can also be conducted on a large population for better generalization and more diverse sample from multiple hospitals and healthcare settings.
- A qualitative study can be conducted on barriers and perception of nurses regarding HIS, including methods such as interviews or focus groups, to gain deeper insight into the specific barriers nurses face and their perceptions of HIS training and support.
- A study can also be done to explore how nurses' proficiency in using HIS impacts clinical decision-making, patient safety, and overall healthcare outcomes, providing evidence of the broader benefits of effective HIS use.
- A comparative study can be conducted to evaluate the differences in knowledge, barriers, and perceptions of HIS use among nursing staff across multiple hospitals.

CONCLUSION:

The study concluded that a large proportion of staff nurses had inadequate knowledge and faced barriers in maintaining Hospital Information System (HIS).

ETHICAL APPROVAL

The study was approved by the Jamia Hamdard Institutional Ethics Committee New Delhi with reference no 12/24 on 13/11/2024. We obtained informed consent in writing. This study followed established ethical guidelines for Medical Research involving Human subjects and the Helsinki declaration of 1975, as revised in 2008.

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Nil

CONFLICTS OF INTEREST

There is no conflict of interests.

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ECONOMIC EVALUATION OF TELEMEDICINE SERVICES PROVIDED AT SATELLITE CENTRE FOR TRIBAL HEALTH AND RESEARCH, ABU ROAD, SIROHI, RAJASTHAN, INDIA

Amit Kumar Mittal¹, Mamta Patel¹, Rakhi Dwivedi², Vibha Joshi¹, Manmohan Singh¹, Pradeep Dwivedi^{2,3} and Kuldeep Singh^{1,2,4*}

1. Resource Centre Health Technology Assessment, All India Institute of Medical Sciences, Jodhpur, India

2. Centre of Excellence for Tribal Health, All India Institute of Medical Sciences, Jodhpur, India

3. Department of Pharmacology, All India Institute of Medical Sciences, Jodhpur, India

4. Department of Paediatrics, All India Institute of Medical Sciences, Jodhpur, India

Correspondence: kulpra@hotmail.com

ABSTRACT

BACKGROUND:

Assessing health technology is a vital tool for determining whether interventions should be continued or stopped. Delivering efficient medical services in remote tribal, hilly regions demands careful planning to maximize limited resources. To identify the effectiveness of telemedicine centres, we conducted an economic evaluation of telemedicine services in term of avoidance of patient transportation costs.

METHODS:

A quantitative telemedicine evaluation was conducted telephonically with patients and hospital authorities. By analyzing direct and indirect costs, including setup, operations, and patient-related expenses, as well as patient satisfaction levels, the study provides insights into the sustainability of telemedicine in resource-constrained settings.

MAIN OUTCOME MEASURES:

Economic impact of telemedicine services, reduction in patient transportation expenses, financial sustainability of telemedicine centres, and patient satisfaction and healthcare accessibility.

RESULTS:

The analysis reveals that telemedicine can significantly reduce patient transportation costs, making healthcare more accessible and affordable, particularly for underserved populations in tribal and hilly regions. The study also highlights substantial operating costs driven by staff salaries and emphasizes the importance of efficient budget planning and resource allocation.

CONCLUSIONS:

The findings underscore the potential of telemedicine to promote health equity by reducing disparities and improving health outcomes. To fully understand the impact of telemedicine services, a comprehensive economic evaluation considering patient outcomes, quality of care, and long-term cost savings is recommended.

KEYWORDS

cost-analysis; telemedicine; tribal health; avoidance of travel cost; decision analysis.

INTRODUCTION

In lower-middle-income countries like India, the vast population and significant distances between regional towns and major cities pose substantial challenges to access specialized healthcare services in remote areas [1]. India employs a three-tier healthcare system designed to serve its diverse populace. Primary health centres (PHCs) cater to village-level needs, secondary health centres operate at district levels, and tertiary-level hospitals provide advanced care in major cities [2]. Despite this structured approach, the availability of healthcare in rural regions remains inadequate [3]. This inadequacy is primarily due to the concentration of highly qualified medical professionals in urban settings, leaving rural areas underserved [4].

Furthermore, the disparity in healthcare access is exacerbated by a notable shortage of hospital beds in rural regions compared to urban counterparts [5]. This shortfall in infrastructure further limits the capacity to provide adequate healthcare services to rural populations. Geographical challenges, particularly pronounced in the northern and northeastern parts of the country, add another layer of complexity to the delivery of healthcare services [6, 7]. The rugged terrain and often underdeveloped transportation networks in these regions make it difficult to reach and serve these populations effectively, thereby deepening the healthcare divide between urban and rural areas [8]. While telehealthcare is not a novel concept in India, it is experiencing increased momentum with ongoing initiatives to develop a standardized IT-enabled healthcare infrastructure [9, 10]. Integrating telemedicine and related technologies holds substantial potential, especially in tribal and hilly regions, to transform healthcare delivery for rural populations by providing cost-effective, high-quality medical services [11]. Empirical studies indicate that the implementation of telemedicine across Asia can significantly enhance the efficacy of healthcare systems [12]. By reducing the necessity for extensive travel, telemedicine can lower patients' travel-related expenses and time commitments, thereby improving their overall quality of life and reducing out-of-pocket expenditures [13]. This technological advancement also has the potential to decrease overall healthcare costs by streamlining service delivery and minimizing the need for physical consultations. The adoption of telemedicine not only bridges the healthcare accessibility gap but also promotes equitable healthcare distribution across different socio-economic and geographical segments [14, 15].

In organisational settings, particularly within the healthcare sector, prioritizing interventions necessitates a comprehensive analysis of epidemiological trends, geographical considerations, operational requirements, client preferences, resource availability, and cost implications [16]. Health technology assessment (HTA) plays a vital role in optimizing the allocation of healthcare resources by evaluating the effectiveness and value of interventions compared to other potential uses of the same resources [17].

Although telemedicine is widely accepted, especially in remote areas, further research is needed into its economic impact in hilly tribal regions [18, 19]. The study aims to compare the costs of telemedicine services with the transportation costs incurred by patients. This comparison will help assess the viability and impact of telemedicine in peripheral and referral hospitals, providing insights into its potential to improve healthcare delivery in these challenging environments.

MATERIALS AND METHODS

STUDY SETTING

The Ministry of Tribal Affairs, Government of India, has designated the All India Institute of Medical Sciences (AIIMS), Jodhpur, as a "Centre of Excellence (COE) for Tribal Health" to address the healthcare needs of tribal communities [20]. This specialized centre adopts a comprehensive approach to tackle health issues and develop strategies to bridge gaps

in healthcare services using modern scientific tools, particularly telemedicine services [20, 21]. A dedicated teleconsultation centre, the Satellite Centre for Tribal Health and Research (STHR), was established 250 kilometres from AIIMS Jodhpur to serve the tribal population within a radius of 100 kilometres or more. The workflow of STHR for patients across various specialities is illustrated in Supplementary Figure 1.

DATA COLLECTION

Data were collected through telephone interviews using a structured questionnaire (for assessing telemedicine services at STHR and CHC/PHCs). The questionnaire was designed to capture information on the economic aspects of telemedicine, patient satisfaction levels, sustainability, and value in tribal healthcare.

The data for this study were collected prospectively over one year (December 1, 2022, to November 30, 2023) from STHR. Patient data from teleconsultations is systematically stored in a computerized database, and routine audits are conducted to ensure data accuracy and compliance. During the 12-month study period, 1,638 patients received telehealth services, primarily referred from nearby CHCs and PHCs. Data from CHCs and PHCs were collected retrospectively over a three-month period (from December 1, 2022, to February 28, 2023). Subsequently, personal telephonic interviews were conducted using validated questionnaires.

COST INCURRED BY STHR

From the government's perspective, direct medical expenditures for STHR included building infrastructure, equipment procurement, furniture, staff member salaries, software acquisition expenses, internet system costs, monthly maintenance charges, etc [22].

COST INCURRED BY PATIENTS

From the patient's perspective, the direct non-medical cost of treatment was determined by including only transportation expenses [23]. We analyzed the travel costs of all patients who consulted at a peripheral government hospital (CHC/PHCs) and were referred to a higher-level center. Data on travel expenses to referral hospitals were gathered through telephonic interviews. Additionally, the same data on travel was collected from the patients of the STHR. Each element was evaluated to calculate the total non-medical expenses incurred per patient throughout the treatment [22].

COST ANALYSIS

A cost analysis of telemedicine services was conducted from both the healthcare system's and the patient's perspectives. Quantitative methodologies were utilized, and the referrals came from four peripheral government hospitals, including one CHC and three PHCs, which serve a large population in the hilly tribal regions of Abu Road in the Sirohi district. The analysis focused on the avoidance of travel cost by patients referred through CHC/PHCs to STHR. A cost analysis of telemedicine services at STHR was conducted, analyzing the costs associated with establishing and operating the teleconsultation centre and the expenses incurred by patients accessing these services [24].

STATISTICAL ANALYSIS

Statistical analysis was conducted using Microsoft Excel. Descriptive statistics were calculated for each category, including the mean, standard deviation, median, and range. Economic evaluation techniques were employed to determine the incremental cost of each unit of travel expenses avoidance due to telemedicine consultations compared to conventional consultations [25].

RESULTS

STHR TELEMEDICINE CENTRE DATA

During the 12-month study period, the STHR telemedicine centre was visited by 1,638 telehealth patients. A detailed breakdown of the socio-demographic characteristics, including key demographics such as age groups, gender, religion, marital status, and educational status, is provided in Supplementary Table 1. Understanding these characteristics is crucial for tailoring healthcare services to meet the specific needs of the community [26]. Notably, referrals from CHCs/PHCs were

a significant source of information, reflecting the integrated approach of the healthcare system in disseminating information about telemedicine services (Supplementary Table 1) [27]. The various specialties, including Cardiology, Dermatology, Endocrinology, General Medicine, General Surgery, Obstetrics and Gynecology, Nephrology, Neurology, Pediatrics, Physical Medicine and Rehabilitation (PMR), Psychiatry, Pulmonary Medicine, and Urology, were included. General Medicine and Dermatology had the highest number of patient visits, at 30.2% and 29.8%, respectively, indicating a high demand for these services (Supplementary Table 3). The first visit accounted for the highest frequency (95.5% of total visits), suggesting that most patients were new to the telemedicine service. This could indicate effective outreach efforts and a growing acceptance of telemedicine in the community (Supplementary Table 4) [28]. About 24.0% of patients visited healthcare services after a year of illness, 18.6% within one month, and 22.2% within one to three months. These findings highlight the delays in seeking medical care, which may be due to a lack of awareness, accessibility issues, or financial constraints (Supplementary Table 5) [29].

On asking about alternative healthcare options, the Palanpur private hospital (20.1%) was the most preferred alternative, indicating a preference for private healthcare facilities among patients (Supplementary Table 6). Among the total, 88% of patients used public transport, 8.6% used private, and 3.3% used personal vehicles (Supplementary Table 7). This underscores the importance of accessible and affordable transportation options for patients seeking telemedicine services [30].

CHC/PHC DATA

Data from 1,013 patients at nearby CHCs and PHCs were retrospectively collected over three months (01-12-2022 to 28-02-2023) using validated questionnaires and personal telephonic interviews. The socio-demographic characteristics of this population are provided in Supplementary Table 8. General Medicine and Cardiology had the highest number of patient visits, 51.0% and 34.5%, respectively. These findings highlight the common health issues faced by the community and the demand for specific medical services (Supplementary Table 9) [31]. The highest frequencies were observed for patients making more than four visits (35.1%) and those making their first visit (31.7%). This indicates a substantial number of repeat visits, suggesting ongoing healthcare needs and chronic conditions among the patient population (Supplementary Table 10) [32]. Approximately 62.5% of patients visited healthcare services within one week of illness onset, while 29.7% visited within one month. This suggests that a significant portion of the population delays seeking medical care, which could impact health outcomes (Supplementary Table 11) [33]. The data indicated that 90.6% of patients returned to CHC/PHC for follow-up, while 9.4% were referred to another centre. This high follow-up rate at CHC/PHC suggests a strong continuity of care within the local healthcare system (Supplementary Table 12) [34]. The alternative healthcare options included were STHR AIIMS Jodhpur Telemedicine, Sirohi Government Hospital, Sirohi Private Hospital, Palanpur Government Hospital, Palanpur Private Hospital, Udaipur Government Hospital, Udaipur Private Hospital, Ahmedabad Government Hospital, Ahmedabad Private Hospital, and Abu Road Private Hospital. The STHR AIIMS Jodhpur Telemedicine Centre was the highest choice, with 91.1% of patient frequencies (Supplementary Table 13). Public transport was used by 37.9% of patients, private transport by 20.1%, personal vehicles by 31.8%, and others by 10.1%. This indicates the patient population's dependence on public transportation and highlights the need for accessible transport options (Supplementary Table 14) [35].

COST INCURRED BY STHR

The comprehensive costs associated with operating the STHR telemedicine centre encompass several critical components, including building rent, procurement of furniture and equipment, staff salaries, internet and electricity bills, maintenance, and miscellaneous related expenses [36]. This analysis provides a detailed breakdown of these expenditures. The total monthly cost of running the STHR telemedicine centre is ₹70,799, and the corresponding annual cost is ₹8,49,587 (Supplementary Table 15). The most significant portion of monthly and yearly expenses is attributed to human resources, specifically the salaries of staff. In the current operational setup, staff members dedicate 50% of their time to teleconsultation activities.

The remaining 50% of their time is allocated to other activities within the telemedicine centre. Therefore, only 50% of the human resources costs are included in the cost calculation. By including only half of the total human resources costs, the

analysis reflects the dual-functional roles of the staff, ensuring a more accurate financial representation. Capital costs cover the procurement of necessary furniture and equipment for the telemedicine centre. These assets are assumed to have an average lifespan of five years. These capital costs are amortized over the five years to provide a realistic depiction of the financial burden. This results in a monthly capital cost of ₹5,799 and an annual capital cost of ₹69,588. Recurring monthly expenses, including internet, electricity, and maintenance, total ₹70,799. The total yearly operating cost is calculated to be ₹849,588, and its various breakdown is shown in Table 1. The costs for doctors are excluded from this financial analysis. This is because their services are already engaged in AIIMS Jodhpur activities, and their consultations for the telemedicine centre are provided as additional services. Hence, their costs do not represent an incremental financial burden specific to the STHR telemedicine centre.

TABLE 1. THE ANNUAL COST FOR STHR TELEMEDICINE WAS CALCULATED ON BOTH A MONTHLY AND YEARLY BASIS. FOR DETAILED CALCULATIONS, PLEASE REFER TO SUPPLEMENTARY TABLE 15

S. No.	Type of cost	Monthly	Annually
1	Capital cost (₹)		
	Building rent, along with maintenance	3,750	45,000
	Equipment: laptop screen, etc*	1,417	17,004
	Furniture and other fixtures*	632	7,584
	Total	5,799	69,588
2.	Operating cost (₹)		
	Human resources**	59,250	7,11,000
	Miscellaneous	3,250	39,000
	Electricity	2,500	30,000
	Total	65,000	7,80,000
Total (1+2) (₹)		70,799	8,49,588

*Assume that the average life of the product is five years. **The current teleconsultation utilizes 50% of the human resources, and the following staff members were involved in other activities of the consultation centres.

COST INCURRED BY PATIENTS

The study aimed to evaluate the direct non-medical costs incurred by patients during treatment, with a primary focus on transportation expenses. Data collection involved assessing travel costs among patients visiting peripheral government hospitals (CHCs/PHCs) who were subsequently referred to higher-level healthcare centres. The data revealed that transportation expenses constituted a significant portion of the total non-medical costs of patients seeking healthcare services [37]. The study identified ten healthcare centres for referrals, and the distances from CHC Abu Road to these centres were calculated, with an average distance of 150 km (Table 2). The cost of public transport, specifically buses and trains, was calculated. The average cost per patient using public transport was ₹226. The median cost of public transport for each health centre was calculated, yielding an average median transport cost per patient of ₹782. The average travel cost for patients using private vehicles, whether two-wheelers or four-wheelers, was ₹1684. The average travel time was determined to be 3.5 hours (range: 0.16 to 12 hours). By multiplying the number of patients by the median transport cost, the total travel cost for 1013 patients visiting CHC/PHCs was ₹5,29,462. When calculated using the average cost, the total was ₹7,92,166 (Table 3). The total cost, combining public, private, personal vehicles, and other transport methods for 1013 patients, was ₹11,46,020. Similarly, for 1638 patients visiting the STHR telemedicine centre, the total transportation cost was calculated to be ₹6,55,956 (Table 4). The analysis revealed that transportation expenses constituted a significant portion of the total non-medical costs borne by patients seeking healthcare services. By aggregating these costs, the study highlighted the financial burden experienced by patients as they navigate different

levels within the healthcare system. This perspective highlights the practical challenges patients encounter in accessing necessary medical care, particularly in terms of affordability and logistical considerations.

Additionally, we assessed patient satisfaction at STHR using a questionnaire. The minimum positive response frequency was 77.7% (Supplementary Table 16).

TABLE 2. TABLE SHOWING THE MODE OF TRANSPORTATION COST BY THE PATIENTS VISITING CHC/PHCS AT ABU ROAD IF THERE IS NO CHOICE OF STHR (N=1013)

S. No.	Health facility	Distance from Abu Road CHC (km)	Cost in public transport, Single person ₹		Cost of private vehicle, two/four-wheeler ₹	Travel time (Hours)	Median Cost ₹	No of patients	Total cost of patient travel ₹
			Bus	Train					
1.	Sirohi govt hospital	69	78	*	312	1.3	195	187	36,465
2.	Sirohi private hospital	70	78	*	312	1.35	195	111	21,645
3.	Palanpur govt hospital	54	150	150	216	1.15	183	82	15,006
4.	Palanpur private hospital	54	150	150	216	1.15	183	232	42,456
5.	Udaipur govt hospital	149	250	*	2,500	4	1,375	14	19,250
6.	Udaipur private hospital	152	250	*	2,500	4	1,375	9	12,375
7.	Ahmedabad govt hospital	216	450	200	4,500	5	1,717	53	91,001
8.	Ahmedabad private hospital	220	450	200	4,500	5	1,717	144	2,47,248
9.	Abu Road Private Hospital	10	0	0	100	0.16	100	143	14,300
10.	Others (Pindwara, Punjab, Mumbai, Jodhpur, Mehsana, etc)	500				12	782	38	29,716
Average/Total		150	₹226		₹1,684	3.5	₹782	1,013	₹5,29,462/₹7,92,166

* No direct train is available on this route

TABLE 3. MODE OF TRANSPORTATION COSTS BY PATIENTS VISITING CHC/PHCS AT ABU ROAD (N=1013)

Mode of travel	No of patients	Cost ₹
Public transport	384	86,784
Private transport	204	3,43,536
Own Vehicle	323	5,43,932
Others	102	1,71,768
Total	1,013	₹11,46,020

TABLE 4. MODE OF TRANSPORTATION COSTS BY PATIENTS OF STHR IF THEY HAVE GONE SOMEWHERE ELSE (N=1638)

Mode of travel	No of patients	Cost ₹
Public transport	1,442	3,25,892
Private transport	141	2,37,444
Own vehicle	55	92,620
Total	1,638	₹6,55,956

COST ANALYSIS

The cost analysis revealed that the total expenditure for telemedicine services in the year amounted to ₹8,49,588. This figure encompasses all operational costs, including technological infrastructure, staffing, and maintenance of the telemedicine network. This investment underscores the health system's commitment to providing remote healthcare services, which are crucial in areas with limited access to traditional healthcare facilities. From the patients' perspective, telemedicine services offer significant cost savings primarily by reducing the need for travel. The analysis showed that between 1,013 and 1,638 patients could save on transportation costs, with the total savings ranging from ₹5,29,462 to ₹11,46,020. These savings are significant for patients living in remote areas who would otherwise incur substantial travel expenses to access healthcare. When considering the upper range of patient transport costs, telemedicine services provided by STHR should be cost-effective. The breakeven point for cost-effectiveness is noted when the number of patient visits exceeds 2,000 per year. This threshold suggests that as the utilisation of telemedicine services increases, the overall cost per patient decreases, enhancing the value proposition of telemedicine. The primary focus of this analysis was on the avoidance of travel costs by patients referred through CHC/PHCs to STHR. By eliminating the need for patients to travel long distances for consultations, telemedicine services reduce travel expenses, save time, and minimise the physical strain on patients [38, 39].

DISCUSSION

The analysis of telemedicine services at the STHR provides detailed insights into patient demographics, visit patterns, follow-up behaviour, and preferences for alternative healthcare options and transportation methods. A notable finding is the high proportion of first-time visits, indicating successful outreach efforts and patient acceptance of telemedicine. This acceptance is critical in ensuring that telemedicine services are utilized to their full potential, especially in remote and underserved areas [27].

Similarly, Dev et al. (2024) found that utilizing telemedicine for follow-up care significantly reduces both costs and travel distances for patients. This highlights the potential of telemedicine to improve healthcare efficiency and accessibility by reducing the financial and logistical burdens on patients [40]. Patients' significant reliance on public transportation highlights the need for accessible and affordable transportation options. The study revealed that transportation expenses represent a substantial financial burden for patients, particularly when travelling long distances to higher-level healthcare centres. The average distance to referral centres was 150 kilometres, with associated costs of ₹226 for public transport and ₹1,684 for private vehicles. These logistical and financial challenges emphasize the importance of telemedicine in reducing travel costs and improving healthcare accessibility [41]. Similarly, Thakar et al. (2018) reported that telemedicine services surpass in-person care strategies by offering more effective and less expensive follow-up care for a remote post-neurosurgical population in India [42]. The cost-effectiveness of telemedicine is attributed to several factors, including adequate patient volume utilizing telemedicine, high patient satisfaction, the success rate of telemedicine interventions, and reduced patient travel distances. These findings highlight the potential of telemedicine to deliver high-quality, affordable healthcare, particularly in geographically remote or underserved areas. The integration of telemedicine into routine healthcare protocols can significantly enhance the accessibility and efficiency of medical services, aligning with the broader goals of healthcare equity and cost containment. From a cost perspective, the analysis demonstrated that telemedicine services offer significant economic benefits by reducing the need for long-distance travel. Patients visiting

CHC/PHCs incurred higher travel costs (₹11,46,020) than those visiting the STHR telemedicine centre (₹6,55,956). This disparity underscores the potential of telemedicine to alleviate financial burdens on patients. Additionally, the average travel time of 3.5 hours poses a significant inconvenience, leading to delays in care, increased absenteeism from work, and added physical strain, especially for patients with severe health conditions.

Recognizing the multi-functional roles of the staff, the analysis incorporated only 50% of the human resources costs, acknowledging their shared responsibilities between teleconsultation and other activities. This adjustment ensures an accurate reflection of the operational reality. By amortizing capital costs over five years, the study precisely represents the long-term financial commitment required to maintain the necessary infrastructure and equipment. The substantial portion of operating expenses driven by staff salaries highlights the need for efficient resource allocation and budget management. Similarly, Rout et al. (2019) demonstrated that telemedicine linkages resulted in an increased caseload, subsequently leading to a decrease in the cost per case [43]. The study highlights the efficient use of resources and improved treatment compliance facilitated by telemedicine. These findings suggest that scaling up telemedicine initiatives could enhance healthcare delivery by optimizing resource utilization and ensuring better adherence to treatment protocols.

The detailed cost analysis highlights the significant financial requirements for sustaining the STHR telemedicine centre. Efficient budget planning and resource allocation are crucial to ensuring continuous and high-quality telemedicine services. By understanding the distribution of costs and the financial impact of various components, policymakers and administrators can make informed decisions to optimize resource utilization [44]. This analysis offers valuable insights into the telemedicine centre's economic sustainability, highlighting the importance of strategic planning to balance costs with service quality. The study's findings have important implications for healthcare policy and resource allocation. Reducing transportation costs through increased use of telemedicine can alleviate the financial burden on patients. Policymakers should consider expanding telemedicine services, especially in rural and underserved areas, to enhance healthcare accessibility and affordability. The analysis underscores the significant non-medical costs patients incur, primarily due to transportation expenses. By identifying these financial challenges, the study emphasizes the need for strategic interventions to reduce these burdens. Expanding telemedicine services, such as those provided by STHR, can offer a viable solution, improving healthcare access while minimizing non-medical costs [45].

LIMITATIONS

The cost analysis included only 50% of the salaries for the telemedicine unit staff, as they also engage in other activities at the centre. This adjustment may not accurately reflect the full cost of their involvement in telemedicine services. Additionally, the costs for doctors were excluded since their consultations are considered additional services to their existing roles at AIIMS Jodhpur. This exclusion might lead to an underestimation of the actual costs associated with telemedicine services. The cost of equipment, furniture, and fixtures was calculated based on an expected lifespan of five years. This assumption may not account for potential variations in the actual lifespan or maintenance costs, which could affect the overall cost calculations. Furthermore, the cost structure is anticipated to change significantly with the expansion of telemedicine services, potentially impacting future financial analyses. Future studies could address these limitations by using detailed time-motion studies to more accurately apportion staff time, incorporating full economic costing of physician time, and employing sensitivity analyses with alternative equipment lifespans and cost scenarios. Moreover, longitudinal studies capturing cost variations over time and at different implementation scales would enhance the generalizability and policy relevance of future evaluations.

CONCLUSIONS

This comprehensive economic evaluation provides policymakers and stakeholders with critical information on the role of telemedicine in expanding healthcare access to underserved populations and promoting health equity. In conclusion, the cost analysis of telemedicine services reveals the financial investment required and the substantial cost savings that patients can achieve. While STHR's telemedicine services may be cost-effective, particularly with higher patient visit volumes, a more comprehensive economic evaluation is necessary to understand their impact fully. This evaluation should

assess the effectiveness of STHR and its surrounding CHCs/PHCs, including patient outcomes, quality of care, and long-term cost savings. Furthermore, the article examines the broader implications of telemedicine for healthcare delivery in tribal and hilly regions, highlighting its potential to reduce disparities and enhance health outcomes. This study will guide decision-makers in leveraging telemedicine to address healthcare challenges and advance health equity in tribal communities.

DECLARATIONS

- No funding was received to conduct this study.
- The study was started after obtaining ethical approval from the Institute Ethics Committee.
- The authors have no relevant financial or non-financial interests to disclose.
- Data were collected through telephonic interviews using a questionnaire.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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SUPPLEMENTS

FIGURE 1: PATIENT WORKFLOW AT THE SATELLITE CENTRE FOR TRIBAL HEALTH AND RESEARCH (STHR)



TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE POPULATION VISITING STHR (N=1,638)

Parameter	Frequency	Percentage (%)
Age		
0-15 years	246	15
16-30 years	461	28.1
31-45 years	374	22.8
46-60 years	370	22.6
61 years & above	187	11.5
Gender		
Male	885	54
Female	753	46
Religion		
Hindu	1424	86.9
Muslim	216	13.1
Marital status		
Married	1145	69.9
Unmarried	493	30.1
Education		
Illiterate	630	38.4
Primary education	297	18.1
Secondary education	575	35.1
Graduation and above	137	8.4

TABLE 2: SOURCES OF INFORMATION ABOUT STHR FOR THE POPULATION (N=1,638)

Question: From where did you get to know about this centre?	Frequency	Percentage (%)
(a) Heard from peer group	274	16.7
(b) Referred from CHC/PHC	1150	70.2
(c) Referred from private hospital	9	0.6
(d) Saw Advertisement/newspaper/TV	0	0
(e) ASHA/ANM/Sarpanch	9	0.6
(f) Camps	196	12

TABLE 3: DEPARTMENT-WISE DISTRIBUTION OF PATIENTS VISITING STHR (N=1,638)

Department	Frequency	Percentage (%)
Cardiology	23	1.4
Dermatology	488	29.8
Endocrinology	37	2.2
General Medicine	495	30.2
General Surgery	18	1.1
Obstetrics and Gynaecology	50	3.1
Nephrology	5	0.3
Neurology	9	0.6
Pediatrics	249	15.2
PMR	214	13.1
Psychiatry	18	1.1
Pulmonary medicine	18	1.1
Urology	14	0.8

TABLE 4: NUMBER OF VISITS BY PATIENTS TO STHR (N=1,638)

Number of visits	Frequency	Percentage (%)
First	1566	95.5
Second	47	2.9
Third	15	1.0
Fourth	11	0.6

TABLE 5: DURATION BEFORE SEEKING FIRST MEDICAL CARE AT STHR AFTER ILLNESS (N=1,638)

When did you first seek medical care for this illness?	Frequency	Percentage (%)
Within a week	28	1.6
Within a month	306	18.6
1-3 months	365	22.2
3-6 months	407	25
6-12 months	138	8.5
>1 year	394	24.1

TABLE 6: ALTERNATIVE HEALTHCARE OPTIONS IF STHR WAS NOT AVAILABLE (N=1,638)

S. No	If you have not come to this centre, where would you have gone for treatment?	Frequency	Percentage (%)
1.	Sirohi govt hospital	265	16.2
2.	Sirohi private hospital	160	9.7
3.	Palanpur govt hospital	119	7.2
4.	Palanpur private hospital	329	20.1
5.	Udaipur govt hospital	18	1.1
6.	Udaipur private hospital	14	0.8
7.	Ahmedabad govt hospital	73	4.5
8.	Ahmedabad private hospital	187	11.4
9.	Abu Road govt hospital	237	14.5
10.	Abu Road private hospital	196	12
11.	Jodhpur govt hospital	5	0.3
12.	Jodhpur private hospital	5	0.3
13.	Mehsana private hospital	5	0.3
14.	Pindwada govt hospital	18	1.1
15.	Mumbai private hospital	5	0.3
16.	Punjab govt hospital	5	0.3

TABLE 7: MODES OF TRANSPORTATION USED BY PATIENTS VISITING STHR (N=1,638)

If you have gone somewhere else, what transportation would you take?	Frequency	Percentage (%)
Public transport	1442	88
Private transport	141	8.6
Own vehicle	55	3.3

TABLE 8: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE POPULATION VISITING CHC/PHCS AT ABU ROAD (N=1,013)

Parameter	Frequency	Percentage (%)
Age		
0-15 years	7	0.7
16-30 years	183	18.1
31-45 years	263	26
46-60 years	332	32.8
61 years & above	228	22.5
Gender		
Male	524	51.7
Female	489	48.3
Religion		
Hindu	917	90.5
Muslim	96	9.5
Marital status		
Married	981	96.8
Unmarried	24	2.4
Widow/widower	8	0.8
Education		
Illiterate	153	15.1
Primary education	621	61.3
Secondary education	208	20.5
Graduation and above	31	3.1
Occupation		
Agriculture/ Labour	287	28.3
Govt/private job	50	4.9
Skilled/Unskilled worker	3	0.3
Businessman	76	7.5
Housewife	474	46.8
Unemployed/student	54	5.3
Retired	69	6.8

TABLE 9: DEPARTMENT-WISE DISTRIBUTION OF PATIENTS VISITING CHC/PHCS AT ABU ROAD (N=1,013)

Department	Frequency	Percentage (%)
Cardiology	349	34.5
Dermatology	10	1
General Medicine	517	51
General Surgery	69	6.8
Gynaecology	60	5.9
Neurology	1	0.1
Psychiatry	4	0.4
Urology	3	0.3

TABLE 10: NUMBER OF VISITS BY PATIENTS CHC/PHCS AT ABU ROAD (N=1,013)

Number of visits	Frequency	Percentage (%)
First	321	31.7
Second	245	24.2
Third	76	7.5
Fourth	15	1.5
More than 4 visits	356	35.1

TABLE 11: DURATION BEFORE SEEKING FIRST MEDICAL CARE AT CHC/PHCS AT ABU ROAD (N=1,013)

When did you first seek medical care for this illness?	Frequency	Percentage (%)
Within a week	633	62.5
Within a month	301	29.7
1-3 months	46	4.5
3-6 months	18	1.8
6-12 months	12	1.2
>1 year	3	0.3

TABLE 12: PROPORTION OF PATIENTS TAKING FOLLOW-UP FROM CHC/PHC ITSELF (N=1,013)

Patients coming for follow-up to CHC/PHC	918 (90.6%)
Patients referred from CHC/PHC to another center	95 (9.4%)
Patients coming for follow-up to CHC/PHC	918 (90.6%)
Patients referred from CHC/PHC to another center	95 (9.4%)

TABLE 13: PROPORTION OF PATIENTS' CHOICE FOR REFERRAL TO DIFFERENT HEALTH FACILITIES VISITING CHC/PHCS AT ABU ROAD (N=1,013)

Health facility	Frequency	Percentage (%)
STHR AIIMS Jodhpur Telemedicine	923	91.12
Sirohi govt hospital	33	3.25
Sirohi private hospital	14	1.38
Palanpur govt hospital	9	0.88
Palanpur private hospital	19	1.87
Udaipur govt hospital	2	0.19
Udaipur private hospital	6	0.59
Ahmedabad govt hospital	1	0.09
Ahmedabad private hospital	3	0.29
Abu Road Private Hospital	3	0.29

TABLE 14: MODE OF TRANSPORTATION OPTIONS BY PATIENTS VISITING CHC/PHCS AT ABU ROAD (N=1,013)

If you have gone somewhere else, what transportation would you take?	Frequency	Percentage (%)
Public transport	384	37.9
Private transport	204	20.1
Personal vehicle	323	31.9
Others	102	10.1

TABLE 15: ESTIMATED MONTHLY AND ANNUAL COSTS FOR OPERATING THE STHR TELEMEDICINE CENTER

Details	Cost	Cost (Monthly)	Cost (Yearly)
Rent of the room providing teleconsultations (Monthly)	2500	2500	30000
1 Bed*	5000	83.33333333	1000
1 Curtain*	1000	16.66666667	200
2 Table*	21060	351	4212
2 Chairs Revolving*	10873.5	181.225	2174.7
Laptop 1*	65000	1083.333333	13000
1 Screen*	10000	166.6666667	2000
BP Hb Machine*	6000	100	1200
Weighing machine*	1000	16.66666667	200
Speaker*	3000	50	600
Salary 1 Medical, 1 Nursing officer and 1 MSW**	118500	59250	711000

Internet System Cost yearly	7500	625	7500
Electricity bill of STHR yearly	30000	2500	30000
PHed Bill (Water Dept.) yearly	9000	750	9000
Cost of stationery used yearly	15000	1250	15000
Cost of Advertisement yearly	1500	125	1500
Maintenance charges yearly	15000	1250	15000
Miscellaneous yearly	6000	500	6000
Total Cost		70799	849587

*Assume that the average life of the product is 5 years. ** The current teleconsultation utilizes 50% of the staff, and the following staff members were involved in other activities of consultation centres.

TABLE 16: PATIENT SATISFACTION BASED ON QUESTIONNAIRE AT STHR (N=1,638)

Questionnaire	Frequency (Yes)	Percentage (%)
Was it easy to use telemedicine?	1291	78.8
Could you easily talk to a clinician using a telehealth system?	1282	78.3
Were the visits provided over the telehealth system the same as in-person visits?	1287	78.6
Will you use telehealth services again?	1273	77.7
Do you find telemedicine an acceptable way to receive health care services?	1296	79.1
Did the telemedicine services has helped you to improve your health?	1278	78

IMPROVING HEALTH SEEKING BEHAVIOUR FOR NON-COMMUNICABLE DISEASES IN SRI LANKA THROUGH HEALTH PROMOTION INTERVENTIONS

Karunaratna, Aluth Durage Upali¹; Dharmagunawardene, Dilantha^{*2,3}; Mediwaka, Mediwaka Wallawwe Malkanthi Kumari⁴; Chandrasiri, Amila⁵; Samaraweera, Sudath³; Hinchcliff, Reece^{2,6}.

1. District General Hospital, Matara, Ministry of Health, Sri Lanka
2. Department of Management, Griffith Business School, Griffith University, Australia
3. Ministry of Health, Sri Lanka
4. Office of Regional Director of Health Services, Matara, Ministry of Health, Sri Lanka
5. Office of Regional Director of Health Services, Galle, Ministry of Health, Sri Lanka
6. School of Public Health and Social Work, Faculty of Health, Queensland University of Technology, Australia

Correspondence: dilanthadharm@gmail.com

ABSTRACT

OBJECTIVE:

We piloted evidence-based health promotion interventions to increase health seeking behaviour (HSB), as measured primarily by utilization of Healthy Lifestyle Centers (HLC). HLCs were introduced in Sri Lanka to increase screening of Non-Communicable Diseases (NCDs), but utilization has not met the pre-defined targets.

DESIGN:

This case-control study involved: development and validation of a contextually adapted tool to assess HSB; examination of HSB for selected NCDs; co-design and delivery of interventions to promote HSB; and evaluation of how these interventions impacted proxy measures of HSB, such as HLC utilization. The HSB tool was developed based on the Health Belief Model (HBM) and validated by local experts. HSB was assessed using a survey involving 850 participants selected using multi-stage cluster sampling. Community-based and health-system interventions were developed through four focus group discussions (FGD). The impact evaluation was completed in study and control areas, with 85 individuals from each area selected through cluster-sampling.

SETTING:

The intervention setting was the Kekanadura Medical Officer of Health (MOH) area and the control was Akuressa MOH area in Matara District, Sri Lanka

MAIN OUTCOME MEASURES:

Pre-post survey results regarding HBM constructs, and awareness and utilization of HLCs, were conceptualised as proxy indicators of changes to HSB.

RESULTS:

Initially, only 46.5% of survey participants were aware of HLCs, 30.1% had ever visited a HLC and, of those, only 40.2% (n=102) were satisfied with HLC services. FGDs revealed lack of awareness, personal and service-related factors as common reasons for limited HLC utilization. Significant post-interventional improvements were identified regarding HLC utilization, but self-reported improvements to HBM constructs were not statistically significant.

CONCLUSIONS:

The structured, rigorous approach used in this study can be replicated in other resource-constrained settings to improve HSB, strengthen the identification and management of NCDs, and, in this way, reduce demand for curative services.

KEYWORDS

health seeking behaviour, health belief model, health promotion, outcome evaluation, mixed methods

INTRODUCTION

Non-Communicable Diseases (NCDs) contribute to 74% of global deaths [1]. Almost one third of these deaths occur prematurely (between 30-69 years), with 85% occurring in Low- and Middle-Income Countries (LMICs) [1]. Reducing NCD rates is a major challenge for LMIC health systems, such as Sri Lanka.

The burden of NCDs in Sri Lanka is lower than the LMIC average (466.7 age-standardized mortality rate per 100,000 population compared to the 589–640.4 average in LMICs) [1], yet it remains a critical domestic health system challenge. Four major NCDs (cancers, cardiovascular diseases, chronic respiratory diseases, and diabetes) contributed to 24,507 deaths (56.2% of the total) and 791,519 hospital admissions (16.9% of the total) in government hospitals in 2020 [2]. Trend analysis indicates that achieving the 25x25¹ target [3] of a 25% reduction in premature mortality due to NCDs between 2010 and 2025 in Sri Lanka will be challenging [4].

The Sri Lankan Ministry of Health (MoH) implemented a large, national health reform in 2011, involving the creation of Healthy Lifestyle Centres (HLCs) in primary care settings to expand the screening of individuals for NCD risk factors [5]. Despite being well supported by the MoH, HLC screening from 2015 to 2019 revealed only 44.2% (n=3,914,509) of the cumulative target population screened [2]. These data indicate that increased HLC utilization may require new MoH approaches to better promote Health Seeking Behaviour (HSB).

HSB is defined as “any activity undertaken by individuals who perceive themselves to have a health problem or to be ill, for the purpose of finding an appropriate remedy” [6]. A widely used model to explain HSB is the “Health Belief Model” (HBM). The HBM proposes that a person's identified health behaviour is influenced by two major factors: The degree to which the disease (negative outcome) is perceived by the person as threatening to their health, and the degree to which the health behaviour is believed to be effective in reducing the risk of a negative health outcome [7].

The HBM has been widely used to assess HSB for different conditions in many national settings [8-12]. Compared to other models, the HBM constructs represent influential and comprehensive elements that have the ability to describe preventive behaviours [8, 12]. The levels of constructs of HBM provide guidance that can help to predict the effectiveness of interventions aiming to increase HSB [10]. However, a systematic review by Anuar et al. (2020) reported that there is only limited evidence for improving HSB by using HBM [8], and a meta-analysis by Carpenter (2010) mentioned that there is limited evidence, especially from LMICs, to predict the effectiveness of HSB using HBM variables [13].

¹ WHO member states committed to reduce mortality from four major NCDs in people aged 30–70 years by 25% relative to their rates in 2010, by 2025 at a UN High-Level Meeting in 2011

Therefore, drawing from the above models and concepts, this study aimed to examine existing rates of HSB in one region of Sri Lanka, then co-design and pilot a package of evidence-based health promotion interventions (based upon the HBM) to evaluate their outcome on HSB proxy measures, including HLC utilization rates.

METHODS

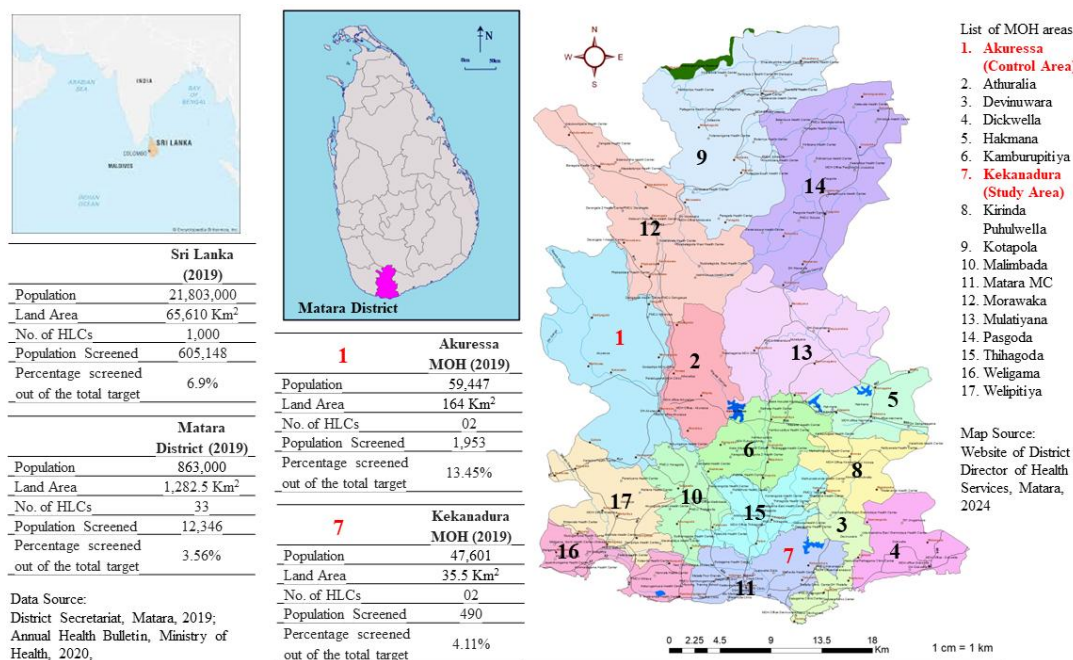
STUDY DESIGN

A case-control design was undertaken, utilizing a mixed method approach. This was considered suitable for the design and evaluation of this type of complex, multi-phase, multi-component intervention [14-16].

STUDY SETTING

The intervention setting was the Kekanadura Medical Officer of Health (MOH) area, and the control was the Akuressa MOH area in Matara District. Matara is one of the 24 administrative districts in Sri Lanka, and the primary care services are managed by the District Director of Health Services (DDHS). Kekanadura and Akuressa are two of the 17 MOH areas in Matara District, and have similar contextual factors in terms of demographic, ethnicity, and educational attainment, but are geographically placed distantly (40 Kms.), thus minimising the spill-over effect (Figure 1). MOH area is the lowest preventive health structure in Sri Lanka, which caters to approximately 60,000 population [2].

FIGURE 1: LOCATION AND COMPARISON OF STUDY AREA WITH SRI LANKA, MATARA DISTRICT AND CONTROL AREA



INITIAL ASSESSMENT

An interviewer-administered questionnaire (IAQ) was developed based on the HBM, which was validated through key informant interviews (KII) followed by a focus group discussion (FGD) with a purposively selected panel of experts. These experts included two medical administrators, two public health specialists, a family physician, three primary care medical officers and a public health nursing sister. The IAQ was pre-tested among 20 persons in the Kirinda Puhulwella MOH area (outside the study and control areas).

The study population consisted of persons above 35 years of age who lived in the Kekanadura MOH area, as permanent residents for more than one year before the date of data collection. Sample size was calculated using the formula for estimating a population proportion with specified absolute precision [17], and the required sample was 425, allowing for

a 90% response rate. As cluster randomized sampling was used, this number was doubled to obtain the sample size of 850, to minimize the effect due to 'clustering' (design effect). A Grama Niladari Division (GND), which is the lowest administrative level in Sri Lanka, was taken as the Primary Sampling Unit (PSU). Sixty-two (62) subjects from each PSU were randomly selected from 18 GNDs, out of a total of 66 GNDs in the Kekanadura MOH area. Six trained research assistants collected data in September and October 2019.

CO-DESIGN OF INTERVENTIONS

The views of stakeholders were gathered through four FGDs to design the interventions, which were conducted based on the findings of the IAQ survey. Two FGDs were conducted with the Members of the "Mothers' Support Group"², because of their experience working as volunteer health workers in the community. Field-level workers were chosen for another FGD as they play a significant role in delivering health care for NCDs. For the last FGD, a group of males were selected as low male participation was already identified as an important issue. Data were thematically analysed (18) by the first author using Microsoft Excel and a coding framework developed on the basis of the IAQ survey results, which was then validated by the co-authors. Design of the interventions was supplemented by IAQ results. This consultative approach to intervention development aimed to maximise the likelihood of effectiveness and sustainability.

IMPLEMENTATION OF INTERVENTIONS

Multiple community-based health promotion interventions were identified by the FGD participants to address complex lifestyle modifications to alleviate risk factors in relation to HBM constructs [9]. Health-system interventions were required to improve access to NCD screening at HLCs. The interventions were implemented by the principal investigator, supported by two experts at Kekanadura MOH (Table 1). Standard and routine programmes were implemented at the Akuressa MOH (Control).

TABLE 1: SUMMARY OF HEALTH-SYSTEM AND COMMUNITY BASED INTERVENTIONS

	Target audience	Intervention
	Community Based Health Promotion Interventions	
1.	Community leaders, including government officials and field officers	Conduct an advocacy-type lecture, discussion
2.	Medical Officer of Health, Medical Officer in charge of HLC, Public Health Inspectors, Public Health Midwives, Mothers' Support Group Members	Conduct an advocacy-type lecture, discussion Program
3.	Students at Nursing Training School Matara	Conducting advocacy-type lectures, discussion programs
4.	School-based interventions	Conducting lecture discussion programmes targeting school children
5.	General public	Distribution of Brochures through Field Health Staff (PHI, PHM), community leaders, Government Officers and field officers
6.	General public	Displaying posters in public places (MOH Office, Offices of PHI, PHM, Grama Niladari Field Officers and Temples
7.	General public	Conducting lecture, discussion series with the participation of PHM, Field Officers of Save the Children and Mothers support groups

² Mothers Support Group is a group of mothers, who have children under the age of five and engaged in a supportive role as volunteers for the public health midwife, at the community level

	Target audience	Intervention
8.	General public	Conducting discussion series with the support of Nursing students at Nursing school, Matara and area PHMs and Mothers support Groups (Brochure and poster)
Health System Interventions		
9	General public	Conducting outreach programs – With the support of MOH in the field outreach programs were conducted in identified places
10	General public	Improvement of Diagnosis facility in HLCs – Provision of cholesterol checking facility in HLCs (Cholesterol strips were provided)
11	General public	Quality improvement in clinics – Infrastructure improvements (improving seating facilities, sanitary facilities etc.) in HLC, and strengthening of quality and productivity
12	Medical Officer of Health, Medical Officer in charge of HLC, Public Health Inspectors, Public Health Midwives, Mothers' Support Group Members	Strengthen health education activities – Health education materials were developed and distributed based on SLDRISK risk tool (19). Health staff and volunteers were trained.
13	Medical Officer of Health, Medical Officer in charge of HLC, Public Health Inspectors, Public Health Midwives, Mothers' Support Group Members	Use of Risk Tool for Diabetes Risk Assessment – Risk assessment tool was designed based on SLDRISK (19) and distributed. Health staff and volunteers were trained on risk assessment using the tool.

(PHI – Public Health Inspector; PHM – Public Health Midwife; SLDRISK – Sri Lankan Diabetes Risk Score)

OUTCOME EVALUATION

Post-implementation evaluation was undertaken after three months using the same IAQ, in Kekanadura and Akuressa. Three months was selected for follow up period for two reasons: first, prior research has reported this as being sufficient for a health educational intervention to impart a statistically significant behavioural change [20]; second, this was the maximum period that could be supported in this study due to financial and human resource constraints. The required sample size was calculated using Lwanga & Lemeshow, (1991) formula [17], considering that this intervention package was intended to increase the proportion of HLC coverage to 15%, from 2%, which was the HLC coverage of the first quarter of 2019 in Kekanadura. The required sample size was 82, and three GN Divisions from both MOH areas were randomly selected, with 30 participants from each Division.

Pre- and post-interventional quantitative data were analysed using descriptive statistics including means, standard deviations (SD) and proportions. Z test for proportions was used to elicit statistical significance.

Ethical approval was obtained from the Postgraduate Institute of Medicine, University of Colombo (ERC/PGIM/2019/149).

RESULTS

The specific results of each study phase are reported separately below (initial assessment, co-design and implementation of interventions, outcome evaluation).

INITIAL ASSESSMENT

A total of 838 out of 850 (non-response rate=1.4%) participants responded. Mean age was 43.14 years (+/-SD=10.17). Among the study participants, 46.5% (n=390) were aware of HLCs. Only 30.1% (n=252) of participants had visited a HLC, and out of those, 40.2% (n=102) were satisfied with the service. Mean distance to the nearest HLC from home was 4.41 km

(SD +/- 4.87). Socio-demographic characteristics are illustrated in Table 2 and the distribution of risk factors is depicted in Table 3.

TABLE 2: SOCIO-DEMOGRAPHIC AND DISEASE RELATED CHARACTERISTICS OF THE PRE-INTERVENTIONAL STUDY POPULATION IN KEKANADURA MOH AREA

Characteristic	Frequency (n=838)	Percentage (%)
Gender		
Male	206	24.6
Female	632	75.4
Highest educational status		
No Schooling	6	0.7
Up to Primary Education	48	5.7
Passed Primary Education	60	7.2
Up to Secondary Education	96	11.5
Passed Ordinary Level	352	42.0
Passed Advanced Level	214	25.5
Higher education	38	4.5
Vocational training	2	0.2
Missing	24	2.9
Literacy level		
Can read complete sentence	744	88.8
Can read a partial sentence	8	1.0
Unable to read	6	0.7
Missing	80	9.5
Employment status		
Permanent Government	64	7.6
Permanent Private	18	2.1
Non-permanent Private	60	7.2
Self Employed	28	3.3
Daily Paid Casual	26	3.1
Not employed	623	74.3
Other	19	2.3
Individual monthly income (SLR)		
Less than Rs. 20000	394	47.0
Rs. 20001 – 40000	155	18.5
Rs. 40001 – 60000	69	8.2
More than Rs. 60000	9	1.1
Not mentioned	55	6.6
No income	156	18.6
Family income (SLR)		
Less than Rs. 20000	182	21.7
Rs. 20001 – 40000	265	31.6
Rs. 40001 – 60000	252	30.1
More than Rs. 60000	93	11.1
Not mentioned	43	5.1
No income	3	0.4
Number of members in the family		

Characteristic	Frequency (n=838)	Percentage (%)
1	4	0.5
2	38	4.5
3	108	12.9
4	276	32.9
5	234	27.9
6	120	14.3
Missing	58	7.0
Number of dependents		
1	176	21.0
2	332	39.6
3	178	21.2
Missing	152	18.2

SLR = Sri Lankan Rupees (1 USD approximately equals to 180 SLR in 2019)

Characteristic/Disease	Frequency (n=838)	Percentage (%)	Mean duration with SD (in years)
No. of participants with			
Diabetes	56	6.7	5.37 (4.19)
Hypertension	50	6.0	4.33 (3.81)
Hypercholesterolemia	34	4.1	3.83 (2.94)
Ischemic Heart Diseases	6	0.7	2.0 (0.0)
Cerebrovascular Diseases	4	0.5	NR
Renal Failure	2	0.2	NR
Cancer	4	0.5	NR
No reported NCD	682	81.38	NR
No. of participants with a family member having			
Diabetes	192	22.9	7.94 (6.66)
Hypertension	196	23.4	8.12 (7.55)
Hypercholesterolemia	118	14.1	7.59 (6.2)
Ischemic Heart Diseases	66	7.9	NR
Cerebrovascular Diseases	18	2.1	NR
Renal Failure	18	2.1	NR
Cancers	50	6.0	NR
No. of participants who reported death of a family member due to NCD			
No deaths	744	88.8	NR
One member	74	8.8	NR
Two members	20	2.4	NR

NR = Not Recorded

TABLE 3: DISTRIBUTION OF RISK FACTORS OF NCD'S AMONG THE STUDY POPULATION

	Smoking n=206 (%) (only Male) ³	Alcohol usage n=206 (%) (Only Male) ⁴	Betel chewing n=838 (%)	Engage in Exercises ⁵ n=838 (%)	Consume fatty food at home. n=838 (%)	Consume fatty food from outside. n=838 (%)
Daily	24 (11.7)	16 (7.86)	70 (8.4)	261 (31.1)	282 (33.7)	106 (12.6)
Few times a Week	8 (3.9)	24 (11.7)	74 (8.8)	227 (27.1)	288 (34.4)	327 (39.0)
Occasional	12 (5.8)	12 (5.8)	95 (11.3)	271 (32.3)	166 (19.8)	197 (23.5)
No	155 (75.2)	150 (72.8)	588 (70.2)	72 (8.6)	100 (11.9)	199 (23.7)
Missing	7 (3.4)	4 (1.9)	11 (1.3)	7 (0.8)	2 (0.2)	9 (1.1)

Perceived Susceptibility

Most participants believed their chances of acquiring a NCD was not high (54.3%, n=455), and that their level of physical health made it unlikely in the future NCD (64.6%, n=541). Additionally, 30.8% believed their risk of a NCD in the future was not high, with 87.0% (n=729) also unconcerned about of the consequences of acquiring a NCD.

Perceived Seriousness

Most participants reported that the "thought of NCDs" didn't scare them (85.4%, n=716), and thinking of NCD didn't make them uncomfortable (77.1%, n=646). Few (29.4%, n=246) believed that their career would be endangered, if they acquired a NCD. Only one third (32.5%, n=272) mentioned that they become anxious when thinking of NCDs, and only 6.1% (n=51) thought that a NCD might endanger their relationships. Conversely, 56.6% (n=474) thought that their financial security would be endangered if they acquired a NCD.

Perceived Benefits

Somewhat at odds to the above results, most participants (90.0%, n=754) believed future problems could be prevented by screening for NCDs. Most (89.7%, n=752) mentioned it was more likely that a NCD would be discovered by chance through an emergency admission if they have not participated in screening, and 88.8% (n = 744) noted that, screening would help in finding hidden diseases.

Perceived Barriers

A minority of participants identified barriers for regular screening for NCDs, including a painful process 5.0% (n=42), time-consuming 2.4% (n=20), embarrassing, 5.7% (n=48), and interfere with their routine activities 10.5% (n=88). It was interesting to note that 30.3% (n=254) reported that undergoing regular screening would require starting a new habit, and 4.5% (n=38) were concerned that they would not be able to complete regular screening.

Motivations

In relation to motivational factors, most participants reported that they consume a well-balanced diet to enhance health (72.6%, n=608). Similarly, 71.4% (n=598) declared that they frequently practice "healthy habits". It was interesting to note that 74.2% (n=622) acknowledged that they always follow medical advice, because they believe it will benefit their health. However, only 30.7% (n=257) mentioned that they practice the routine yearly physical examinations in addition to visits to

³ No females mentioned that they ever smoked.

⁴ Only two females mentioned that they take alcohol occasionally

⁵ Engage in exercise is a protective factor

a medical practitioner during an illness, and only 10.7% (n=90) reported undertaking physical exercises regularly (at least three times a week).

CO-DESIGN AND IMPLEMENTATION OF INTERVENTIONS

Results of the pre-interventional assessment from the IAQ were analysed to determine positive and negative factors for HSB, with a special emphasis on seeking services for NCDs from HLCs. A summary of findings and their implications for developing strategies to promote HSB are presented in Table 4.

TABLE 4: SUMMARY OF FINDINGS OF THE SOCIO DEMOGRAPHIC AND HBM STUDY AND THEIR IMPLICATIONS IN CO-DESIGNING OF INTERVENTIONS TO PROMOTE HEALTH SEEKING BEHAVIOUR.

	Findings of the study	Influence on HSB / Themes emerged from HBM	Implication in designing strategies
Study Based on Socio-Demographic Data			
1	Almost all the participants were Sinhala Buddhists	Cultural adaptation should be done accordingly in designing strategies.	Irritating, sensitive, and antagonizing messages to the existing context should not be included
2	Having a satisfactory level of education (> 80% of the participants had secondary education or above).	It Means, there is a positive factor to improve HSB	It can adjust general messages according to that level
3	Known prevalence of NCD's (detected so far) is lower than national figures	It Means, the study population seems to be healthier or selection bias	Need to further strengthen the situation.
4	Mean duration of having the disease is lower (knowledge of having the disease).	It Means, there is a possibility of a high proportion of late detection	Need to stress the importance of early detection and its benefits
5	There is a HLC in the proximity.	Positive factor to attract population	Need to mention in promotional messages that 'It's within your proximity'
6	A convenient method of public transport is not available at the location of HLC	Accessibility and availability of easy transport are two important factors to ensure. Yet, it needs to be fulfilled by other sectors	Need to discuss with relevant authorities and take necessary action, like starting new/extra bus services and necessary road development. or conduct out-reach clinics
7	Many people referred to multiple methods of media in seeking information. Television was the information source, which was exposed by the majority, and only a few referred to the internet.	Understanding the habit of media use is important in changing HSB	Since television is regarded as the most used method (though it's out of the scope of this study), can make a recommendation to relevant authorities to advocate television channels to pay more attention on delivering health messages in an accurate and reliable way and to guide them on referring to correct sources

	Findings of the study	Influence on HSB / Themes emerged from HBM	Implication in designing strategies
8	The most preferred method of acquiring information pertaining to health and diseases was by health professionals, and mainly by Western medical doctors, both in government and private sector. There were very few who relied on information given by doctors in other systems	Understanding the habit of health information seeking is important in changing HSB	This is a positive factor which can be capitalized. Authorities should create more opportunities (time and resources) to allow health professionals to deliver health messages in hospital settings. Promoting delivery of NCD messages through health professionals in other systems should be reviewed and ensure a supplementary approach.
Study Based on HBM			
1	• 'NCD didn't scare them.' • 'Not afraid to think of NCDs.'	Not feeling fear of NCD's This is a negative theme and important in understanding their view and how to challenge that	Need to stress the devastating consequences of NCDs (secondary complications). In addition to that, the asymptomatic nature at the early stage of the disease should be highlighted.
2	• 'Didn't worry about their risk of getting an NCD.' • 'Didn't believe that NCD is a hopeless disease.'	Not worrying about NCD's This is a negative theme and important in understanding their view and how to challenge that	It is needed to stress the social and domestic consequences of NCDs to self or a family member. Financial consequences of NCDs can be used to gain attention, as majority expressed that 'their financial security will be endangered' if they get a NCD
3	• 'Their chances of getting an NCD is not high.' • 'Their physical health makes it unlikely to cause an NCD' • 'Within next year they will not get an NCD'	Not perceiving the susceptibility of NCD This is a negative theme and important in understanding their view and how to make them realize the individual risk.	It is needed to provide current statistics (prevalence) in a simple way and highlight the trends in Sri Lanka to make them realize the individual susceptibility using the risk tool i.e. Sri Lanka Diabetes Risk Score (SLDRISK) (19)
4	• 'Screening for NCDs will prevent future problems for them.' • 'Can gain a lot by screening for NCDs'	Knowing the importance of screening This is a positive theme. It can be used to capitalize the HSB.	It can be used the perception of benefits; they can gain as promotional content
5	• 'By regular screening for NCDs, they may find a disease before it is discovered by	Knowing the importance of early screening This is a positive theme. It can be used to capitalize the HSB.	It can use the perception of benefits; they can gain as promotional content.

	Findings of the study	Influence on HSB / Themes emerged from HBM	Implication in designing strategies
	emergency hospital admission.		
6	'Screening will help in finding hidden diseases'	Knowing the asymptomatic nature of NCDs This is a positive theme and can be used in designing appropriate health messages.	It is needed to include these facts in developing health messages
7	'It's not a painful process'. 'It's not a time-consuming process.' 'To follow NCD screening regularly, they don't have to give up certain things in their lives'. 'It will not interfere their routine activities'	Undergoing NCD screening is not a difficult and unwieldy process. This is a positive theme, as people find that it's not a painful or a time-consuming process.	It can be capitalized in the promotional process.
8	'It's an embarrassing thing to go for NCD screening.' 'Family or society will not make fun of them if they do regular screening'	There is no related stigma for NCD screening. This is a positive theme and direct us to widen the promotion.	It can be included in more target groups.
9	'Undergoing regular screening would require starting a new habit, which is not difficult.' 'Can continue to do regular screening if starts'	Inculcating the habit of regular NCD screening is not difficult. This is a positive theme, and there is a possibility of making it a trend.	Social marketing strategies can be used to make it as a trend. The Branding would be a better option.
10	'They always follow medical advice because they believe that it will benefit their health.' 'Like to search for new information related to their health'	Readiness to accept medical advice and knowing it has a value. This is a positive theme and suggests that, community is enthusiastic for health information.	It is important to make accurate health information available for the community.
11	'Only a small proportion undergo regular physical examination.' 'Only a small proportion undergo regular oral examination.'	People are not undergoing regular physical and dental examinations. This is a negative theme and tells us that though they understand the importance of screening and have an interest in medical	It is needed to find mechanisms to transform good perceptions and attitudes to correct health practices.

Findings of the study	Influence on HSB / Themes emerged from HBM	Implication in designing strategies
	information, they are not practicing it	

Perceptions from the FGDs informed the design of the interventions. Most of the participants from Mothers' Support Groups knew about NCDs, but some did not know about HLCs. The reasons for low participation were difficult to inculcate screening as a habit, and not being afraid of diseases such as diabetes and hypertension, and were reported to be due to poor awareness and health-system related factors. Overall the generated themes are categorized and illustrated in Table 5.

TABLE 5: GENERATED MAIN THEMES, SUB-THEMES, AND PROPOSED STRATEGIES DURING FGDS FOR CO-DESIGNING OF INTERVENTIONS

Main Theme I	Main Theme II	Main Theme III
Perceptions on Reasons for the low participation of HLC	Perceptions on "Why people think screening is a difficult habit to inculcate". "Lack of motivation for screening"	Perceptions on "Not thinking I will not be getting any Diabetes and Hypertension". "Not being afraid of Diabetes and Hypertension, with opposite perception to Cancer, Stroke and Heart attack"
Sub Themes	Sub Themes	Sub Themes
a. Lack of awareness b. Not taking diseases seriously or not afraid of the diseases c. Lack of time due to the busy schedules of people or the need for a lot of time to attend the clinic. d. Lack of motivation	a. People do not think that they will get the disease when they are healthy. b. Personal factors, Stigma, economic factors, and a busy schedule. c. People do not like to have long term treatment or behavioural changes for NCD. d. System / service-related factors	a. Poor knowledge of diseases – thinking these diseases are inherited, do not know the pre symptoms and complications. b. Disease related factors – Cost, Quality of life c. Service factors – Non availability of screening for cancers.
Proposed Strategies	Proposed Strategies	Proposed Strategies
a. Conduct awareness programs b. Provision of incentives c. Improve access to screening at the local level d. Checking cholesterol e. Reducing the time spent at the HLC f. Improve attitudes for NCD screening by health staff	a. Implement innovative strategies to increase awareness b. Provide cholesterol testing facility and other incentives c. Strategies to increase male participation d. Increase coordination between the curative and preventive sector, and other non-health sectors	a. Improving awareness of complications b. Having a screening tool for NCD c. Improving awareness and publication of results of screening at HLC

g. Participation of volunteer groups		
h. Engagement of health staff augmented by volunteer groups		

Based on these findings, a package of community-based, health promotion, and health-system interventions, were implemented in the study setting, as outlined in Table 1.

OUTCOME EVALUATION

Socio-demographic characteristics of the post-interventional participants in the study and control settings were not statistically significant ($p > 0.05$). (Table 6).

TABLE 6: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE PRE- AND POST-INTERVENTIONAL STUDY POPULATION IN KEKANADURA AND AKURESSA MOH AREAS

Characteristic	Kekanadura MOH area (n = 80)		Akuressa MOH area (n = 78)	
Mean Age	42.25		39.85	
	No	%	No	%
Gender				
Male	21	25.7	23	29.5
Female	59	74.3	55	70.5
Education status				
No schooling	1	1.3	2	2.6
Up to Primary Education	4	5.0	2	2.6
Passed Primary Education	5	6.3	8	10.3
Up to Secondary Education	8	10.0	13	16.7
Passed O/L	36	45.0	34	43.6
Passed A/L	22	27.5	15	19.2
Higher education	4	5.0	3	3.8
Missing	0	0.0	1	1.3
Occupational status				
Permanent Government	5	6.3	3	3.8
Permanent Private	2	2.5	3	3.8
Non-permanent Private	6	7.5	9	11.5
Self Employed	3	3.8	2	2.6
Daily Paid Casual	2	2.5	4	5.1
Not employed	61	76.3	55	70.5
Other	1	1.25	0	0.0
Individual income (SLR)				
Less than Rs. 20000	41	51.3	45	57.7
Rs. 20001 – 40000	19	23.6	21	26.9
Rs. 40001 – 60000	5	6.3	3	3.8
More than Rs. 60000	2	2.5	1	1.3
Not mentioned	7	8.8	1	1.3
No income	6	6.3	7	9.0

SLR = Sri Lankan Rupees (1 USD approximately equals to 180 SLR in 2019)

There were no statistically significant differences in risk factors between pre- and post-intervention periods, except for engaging in physical activities in the study area. However, there were significant improvements in all HLC utilization parameters between pre- and post-intervention periods in the study setting, but only female HLC participation was improved significantly in the control setting (Table 7).

TABLE 7: OUTCOME EVALUATION BETWEEN PRE- AND POST-INTERVENTION PERIODS IN STUDY AND CONTROL SETTINGS IN RELATION TO RISK FACTORS AND HLC UTILIZATION PARAMETERS.

Risk Factor / HLC Utilization Parameter	Kekanadura MOH (Study)			Akuressa MOH (Control)		
	Pre-	Post-	z Value * (Significance)	Pre-	Post-	z Value * (Significance)
Smoking	22	23	z = -0.17 (p = 0.85)	19	17	z = 0.39, (p = 0.70)
Alcohol	26	22	z = 0.69, (p = 0.50)	30	30	z = 0.0, (p = 1.0)
Betel Chewing	29	27	z = 0.33, (p = 0.74)	34	35	z = -0.16, (p = 0.87)
Physical Activities	40	76	z = -6.37, (p = <0.001)	38	37	z = 0.16, (p = 0.87)
Fatty food consumption	34	26	z = 1.3, (p = 0.20)	30	28	z = 0.32, (p = 0.74)
Heard about HLC	41	85	z = - 8.50, (p = <0.001)	37	38	z = -0.16, (p = 0.87)
Knows the difference of HLC and hospital	26	50	z = - 3.80, (p = 0.001)	20	18	z = 0.39, (p = 0.70)
Visited HLC	28	65	z = - 5.90, (p = <0.001)	39	45	z = -0.96, (p = 0.34)
Satisfied with HLC	42	55	z = - 2.10, (p = 0.04)	38	43	z = -0.80, (p = 0.42)
Percentage screened	1.02%	3.00%	z = -10.85, (p=<0.001)	3.36%	3.72%	z = -1.65, (p=0.99)
Male Participation	0.33%	0.52%	z = -2.28, (p=0.02)	1.1%	0.82%	z = 2.47, ** (p=0.01)
Female Participation	0.69%	2.47%	z = -11.04, (p=<0.001)	2.26%	2.89%	z = -3.41, (p=0.001)

* Significance was calculated using the z-score test for two population proportions

** There was a reduction in male participants, despite the significant difference

Pre- and post- analysis of constructs of HBM indicated that 16 out of 47 statements (Perceived susceptibility - 2/6; Perceived Seriousness – 5/12; Perceived Benefits – 0/5; Perceived Barriers 8/16; Motivation 1/8) were statistically significant between pre- and post-intervention periods in the study setting (Figure 2), but none of the statements in the control setting showed significant differences.

FIGURE 2: SIGNIFICANT STATEMENTS IN HEALTH BELIEF MODEL CONSTRUCTS BETWEEN PRE - AND POST INTERVENTION

Perceived Susceptibility

- “My physical health makes it more likely that I will get a Non communicable disease” ($z = -2.10$, $p=0.04$)
- “There is a good possibility that, I will get a Non communicable disease” ($z = -3.49$, $p<0.001$)

Perceived Seriousness

- “If I had a Non communicable disease my career would be endangered” ($z = -2.18$, $p=0.03$)
- “A Non communicable disease would endanger my marriage (or a significant relationship)” ($z = -2.18$, $p=0.03$)
- “Non communicable diseases are hopeless diseases” ($z = -3.17$, $p=0.002$)
- “My feelings about myself would change if I got a Non communicable disease” ($z = -3.36$, $p<0.001$)
- “I am afraid to even think about a Non communicable disease” ($z = -2.97$, $p=0.003$)

Perceived Benefits

- No statements were significant.

Perceived Barriers (‘false’ statements were taken into the consideration for z test)

- It is embarrassing for me to do regular screening for Non communicable diseases ($z = 2.39$, $p=0.02$)
- To do regular screening for Non communicable diseases, I have to give up quite a bit ($z = 3.16$, $p=0.002$)
- Regular screening for Non communicable diseases can be painful ($z = 2.32$, $p=0.02$)
- Regular screening for Non communicable diseases is time consuming ($z = 2.44$, $p=0.02$)
- My family or society would make fun of me, if I did regular screening for Non communicable diseases ($z = 3.33$, $p<0.001$)
- The practice of regular screening for Non communicable diseases interferes with my activities ($z = 4.96$, $p<0.001$)
- Doing regular screening for Non communicable diseases would require starting a new habit, which is difficult ($z = 2.86$, $p=0.004$)
- I am afraid, I would not be able to do regular screening for Non communicable diseases ($z = 2.39$, $p=0.02$).

Motivation

- I exercise regularly- at least three times a week ($z = -2.43$, $p=0.02$)

DISCUSSION

SUMMARY OF KEY FINDINGS

HLCs were established in Sri Lanka to screen vulnerable groups for NCDs using primary healthcare settings and resources. However, the expected level of coverage was not achieved due to various reasons, and poor HSB was considered as the most important factor. Therefore, this case control study was conducted with the objectives of describing the HSB for NCDs, then co-designing and evaluating a package of evidence-based interventions to improve HSB in a selected region. The interventions were developed consultatively following quantitative pre-assessment of HSB, and FGD analysis of key stakeholder perceptions. Evaluation of this multi-component intervention showed significant improvements in HSB in relation to perceived susceptibility, perceived barriers, and utilization of HLCs compared with the control setting. However, there were only non-significant improvements in other HSB constructs and risk factors, except for engagement in physical activities. Overall, these results indicate that the multi-component intervention should be implemented at a broader scale across Sri Lanka, though some refinements may be required to design and implementation.

PRE-INTERVENTIONAL ASSESSMENT

Our pre-interventional assessment reported that participants had higher levels of "perceived benefits", with lower levels of "perceived seriousness" and "perceived susceptibility". These results indicated that the participants neglected the seriousness and susceptibility of NCDs, despite holding knowledge on benefits of screening. Similarly, a recent systematic review and meta-analysis reported "perceived benefits" as the highest construct and "perceived susceptibility" as the lowest construct determining the beliefs of diabetic patients [10]. Multivariate logistic regression analysis of health behaviours towards prevention of NCDs in China reported that HBM constructs are directly or indirectly related with such behaviours, and "perceived barriers" had the greatest impact [21]. However, a similar analysis in Saudi Arabia for screening of colorectal cancers, reported no relationship of acceptance of screening with the HSB constructs [22], which may be due to limitations of the study or other contextual factors. Studies by Wang et.al. (2022), Khosravizadeh et.al. (2021), and our study highlight the importance of analysing HSB using HBM, prior to the planning of interventions to improve HSB.

IMPROVING HLC UTILIZATION

The main goal of our study was to improve utilization of HLCs for the screening of NCDs. Post-interventional health services utilization was significantly improved with the improvements in "perceived susceptibility" and "barriers" in our study. Similarly, a narrative synthesis of African studies reported that "perceived barriers" and "benefits" were the major determining constructs in HBM on behaviour towards screening for cervical cancer, but "perceived susceptibility" was also highlighted in more recent studies [11]. In contrast, a systematic review of European studies on breast cancer screening mentioned a significant association of all HBM constructs with attendance to mammography [12]. Additionally, a USA study on breast cancer screening using mammogram in the rural population indicated that fewer "perceived barriers" led to significantly improved screening and "perceived susceptibility" led to marginally improved screening, but other HBM constructs were unable to predict the screening frequency [23]. Similarly, a lack of perceived susceptibility, despite providing knowledge on complications of NCDs, and a significant correlation between screening practices and perceived susceptibility ($P < 0.05$) was reported among Chinese individuals with Diabetes [24]. Additionally, the significant association between perception of susceptibility and adherence with lifestyle modifications was noted among Indonesian elderly people with hypertension [25]. All these studies highlight the importance of improving "perceived barriers" and awareness of "perceived susceptibility" to improve HSB, in any setting.

OUTCOMES

Our study employed multiple and complex interventions to improve HBM constructs through awareness of the community on NCD susceptibility and seriousness through community engagement and inter-sectoral collaboration. Additionally, a risk assessment tool for Diabetes, which was designed based on the Sri Lanka Diabetes Risk Score (SLDRISK) [19], was incorporated into the design of health education materials and training of volunteer groups and health staff in the

assessment of susceptibility. Furthermore, the study incorporated system related interventions to minimise barriers to screening. Analysis of system level interventions for improving screening for diabetes among women who had gestational diabetes, highlighted the importance of having integrated and multiple interventions to bridge the gap between recommended guidelines and actual practice [26]. For example, improving the quality of care is strongly linked with increased attendance to community screening services [27], and obtaining patients' feedback enabled health care providers to understand how patients and their families perceive the quality of healthcare [28]. Additionally, these types of multiple interventions are recommended in several studies to improve HSB of chronic NCDs and related risk factors [10, 11, 21].

Nevertheless, except for engaging in physical activities, none of the other lifestyle practices had significant improvements in the study area. Quiroz-Mora, et.al. (2018), noted that self-perceived importance of quality-of-life is the most important factor which promotes engagement with physical activities [29]. However, improving other risk factors (smoking, alcohol, unhealthy diet) would need more complex interventions than those implemented at the community level [30, 31].

LIMITATIONS

There are relationships of HSB with socio-demographic factors, as highlighted in HBM [32]. A systematic review of African studies reported a range of socio-demographic factors contributing to HSB in cervical cancer screening [11]. For example, Tanzanian women from lower socio-economic backgrounds had more chance of inaccurate information, and less chance of screening [33]. Therefore, it is vital to analyse the HSB relationships with socio-demographic factors, to identify specific and targeted interventions for high risk groups [26]. However, our study did not analyse these relationships, as the intention was to design community level intervention without targeting any specific groups, except for males, as identified through the FGDs as a group of low HLC utilization.

Multiple, complex interventions were employed to improve HSB in a local community, but we did not assess the effect of each intervention individually in improving HSB. Due to limitations in sample size, data characteristics of HBM and follow-up period, multivariate regression analysis could not be performed and unadjusted comparisons are reported in the results. Therefore, observed improvements may not be totally linked to the myriads of performed interventions and interpretations linked with causality are to be made cautiously. It is recommended to have extended follow-up periods and increased sample sizes for future research. Additionally, the findings may not be generalizable to other settings, with different contextual parameters.

CONCLUSIONS

The co-designed, evidence-based package of interventions implemented was found to have significantly increased utilization of HLCs, but only HSB practices related to physical activity. Risk factors for NCD, like smoking, excessive use of alcohol, beetle chewing, consuming of unhealthy foods and lack of physical exercise, remained high in both the intervention and control populations. The post-interventional changes of risk factors were not significant, except for an increase in physical exercise, as they may need more complex community-based and individualized interventions. These results indicate that in addition to promoting HLC utilization, it may be necessary to reduce NCD rates in Sri Lanka and other comparable settings through uplift of the quality of HLC programs, along with holistic planning that allows HLCs to complement other primary care and public health programs that are adapted to local socio-cultural and economic needs. The use of structured phases (pre-intervention analysis, co-design of an evidence-based package of community based, health promotion and health system-level interventions, and robust evaluation) may offer guidance for stakeholders in other resource-constrained settings who are aiming to increase NCD screening rates efficiently. Future research should evaluate the specific contribution of the individual interventions that were packaged together in this study and explicate which of those is most suitable for targeting specific demographic groups.

AUTHORSHIP

ADUK was involved in initial conceptualization, and design of the research. ADUK, DD, MWMKW and AC collectively contributed to designing the methodology, analysis, and interpretation of results. DD contributed for reviewing the initial conceptualization and design and prepared the initial draft of the manuscript. SS supervised and refined the study design and methodology and co-reviewed the initial draft of the manuscript. HR reviewed the manuscript to ensure overall accuracy and integrity, and did the final revision and approval of the manuscript. All authors reviewed the manuscript before final submission.

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CONFLICT OF INTEREST

ADUK was the District Director of Health Services, and DD was the Deputy District Director of Health Services, who were responsible for supervising primary care services in the study and control settings. MWMKM is the present District Director of Health Services of Matara District.

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DETERMINATION OF THE STATE OF OPERATING ROOM EFFICIENCY IN A TERTIARY HOSPITAL IN THE PHILIPPINES

Maria Teresita B. Aspi^{*1}, Carl Abelardo T. Antonio², Khimberlain D. Medina³

1. University of the Philippines Manila College of Medicine, Philippines
2. University of the Philippines Manila College of Public Health, Philippines
3. Pasig City General Hospital, Philippines

Correspondence: mbaspi1@up.edu.ph

ABSTRACT

OBJECTIVE:

This study aimed to describe the status of operating room (OR) efficiency of a tertiary hospital in the Philippines according to time-based parameters, identify the direct causes of delays in the OR, and predict the change in number of patients served and OR income if utilization rates improve.

DESIGN AND SETTING:

A cross-sectional study employing a retrospective records review of all elective surgical cases from June 2023 to June 2024 was done at a tertiary hospital in Pasig City, Philippines.

MAIN OUTCOME MEASURES:

The study determined the means of the different OR efficiency parameters, the causes of delays, the relationship between the changes in utilization rate and number of patients served, and the relationship between the changes in the number of patients served and the gross income.

RESULTS:

The means of the arrival of first case lag time, anesthesia induction lag time and turnover time did not reach target, while the means of the procedure lag time, trans-out lag time and utilization rate were optimal. Among the different causes of delay, those related to the surgeon predominated. The relationship between the change in utilization rate and change in the number of patients served was not significant. Likewise, there was no significant relationship between the change in the number of patients served and the change in gross income.

CONCLUSION:

While the means of the arrival of first case lag time, anesthesia induction lag time and turnover time were beyond target mainly due to surgeon-related factors, the utilization rate of the functioning operating rooms was optimal. Hence, the current number of functioning operating rooms may no longer be enough to address the existing backlog of cases. Increasing the number of functioning operating rooms may be considered.

KEYWORDS

Operating room efficiency, delays, elective surgery

INTRODUCTION

BACKGROUND

Operating room (OR) efficiency may be defined as the maximization of throughput and OR utilization, and minimization of overtime and waiting time, without additional resources.[1] Other studies define it in terms of cost reduction while preserving the same level of quality and productivity.[2]

The OR generates 60-70% of the entire hospital income but accounts for up to 40% of total operating costs.[3] Hence, OR efficiency warrants close examination, as it significantly affects hospital revenue and operational viability.

A study on OR efficiency in a low resource setting revealed that 42.7% of operating rooms were underutilized.[4] In a developing country like the Philippines, a certain government-funded tertiary hospital utilizes less than 50% of operating rooms despite the backlog of cases. Consequently, a patient seen at the outpatient clinic waits around a month before being scheduled for surgery. Attempts at monitoring delays and addressing their causes, especially the late arrival of surgeons, remain challenging for the management. While the maximization of OR utilization is crucial, the said hospital lacked data on OR efficiency.

Determining the level of OR efficiency and identifying modifiable factors enable implementation of strategies that prevent unnecessary delays. Especially for government hospitals in developing countries, wastage of the already limited resources may be avoided, and the number of surgeries per day may be increased. Moreover, improvement in the quality of patient care may be seen.

REVIEW OF RELATED LITERATURE

Several parameters that define OR efficiency in terms of time have been studied and their values set. [4, 5, 6, 7] The table below summarizes the definition and target of each parameter.

TABLE 1. OPERATING ROOM EFFICIENCY PARAMETERS [4,6,7]

OR Efficiency Parameter	Definition	Target
Arrival of first case lag time	Difference between the actual arrival time of the first case in the OR and the scheduled arrival time of the first case	≤ 15 minutes
Anesthesia induction lag time	Time difference between arrival time and start of induction of anesthesia	≤ 5 minutes
Procedure lag time	Time difference between start of induction of anesthesia and start of procedure	≤ 30 minutes
Trans-out lag time	Time difference between end of procedure and trans-out time	≤ 15 minutes
Turnover time	Time difference between trans-out time of previous case and arrival time of next case	≤ 30 minutes
Utilization rate	Proportion of time within the working hours in which a patient was in the operating room minus the excesses in lag times	≥ 75%

The lag times listed above have the advantage of being easily measured. Unfortunately, when taken in isolation, they do not consider how schedules with more cases tend to have lengthier gap times compared to those with less.[8] The utilization rate addresses this issue by relating the sum of the different gap times subtracted from the time the patient was in the OR to the total time required for a certain case.[7]

Other studies have utilized other OR efficiency metrics. Start time was easy to measure but definitions were varied and there was absence of correlation with finish time or efficiency. Cancellations on the day of surgery were routinely recorded and deemed important to patient experience by other studies. However, disruptions caused by cancellations were difficult to measure. The number of operations were easy to measure but it did not take into consideration the length of each operation.[8]

Causes of delays in the OR have been investigated by several studies. [5, 6, 9, 10, 11] Delays in the arrival of the first case and prolonged turnover time were due to transport delay, inadequate preoperative workup, consent issues, sudden cancellation, family discussion, clergy visitation, and power interruption. Scheduling error or change of plan, lack of timely OR preparation, and surgeon unavailability also delayed turnover. Anesthesia induction lag time was prolonged due to unclear staff assignments, late anesthesiologist, problems with setup, and difficult vascular access. Procedure lag time was prolonged due to late surgeon, incomplete supplies and instruments, equipment setup, radiology technician unavailability, and sterile field compromise. Trans-out time was delayed due to unavailability of stretcher and institutional worker, and lack of bed in the receiving unit. All the factors previously mentioned were attributed to patient, nurse, anesthesiologist, surgeon, or system. [9, 10, 11, 12, 13]

Current literature largely concentrates on institutions in developed countries, resulting in limited insight into how poor OR efficiency arise in low-resource settings. In fact, in the Philippines, very few published studies have measured operating room efficiency. Three studies done in the same local hospital in Luzon revealed that 49.7% of cases were delayed for more than an hour, mainly due to late surgeons,[5], the first case on time, entry lag, and exit lag were below the 50th percentile,[6] and no improvement in efficiency parameters was seen despite changes in policies.[14] The other published study, which was done in Visayas, attributed turnover time delays mostly to anesthesia and institutional factors.[15] While these studies measured specific OR efficiency parameters, quantification of the specific causes of delay is lacking. In addition, no study predicted the impact of improving OR efficiency on income and service delivery.

METHODOLOGY

OBJECTIVES OF THE STUDY

General Objective

To determine the state of OR efficiency of a tertiary hospital in the Philippines

Specific Objectives

- a. To describe the efficiency of the OR according to time-based parameters
- b. To identify the direct causes of delays in the OR
- c. To predict the change in number of patients served and OR income if utilization rates improve

STUDY DESIGN

This was a cross-sectional study employing a retrospective records review of the Time Log Form of elective surgical cases.

STUDY SETTING

The study was conducted at the operating room complex of the Pasig City General Hospital (PCGH). PCGH provides surgical services such as general surgery, pediatric surgery, orthopedics, otorhinolaryngology, ophthalmology, and obstetrics and gynecology. The operating room complex has 5 operating rooms but only 1 to 2 are used for elective cases. About 2 to 4 cases are done per day, totaling around 50 cases a month.

POPULATION AND SAMPLING TECHNIQUE

The study population were all elective surgical cases scheduled at the operating room complex of PCGH. Cases that were done at the operating complex of PCGH from June 2023 to June 2024, scheduled as an elective procedure, and required anesthesia were included; while cases that required only local anesthesia, became an emergency case, and

had an American Society of Anesthesiologists - Physical Status (ASA-PS) classification of 5 or 6 (Appendix 1) were excluded. No sampling was done.

DATA COLLECTION PROCEDURE

Data extracted from the Time Log form (Appendix 2) was recorded in the data collection form. To remove potential bias, the recorder was blinded as to who the surgeons, anesthesiologists, and patients were.

In order to project the change in the number of patients served and the OR income with improvement of utilization rate, the total number of elective surgeries, total number of emergency surgeries, and gross income were gathered. The total number of elective cases and emergency cases was obtained from the census of the Department of Anesthesiology. The gross income of the operating room was requested from the Finance Department of PCGH. These data were recorded in the data collection form.

This study was only conducted after its approval by the Research Technical Review Committee and Research Ethics Review Board of PCGH (Study Code 2024-004). Since this is a records review, the request to waive the requirement of obtaining consent from the subjects whose cases were logged in the Time Log Form was approved. All patient information was kept anonymous and confidential. Investigators assigned a numeric code for each case number to conceal the information. Only the investigators and the statistician had access to the data collection forms. The investigators complied with ethical principles, policies and relevant guidelines. Since this is an observational study involving a review of records, no more than minimal risk was involved.

DATA PROCESSING AND ANALYSIS

In order to describe the status of the operating room efficiency according to time-based parameters, means and ranges of OR efficiency parameters and the percentages of OR efficiency parameters that achieved the recommended targets were determined. To determine the direct causes of delays in the operating room, percentages of delayed cases according to cause per OR efficiency parameter were obtained. In order to predict the change in number of patients served and OR income if utilization rates improve, forecasting using simple linear regression (equation of the line approach) was done using the utilization rates, total number of cases and OR income as variables.

No missing data was encountered. The level of significance for all sets of analysis was set at a p-value < 0.05. The statistical software SPSS IBM Version 26 was used.

RESULTS

A total of 627 cases were included in the study. 283 were first cases while 344 were succeeding cases. Table 2 shows the means of OR efficiency parameters.

TABLE 2. MEANS OF OR EFFICIENCY PARAMETERS

OR Efficiency Parameter	Mean	Confidence Interval
Arrival of first case lag time	52.53 ± 86.30 minutes	43.48-63.59
Anesthesia induction lag time	17.53 ± 18.47 minutes	16.08-18.76
Procedure lag time	19.41 ± 13.02 minutes	18.39-20.43
Trans-out lag time	9.67 ± 8.40 minutes	9.01-10.33
Turnover time	56.39 ± 64.46 minutes	49.58-63.20
Utilization rate	78.75 ± 20.03%	77.18-80.32

The study revealed that 36.4% of OR efficiency parameters were delayed. Surgeons, particularly their unavailability, caused the most number of delays in the arrival of first case lag time (86.90%), turn-over time (81.82%), and in the anesthesia induction lag time (80.97%). The preparation of equipment for surgery caused the most number of delays in

the procedure lag time (44.79%), while the lack of personnel for transfer caused the most number of the delays in the trans-out lag time (51.92%). Table 3 summarizes the percentage contribution of each cause of delay.

TABLE 3. DIRECT CAUSES OF DELAYS IN PERCENTAGES

	Delayed arrival of first lag time (%)	Delayed turn-over time (%)	Delayed anesthesia induction (%)	Delayed procedure (%)	Delayed trans-out time (%)	Overall (%)
Patient	0.69	2.27	2.93	11.98	40.38	5.53
Puncture	0.00	0.00	1.80	11.98	0.00	2.14
Late emergence	0.00	0.00	0.00	0.00	38.46	2.19
Abnormal vital signs	0.00	0.00	0.68	0.00	0.00	0.33
No guardians	0.69	0.57	0.23	0.00	0.00	0.33
Extra preparation for obese	0.00	1.70	0.23	0.00	0.00	0.44
Adverse Events	0.00	0.00	0.00	0.00	1.92	0.11
Nurses	7.24	9.09	3.04	0.00	3.85	4.60
Availability of Nurses	1.72	6.82	2.82	0.00	3.85	3.18
Preoperative preparation	5.52	2.27	0.23	0.00	0.00	1.42
Anesthesiologist	0.34	1.70	8.67	2.08	0.00	4.82
Teaching case	0.00	0.00	0.23	1.04	0.00	0.22
Preparation of anesthetic needs	0.00	0.00	7.21	1.04	0.00	3.61
Availability of Anesthesiologist	0.34	1.70	1.24	0.00	0.00	0.99
Surgeon	87.59	83.52	81.42	26.04	1.92	72.45
Availability of Surgeons	86.90	81.82	80.97	25.00	0.00	71.58
Securing preoperative clearance /testing	0.69	1.14	0.45	0.00	0.00	0.55
Addressing concerns of patients	0.00	0.57	0.00	0.00	0.00	0.11
Skin prepping	0.00	0.00	0.00	1.04	0.00	0.11
Postoperative testing	0.00	0.00	0.00	0.00	1.92	0.11
Others	4.14	3.41	3.94	59.90	53.85	12.60
Procuring unavailable needs	0.69	0.00	0.23	1.04	0.00	0.33
Preparation of equipment for surgery	0.00	1.70	2.48	44.79	0.00	6.24
Positioning changes	0.00	0.00	0.23	5.73	0.00	0.71
Slow drug onset	0.00	0.00	0.00	8.33	0.00	0.88
Change in schedule	1.38	0.00	0.45	0.00	0.00	0.44
Lack of personnel for transfer	1.38	1.14	0.00	0.00	51.92	3.40
Change in room	0.00	0.00	0.23	0.00	0.00	0.11
Documentation	0.00	0.00	0.00	0.00	1.92	0.11
Cleaning of room	0.00	0.00	0.23	0.00	0.00	0.11
Availability of orthopedic technician	0.00	0.00	0.11	0.00	0.00	0.05
Miscommunication with schedule	0.69	0.57	0.00	0.00	0.00	0.22

Table 4 shows the monthly utilization rate, number of cases and gross income. The gross income provided by the accounting department of the hospital came from both elective and emergency cases and cannot be delineated. Given that the operating expenses of the OR also cannot be delineated between the elective and emergency cases, determination of the net income from elective cases alone was not feasible. Given this limitation, the monthly difference

in the number of emergency cases was analyzed. Analysis revealed that there is no difference in the monthly number of emergency cases from June 2023 to June 2024 (chi square value of 0, $p=1.000$). It was then assumed that the number of elective cases mainly contributed to the total number of monthly cases. Analysis was carried out to see how the change in the utilization rate related to the total number of monthly cases and how the change in number of cases related to the gross income.

TABLE 4 MONTHLY UTILIZATION RATE, NUMBER OF CASES AND GROSS INCOME

Month	Utilization Rate	Number of Cases	Gross Income
June 2023	78.55	154	917,434.62
July 2023	79.92	124	1,092,209.19
August 2023	79.71	167	1,239,304.01
September 2023	82.36	171	1,100,748.87
October 2023	83.22	166	943,907.66
November 2023	71.89	136	818,110.58
January 2024	71.45	177	663,747.69
February 2024	80.89	167	904,736.80
March 2024	80.30	149	934,146.75
April 2024	78.10	195	910,666.76
May 2024	81.00	169	1,047,428.15
June 2024	80.00	222	1,107,106.07

The utilization rate was compared to the total number of cases per month. The regression analysis revealed that utilization rate had a very little positive relationship with number of cases ($B=0.874$, $p<0.697$). The utilization rate accounted for 1.6% of the variance in the number of cases ($F(1,11) = .160$, $p=0.697$). The linear regression equation generated ($y = 0.8742x + 97.403$) means that for a unit increase in the utilization rate, the number of cases was around 98.

The number of patients was compared to the gross income. The regression analysis revealed that number of cases had a minimal positive relationship with gross income ($B=873700.470$, $p<0.757$). The number of patients accounted for 1.0% of the variance in the gross income ($F(1,11) = .101$, $p=0.757$). The linear regression equation generated ($y = 598.47x + 873700$) means that for a unit increase in the number of cases, the gross income was Php 874,298.47.

DISCUSSION

The means of the arrival of first case lag time, anesthesia induction lag time and turnover time exceeded the target times for each parameter. Less than 50% of the cases achieved the targets. On the other hand, the means of the procedure lag time, trans-out lag time and utilization rate were within the target times for each parameter. More than 50% of the cases achieved the targets.

Comparing results of this study with available data from the OR Benchmarks Collaborative, the mean patient into incision (which is the sum of anesthesia induction lag time and procedure lag time) was below the 50% percentile, the trans-out lag time was at 50% percentile while the mean turnover time was below the 50% percentile.[13]

In terms of the percentage of cases that achieved target, results of this study were higher in the arrival of first case lag time, procedure lag time and trans-out lag time compared to those of other studies. On the other hand, anesthesia induction lag time and turnover time were lower. [5,11]

Aggregation of the data of delayed cases revealed that majority of the delayed cases were due to unavailability or absence of surgeons in the operating room (71.58%), and issues with preparation of surgical equipment (6.24%) and

anesthesia needs (3.61%). Several local and international studies echo the same results with 54.3 to 80.6% of delayed cases being caused by surgeon-related factors particularly their tardiness. [5, 10, 16] Similar to the results of this study, other local and international studies saw that factors related to the patient and system only had minor contributions to delay. [5, 10, 16]

Carrying out interventions that will improve the availability of the surgeons may minimize delays. A notification system to alert physicians of the events in the OR has been shown to improve efficiency.[17] Tracking of surgeons and anesthesiologists who are frequently late may be done. Their tardiness may be tackled at the individual level and sanctions may be considered. Since surgeons have other duties outside the operating room that could delay their arrival, additional manpower may be considered.

The current utilization rate was within the target range of 75-85% mentioned by several references.[4,18] Utilization rates exceeding 85-90% in simulations have been shown to increase patient delays and staff overtime.[19] It may also indicate that the number of operating rooms is not enough to meet the demand.[18] Using the line equations generated, targeting 85% may increase the number of patients to almost 6, which may potentially yield an increase in gross income of Php 3,269.70. For curiosity's sake, a 100% utilization rate may increase the number of patients to almost 19, which may potentially yield an increase in gross income of Php 11,116.98. Hence, any further increase in utilization rate only has minimal effects.

When the current utilization rate is already within target, increasing the utilization rate of the existing functioning operating rooms is not recommended based on existing evidence. [18,19] Increasing it to the maximum recommended value adds very little to the number of patients and income. Since the backlog of cases is significant, the existing number of operating rooms is no longer enough to meet the current demand. Increasing the number of functioning operating rooms may be the way to address this problem rather than increasing the utilization rate of the existing operating rooms.

Limitations of this study were as follows. Parameters, particularly maximization of utilization of all operating rooms, maximization of throughput and minimization of resources, were not included. Causes of delay were limited only to those known to or observed by the anesthesiologist. Results of forecasting were limited by the unavailability of financial data on elective cases only. Since this was a cross-sectional study employing a retrospective records review, causation cannot be established, and biases and confounders may exist.

CONCLUSION AND RECOMMENDATIONS

While the arrival of first case lag time, anesthesia induction lag time and turnover time did not reach target, the utilization rate of the existing functional operating rooms in PCGH was at the optimal level. Surgeon-related factors caused the most number of delays.

Addressing surgeon-related factors to improve OR efficiency may seem logical. However, this study revealed that increasing the utilization rate of the presently functioning operating rooms may have no significant effect on the number of patients served and OR income. Since there is a considerable backlog of cases despite the optimal utilization rate, the current number of functioning operating rooms may no longer be enough to provide surgical services in a timely manner. Increasing the number of operating rooms may be the solution to address the backlog, and a feasibility study may be carried out to assess its viability. This study showed that predicting the impact of improved OR utilization on service delivery and revenues may guide hospital managers in deciding between improving the efficiency of existing operating rooms or expanding the OR complex.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was approved by the Research Ethics Review Board of PCGH with Study Code 2024-004. Since this was a records review, the request to waive the requirement of obtaining consent to participate from the subjects was approved.

CONSENT FOR PUBLICATION OF PARTICIPANTS

Not applicable

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analyzed in this study are available from the corresponding author on reasonable request.

COMPETING INTERESTS

The authors declare that they have no competing interests.

FUNDING

Not applicable

AUTHORS' CONTRIBUTIONS

MTBA had substantial contributions to the protocol design, data collection, analysis and interpretation, and drafting the final manuscript. CATA was involved in the revision of the protocol and final manuscript. KDM helped in data collection and analysis. All authors read and approved the final manuscript

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APPENDICES

APPENDIX 1. ASA-PS CLASSIFICATION

ASA-PS Classification	Definition
I	A normal healthy patient
II	A patient with mild systemic disease
III	A patient with severe systemic disease
IV	A patient with severe systemic disease that is a constant threat to life
V	A moribund patient who is not expected to survive without the operation
VI	A declared brain-dead patient whose organs are being removed for donor purposes

APPENDIX 2. TIME LOG FORM OF THE PCGH DEPARTMENT OF ANESTHESIOLOGY

Date				
Operating Room				
Case Number				
ASA-PS Classification				
Service				
Surgical Procedure				
Primary Anesthesiologist				
Anesthetic Technique				
Parameter	Time	Note	Cause/s of delay	Details
Arrival time		Time when patient arrives at the OR For first case: If arrival time exceeds 6:45 AM , indicate cause of delay For other cases: If arrival time exceeds 30 minutes from trans-out time of previous case, indicate cause of delay	☐ Patient ☐ Nurse ☐ Anesthesiologist ☐ Surgeon ☐ Others	
Start of induction of anesthesia		If GA: time at preoxygenation If sedation: time when first drug is given If RA: time at start of prep If start of induction exceeds 5 minutes from arrival time, indicate cause of delay	☐ Patient ☐ Nurse ☐ Anesthesiologist ☐ Surgeon ☐ Others	
Start of procedure		Time of first incision or use of any instrument If start of procedure exceeds 30 minutes from start of induction, indicate cause of delay	☐ Patient ☐ Nurse ☐ Anesthesiologist ☐ Surgeon ☐ Others	
End of procedure		Time of completion of surgical dressing or instrumentation		
Trans-out time		Time when patient has left the operating room If trans-out time exceeds 15 minutes from end of procedure, indicate cause of delay	☐ Patient ☐ Nurse ☐ Anesthesiologist ☐ Surgeon ☐ Others	

EVALUATING THE IMPACT OF EARLY INTERVENTION ON DEVELOPMENTAL OUTCOMES IN CHILDREN WITH AUTISM SPECTRUM DISORDER: A COMPARATIVE STUDY IN BANGLADESH

Anika Ferdous¹, MD Nahid Hassan Nishan^{*2}, Siva Ganesan¹

1. Department of Audiology and Speech-Language Pathology, Bangladesh University of Professionals, Dhaka-1216, Bangladesh

2. Department of Public Health, North South University, Dhaka, Bangladesh

Correspondence: nissan0808@yahoo.com

ABSTRACT

INTRODUCTION

Autism Spectrum Disorder (ASD) presents a range of developmental challenges, often impacting social, cognitive, and motor skills. Early intervention (EI) is essential in supporting children with ASD by leveraging neuroplasticity during early developmental stages. This study aims to describe developmental profiles of children with ASD receiving early intervention compared to typically developing peers.

METHODOLOGY

A quantitative, comparative study was conducted among 400 six-year-old children, equally divided between ASD (n = 200) and typically developing (TD) (n = 200) groups, selected through purposive sampling from all eight administrative divisions of Bangladesh. Children in the ASD group had received EI since diagnosis before age three. Developmental outcomes were assessed using the Communication DEALL Developmental Checklist (ComDEALL), the Speech and Language Development Chart (SLDC), and the Indian Scale for Assessment of Autism (ISAA). Descriptive and comparative analyses were performed using Python.

RESULTS

The ASD group demonstrated lower acquisition across all domains. Gross motor and fine motor mastery was achieved by only 60% and 40% of ASD children, respectively, compared to 100% in TD peers. Receptive and expressive language skills were acquired by 54% and 46% of ASD participants, with phonology (11%) and pragmatics (20%) particularly underdeveloped. Daily living, cognitive, social, and emotional skills were acquired by less than 52% of ASD children. ISAA scores classified 78% of ASD participants as having severe autism.

CONCLUSION

These findings highlight critical delays in motor, language, and social skills in children with ASD. Tailored EI programs addressing these areas could enhance developmental outcomes and functional independence for children with ASD in resource-limited settings like Bangladesh.

KEYWORDS

autism spectrum disorder, child development disorders pervasive, early intervention education, language development disorders, social skills development

INTRODUCTION

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by impairments in social communication, restricted interests, and repetitive behaviors that affect millions globally, including a growing number of children in low- and middle-income countries (LMICs) such as Bangladesh [1]. ASD requires early, targeted interventions to support optimal developmental outcomes [2]. Research underscores the efficacy of early intervention (EI) in improving language, social interaction, and adaptive functioning in children with ASD by addressing developmental challenges during critical periods of neuroplasticity [3,4].

In high-income countries, EI for ASD is typically provided by specialized healthcare professionals, including speech therapists, behavioral analysts, and developmental pediatricians [5]. However, in LMICs, such resources are scarce and often inaccessible, particularly in rural regions. For instance, a systematic review highlighted that the "treatment gap" for ASD in LMICs remains significant, with nearly 80% of children lacking access to specialized interventions due to financial, logistical, and infrastructural barriers [6]. In response, some countries have adopted task-sharing models, where non-specialists are trained to deliver simplified versions of ASD interventions, which has shown promise in South Asia and sub-Saharan Africa [7]. Studies from these regions report positive outcomes with parent-mediated interventions led by trained community health workers, suggesting the potential effectiveness of these models in resource-constrained settings [8].

A notable example is a South African study where a cascaded task-sharing model was used to train non-specialist health workers in delivering the Naturalistic Developmental Behavioral Intervention (NDBI), an evidence-based ASD intervention [7]. This model showed encouraging improvements in children's social engagement and language development, demonstrating that even simplified interventions can be impactful when specialized resources are unavailable [9]. Similarly, a study in India implemented a parent-mediated intervention where local health workers coached parents on ASD management strategies, resulting in measurable gains in child outcomes and increased parental confidence [10].

Despite these promising findings, Bangladesh still faces unique cultural, social, and structural challenges in implementing EI for ASD [11]. While awareness of ASD is increasing, many families encounter barriers to accessing timely diagnosis and intervention services [12]. Cultural attitudes, stigma, and limited healthcare infrastructure further complicate the delivery of ASD-specific interventions [13–15]. Given these constraints, there is a critical need to adapt existing EI models to Bangladesh's context, potentially by leveraging community-based, culturally sensitive approaches that involve family members and local health workers [16].

The study evaluates the impact of early intervention on children with ASD by comparing developmental outcomes between children with ASD who received early intervention and typically developing children. This comparison underscores the importance of tailored early intervention for children with ASD in Bangladesh. By addressing these gaps, the research aims to inform relevant, scalable intervention strategies for underserved populations in Bangladesh.

METHODOLOGY

STUDY DESIGN

This study employed a quantitative, comparative design using purposive sampling to ensure participants met specific criteria essential for addressing the research objectives. The sample consists of 400 children, equally divided between two groups: 200 children diagnosed with ASD who received early intervention and 200 typically developing (TD) children. Each group includes equal gender representation, with 50% male and 50% female participants, though individuals from the third-gender community were not included due to resource limitations. Purposive sampling was chosen to facilitate a focused comparison by selecting participants who closely matched the study's inclusion criteria. While this non-random sampling method is less generalizable, it is suitable for ensuring a balanced and relevant population for examining developmental outcomes across groups.

PARTICIPANTS

The study sample comprised 400 children, divided equally into two groups: Group 1 included 200 children diagnosed with ASD who had received early intervention, and Group 2 consisted of 200 typically developing (TD) children. Gender balance was maintained with 50% male and 50% female participants in each group. Participants were selected from each of Bangladesh's eight administrative divisions—Dhaka, Chattogram, Khulna, Rajshahi, Barishal, Sylhet, Rangpur, and Mymensingh. This selection ensured geographic representation and aimed to include a diverse cross-section of children from different cultural and socio-economic backgrounds across the country. Despite the regional diversity of participants, all assessments and treatments were conducted in Dhaka. Dhaka was chosen as the centralized treatment location because it provides greater access to specialized facilities and trained professionals necessary for administering standardized assessments and early intervention services. This approach allowed for consistent and high-quality data collection while maintaining representation from across Bangladesh.

INCLUSION AND EXCLUSION CRITERIA

Participants were recruited according to predefined criteria to ensure comparability between groups and to minimize potential confounding factors. For the ASD group ($n = 200$), eligible children were exactly six years old, had received a confirmed clinical diagnosis of ASD before the age of three, and had been consistently engaged in early intervention therapy since diagnosis. The intervention consisted of a structured combination of speech therapy, occupational therapy, and behavioral interventions, delivered by trained professionals at an average frequency of three to five sessions per week, each lasting 45–60 minutes, over a period of at least three consecutive years. To reduce the influence of external variables, only children who were not taking regular medication known to affect cognitive, behavioral, or developmental outcomes (such as antipsychotics, anticonvulsants, or ADHD medications) were included, and those with any co-occurring developmental, neurological, or genetic disorders were excluded. Additional exclusion criteria for this group included irregular attendance at therapy sessions—defined as less than 75% adherence to the planned schedule—and diagnosis of ASD after the age of three.

For the TD group ($n = 200$), participants were matched to the ASD group by age, sex, and geographic distribution. Inclusion required the absence of any current or past developmental, neurological, psychiatric, or genetic disorders, and none of the children were receiving special education, developmental therapy, or medication that could influence developmental skills. Children identified with developmental delays, special educational needs, or regular use of medication for neurological, psychiatric, or behavioral conditions were excluded. These criteria were applied to ensure that both groups were comparable in demographic characteristics while differing only in the presence or absence of ASD and its associated interventions, thereby allowing for a focused assessment of developmental outcomes.

MATERIALS AND INSTRUMENTS

Three validated and widely used assessment tools were employed to evaluate key developmental areas in both ASD and TD children, namely the Communication DEALL Developmental Checklist (ComDEALL), the Speech and Language Development Chart (SLDC), and the Indian Scale for Assessment of Autism (ISAA) [17–19].

- **Communication DEALL Developmental Checklist (ComDEALL):** This tool measures developmental skills across eight domains: gross motor, fine motor, activities of daily living, receptive skills, expressive skills, cognitive skills, social skills, and emotional skills. Scores range from 0 (not acquired) to 4 (mastered across all situations), with a color-coded scale from red (not acquired) to dark green (fully mastered).
- **Speech and Language Development Chart (SLDC):** The SLDC assesses five domains of speech and language development—phonology, semantics, play, syntax-morphology, and pragmatics—indicating the presence or absence of these skills.
- **Indian Scale for Assessment of Autism (ISAA):** The ISAA, an observational tool, evaluates 40 items across six domains: social relationship and reciprocity, emotional responsiveness, speech-language and communication, behavior patterns, sensory aspects, and cognitive components. Scores on the ISAA categorize the degree of autism from normal (<70) to severe (>153).

DATA COLLECTION PROCEDURE

Data were collected through structured, one-on-one assessments conducted in a controlled clinical setting to minimize variability and external distractions. Each child was evaluated individually across multiple developmental domains using three standardized tools: the Communication DEALL Developmental Checklist (ComDEALL), the Speech and Language Development Chart (SLDC), and the Indian Scale for Assessment of Autism (ISAA). Assessments were carried out by a team of six raters, including speech and language therapists, occupational therapists, and special educators, each with a minimum of three years' experience in pediatric developmental assessment. Although no formal external certification was provided for the use of these specific tools, all assessors participated in an intensive, study-specific training program led by senior clinicians with expertise in the instruments. This training covered administration procedures, scoring guidelines, and case-based calibration exercises to ensure consistent application across raters. To further reduce subjectivity, all assessments followed standardized protocols, and regular team meetings were held to review scoring practices. Supplementary information for ISAA scoring was obtained from parents or caregivers through structured interviews, enabling a more comprehensive understanding of each child's abilities in everyday contexts.

ETHICAL CONSIDERATIONS

This study received ethical approval from the Proyash Institute of Special Education and Research (PISER) Review Board under IRB No: 1034/31/Cen/PISERVE. The procedures adhered to the ethical standards set by the Bangladesh Medical Research Council (BMRC) and the principles of the Declaration of Helsinki. Special consideration was given to ethical principles for research involving vulnerable populations, ensuring that the best interests of the children were prioritized throughout the study. Informed consent was obtained from the parents or legal guardians of all participants, ensuring they fully understood the study's purpose, procedures, and voluntary nature. Participation was entirely voluntary, and parents were informed of their right to withdraw at any time without consequences. To protect participant confidentiality, all data were anonymized using unique codes assigned to each participant and securely stored with restricted access. Data collection and management complied with relevant data protection and privacy regulations. Assessments were conducted in a clinical setting, prioritizing the comfort and safety of each child, and ensuring a supportive and ethical research environment.

DATA ANALYSIS

Data analysis was conducted using Python (version 3.11.4 <https://www.python.org/>) to perform descriptive statistical analysis and create visualizations for presenting the results. The analysis focused on summarizing developmental outcomes across the ASD and TD groups, particularly in areas of communication, socialization, and daily living skills. Python's data analysis libraries, such as Pandas and NumPy, were used to organize and manipulate the dataset efficiently, while Matplotlib and Seaborn facilitated the creation of clear, visually engaging graphs and tables.

The data analysis involved calculating frequency distributions and percentage comparisons for each domain assessed, allowing for a straightforward comparison of developmental progress between the two groups. Visualizations, including graphs, were generated to present data and highlight differences in developmental outcomes between ASD and TD children. Each domain was presented in a distinct graphical format, providing a comprehensive and accessible overview of the findings. All visualizations and data summaries were prepared to ensure clarity for readers, highlighting key contrasts in developmental performance between the ASD and TD groups.

RESULTS

COMDEALL DEVELOPMENTAL SKILLS

The ComDEALL Developmental Checklist assessed gross motor, fine motor, daily living, receptive language, expressive language, cognitive, social, and emotional skills, revealing marked differences between the ASD and TD groups. Gross motor skill acquisition in the ASD group was limited, with only 60% of children showing partial skill mastery compared to 100% of TD children achieving full acquisition. This suggests substantial gaps in physical coordination and mobility for children with ASD. Fine motor skills showed a similar trend, with only 40% of the ASD group displaying consistent skill

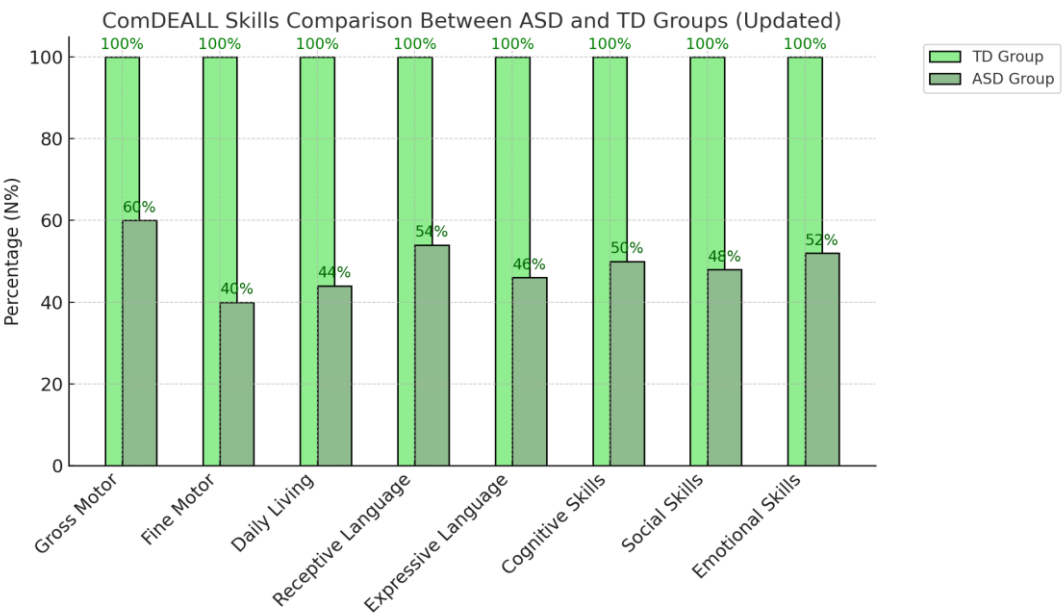
presence, in contrast to full acquisition in TD children. This finding indicates the need for focused support on fine motor activities, such as hand-eye coordination tasks, in EI programs to bridge this gap.

Daily living skills, essential for self-care and routine activities, were notably limited within the ASD group, with only 44% demonstrating adequate skill acquisition. In comparison, all children in the TD group achieved full mastery in this domain. This discrepancy highlights potential challenges in independence for children with ASD and suggests an area where EI could incorporate additional training.

Language skills, assessed via receptive and expressive language metrics, showed similar challenges. Only 54% of the ASD group acquired receptive language skills, and 46% displayed expressive language skills, whereas the TD group achieved 100% acquisition across both metrics. This result emphasizes the need for language-focused interventions within EI programs to support children with ASD in both understanding and producing language.

Cognitive, social, and emotional skills also demonstrated significant gaps. While 50%, 48%, and 52% of children in the ASD group exhibited skill acquisition in cognitive, social, and emotional domains respectively, the TD group achieved 100% in all areas. These results suggest that comprehensive EI programs should integrate cognitive and emotional development support, in addition to social skill-building activities, to address these areas effectively.

FIGURE 1: BAR CHART SHOWING DEVELOPMENTAL SKILLS IN ASD AND TD GROUPS



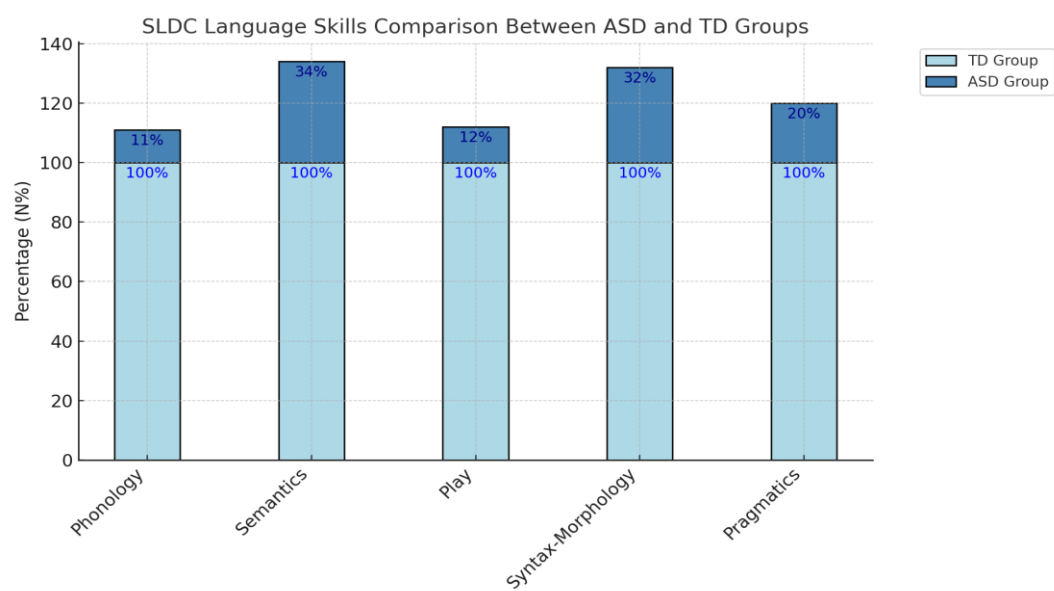
Footnote: This bar chart illustrates the percentage of skill acquisition across eight domains: gross motor, fine motor, daily living, receptive language, expressive language, cognitive, social, and emotional skills. The ASD group shows lower percentages across all skills, highlighting specific areas—such as social and cognitive skills—where additional support through early intervention may be needed.

SLDC LANGUAGE SKILLS

The SLDC further delineated differences in language skills across phonology, semantics, play, syntax morphology, and pragmatics. Phonological skills in the ASD group reached only 11%, indicating limited progress in sound production and discrimination, compared to 100% in the TD group. Pragmatic skills, critical for social communication, were similarly low, with only 20% of ASD children achieving these skills, contrasting with full mastery in TD children. These areas highlight where additional social communication interventions could benefit children with ASD. Higher-level language functions, such as semantics and syntax morphology, were also underdeveloped, with only 34% and 32% of the ASD group demonstrating sufficient skill acquisition, respectively. In contrast, TD children achieved full mastery across these domains, indicating a significant gap. These findings suggest that targeted interventions in vocabulary development and sentence structure could greatly support ASD children's language development. Lastly, play skills were notably limited, with only 12% of children in the ASD group exhibiting age-appropriate play abilities compared to 100% in the TD group. Given that play is

closely linked to social and cognitive development, integrating play-based approaches into EI could potentially improve social skills and creativity.

FIGURE 2: STACKED BAR CHART SHOWING LANGUAGE SKILLS IN ASD AND TD GROUPS

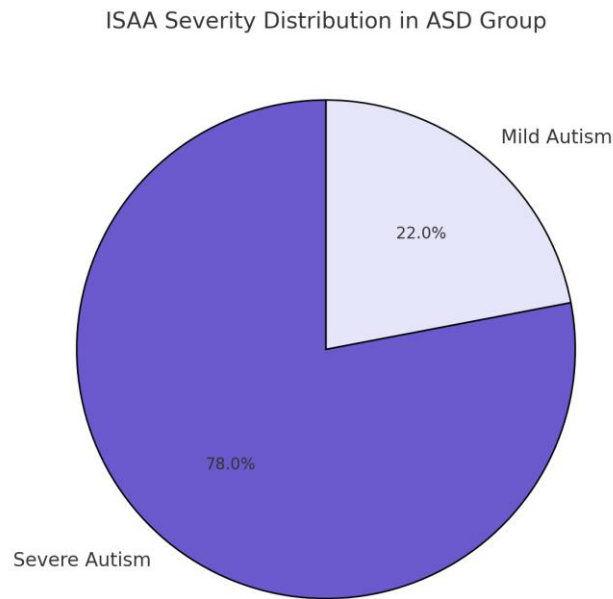


Footnote: This stacked bar chart compares five language skills (phonology, semantics, play, syntax-morphology, and pragmatics) between ASD and TD groups. The TD group achieved 100% acquisition in all domains, whereas the ASD group showed substantial deficits, particularly in phonology and pragmatics, underscoring the impact of language-based interventions.

ISAA SEVERITY DISTRIBUTION

The ISAA provided insights into the severity levels within the ASD group, categorizing children as mild or severe. The majority (78%) were classified with severe autism, with only 22% falling within the mild range. This distribution underscores the variability within ASD and highlights the need for adaptive, individualized intervention strategies. The higher incidence of severe cases suggests that many children with ASD may benefit from more intensive, multifaceted intervention approaches designed to address complex needs.

FIGURE 3: PIE CHART SHOWING ISAA SEVERITY IN THE ASD GROUP



Footnote: The pie chart shows the distribution of autism severity within the ASD group based on the ISAA scale. A majority (78%) of children are categorized as having severe autism, while 22% fall in the mild range, emphasizing the need for targeted, intensive interventions tailored to individual severity levels.

DISCUSSION

This study highlights the substantial developmental challenges children with ASD face across multiple domains, including motor, language, cognitive, social, and emotional skills. Using the ComDEALL, SLDC, and the ISAA tools, significant delays in skill acquisition were noted in the ASD group compared to TD children. These findings align with existing literature, which commonly observes delays in language, social skills, and motor abilities in children with ASD [20,21].

The ComDEALL results underscore the need for targeted interventions in both gross and fine motor skills for children with ASD. Only 60% of children with ASD showed partial mastery in gross motor skills, and a mere 40% demonstrated consistent fine motor abilities, compared to the full acquisition seen in the TD group. This suggests a foundational gap in physical coordination and dexterity, which may impact other developmental areas, including daily living and social engagement. Studies have similarly found that children with ASD often struggle with motor coordination, which can hinder their ability to participate in peer activities and achieve age-appropriate independence [22,23]. EI programs that incorporate structured motor skill training—such as guided balance exercises, coordinated object manipulation, and fine-motor precision tasks—have been shown to improve physical coordination, postural control, and functional independence in children with ASD. Such interventions not only enhance basic movement patterns but also facilitate participation in daily routines, self-care activities, and peer play, which in turn promote broader social and cognitive development [24,25]. Evidence suggests that targeted motor interventions delivered in early childhood can yield measurable gains in adaptive functioning and overall quality of life, particularly when integrated into multi-domain early intervention programs [26].

The language skills assessed via SLDC were markedly underdeveloped in the ASD group. Phonology and pragmatics were particularly low, with only 11% and 20% acquisition rates, respectively, in contrast to 100% in the TD group. Limited phonological skills indicate a barrier in sound discrimination and production, while reduced pragmatic skills impede social communication—a critical component of interaction. Studies have highlighted that deficits in phonological awareness and pragmatic skills are key characteristics of ASD. In our intervention, phonological training involved structured articulation drills, auditory discrimination activities, and repetitive syllable practice to improve sound production and clarity. Social language development was supported through guided role-play, storytelling, and turn-taking games aimed at enhancing pragmatic communication skills. Given that language development in children with ASD often progresses differently from that in TD children, incorporating EI strategies focused on phonological training and social language use can be beneficial [27,28]. Speech-language interventions that prioritize sound production exercises and social communication skills could support ASD children in achieving greater proficiency in language [29,30].

Daily living skills were another area with a notable discrepancy between groups, with only 44% of the ASD group showing adequate skill acquisition. This emphasizes a potential challenge in fostering independence and self-care in children with ASD, which could impact their quality of life and ability to integrate into social environments. Other studies have found that deficits in daily living skills are common among children with ASD and contribute to challenges in achieving functional independence [31,32]. Structured routines and behavioral interventions within EI programs may bridge this gap, helping children with ASD build competencies in essential daily activities, such as dressing, eating, and hygiene.

Cognitive, social, and emotional domains also showed significant skill gaps in the ASD group, with only half or fewer children demonstrating acquisition compared to the TD group. Deficits in social and emotional skills can contribute to social isolation and behavioral issues, and research indicates that children with ASD often struggle with social reciprocity and emotional regulation [33,34]. In our intervention, social and emotional skills training included cooperative board games to encourage teamwork, the use of emotion recognition picture cards to enhance emotional awareness, and guided peer-interaction activities to practice turn-taking and conversational exchanges in structured settings. Integrating social and emotional skills training, such as cooperative play and emotion recognition activities, into EI programs may help ASD children better understand social cues and manage emotional responses, facilitating smoother social interactions.

The ISAA severity distribution revealed that 78% of children in the ASD group were classified as having severe autism. This high proportion almost certainly influenced the developmental outcome patterns observed in this study. Children with severe ASD typically present with greater impairments in communication, social interaction, and adaptive functioning, which limit their baseline skill acquisition. As a result, even when enrolled in early intervention programs, progress may be slower and gains smaller compared to those with mild or moderate ASD [35,36]. In our sample, these severe cases often required higher levels of support and more repetition during therapy tasks, leaving less opportunity for advancement across multiple developmental domains within the same timeframe. Furthermore, high severity can impact engagement and attention during structured tasks, reducing the effectiveness of standardized interventions and contributing to the lower percentages of mastery seen in gross motor, fine motor, language, and social-emotional skills. The variability within ASD underscores the importance of adaptive interventions, as studies have shown that autism severity can predict both the type and intensity of support needed in social, cognitive, and behavioral domains [37,38]. For these children, EI approaches need to be flexible, allowing for adjustments in intensity and focus based on each child's unique needs. Studies also suggest that consistent and intensive interventions may improve outcomes for children with severe ASD, underscoring the value of early and personalized therapeutic strategies [39].

In addition to skill-specific interventions, integrating play-based and peer-interaction methods could be advantageous for comprehensive development. Play, as seen with only 12% skill acquisition in the ASD group compared to 100% in TD children, is a foundational activity closely linked to social, cognitive, and language development. This finding suggests that ASD children could benefit from interventions that incorporate structured play, aligning with other studies showing that play-based approaches can promote social engagement and creativity in children with ASD. Play therapy, especially when involving peer interactions, can encourage children to practice social behaviors in a supportive, structured environment, potentially improving social and cognitive outcomes.

STRENGTHS AND LIMITATIONS

This study benefits from a relatively large and geographically diverse sample, with participants drawn from all eight administrative divisions of Bangladesh and balanced for age and gender. Standardized, validated assessment tools (ComDEALL, SLDC, ISAA) were used to measure multiple developmental domains, and evaluations were conducted in controlled clinical settings by trained professionals, which helped minimize environmental variability.

However, several limitations should be considered when interpreting the findings. The purposive sampling strategy, while ensuring representation across regions, may introduce selection bias and limit generalizability to the broader ASD population in Bangladesh. The absence of random assignment between the ASD and TD groups restricts causal inference, as pre-existing differences beyond early intervention could have influenced outcomes. Reliance on parent and caregiver reports for certain measures introduces potential subjectivity, despite structured interview protocols. Additionally, the cross-sectional design precludes assessment of long-term intervention effects, and the chosen assessment tools, although standardized, may not fully capture culturally specific aspects of child development. Importantly, there was variability in the intensity, duration, and composition of early intervention programs across participants, which may have contributed to the heterogeneity of outcomes observed.

IMPLICATIONS AND FUTURE DIRECTIONS

These findings underscore the pressing need for scalable, multi-domain early intervention programs in Bangladesh and other resource-limited settings, with approaches that integrate motor, language, and social-emotional training and are tailored to the severity of each child's needs. The high proportion of severe ASD cases in this study highlights the importance of tiered service models, ensuring that children with greater developmental challenges receive more intensive, specialized support. From a policy perspective, integrating ASD-specific developmental screening into routine maternal and child health services could promote earlier identification, while expanding community-based delivery models would improve access for rural and underserved populations. Strategic investment in training non-specialist providers to deliver culturally adapted, evidence-based interventions could help close the treatment gap and reduce long-term societal costs associated with unmet developmental needs. Future research should adopt longitudinal and randomized designs to evaluate sustained impacts, develop locally relevant intervention protocols that leverage family

engagement and community resources, and examine how autism severity interacts with specific intervention components to inform more personalized, effective treatment strategies.

CONCLUSION

This study highlights substantial developmental challenges in motor, language, cognitive, social, and emotional domains among children with ASD compared to typically developing peers. The findings emphasize the critical need for individualized, multi-dimensional intervention approaches tailored to these specific areas of delay. By targeting each child's unique needs within a structured and adaptive framework, EI programs have the potential to more effectively address the complex developmental needs of children with ASD, as suggested by the observed skill gaps. Further research is needed to evaluate the specific impacts and long-term benefits of EI in ASD populations, especially in low-resource settings, to establish inclusive, scalable intervention models for ASD care worldwide.

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COMPETING INTERESTS:

The authors declare that they have no competing interests.

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PARENTS' KNOWLEDGE, ATTITUDES, AND PRACTICES TOWARDS THE UTILIZATION OF HEALTHCARE SERVICES FOR CHILDREN WITH AUTISM SPECTRUM DISORDER: A CROSS-SECTIONAL DESCRIPTIVE STUDY IN VIETNAM

Yen Thi Pham¹, Thang Huu Nguyen^{*2}, Lam Ha Nguyen², Giang Thi Huong Nguyen¹, Van Thanh Nguyen²

1. Vietnam National Children's Hospital, Hanoi, Vietnam

2. School of Preventive Medicine and Public Health, Hanoi Medical University, Hanoi, Vietnam

Correspondence: nguyenhuuthang@hmu.edu.vn

ABSTRACT

OBJECTIVE:

This study aimed to describe knowledge, attitude, practice, and some impact factors regarding the utilization of healthcare services for children with autism spectrum disorder (ASD) among parents in Hanoi, Vietnam, in 2024.

METHODS:

The cross-sectional descriptive study was conducted on 191 parents of children with ASD who were using care services at five healthcare facilities in Hanoi from October 2023 to March 2024.

RESULTS:

Only 23.6% of parents had good knowledge, while up to 67.2% had moderate knowledge regarding ASD. The prevalence of parents with positive attitudes towards childcare services was 84.7%, and only 2.3% had a negative attitude. Special education services and inclusive education support were the most frequently used, with over 70% of parents using them regularly. Parents of first-born children and those whose children were diagnosed immediately after abnormalities were detected had higher knowledge and attitude scores ($p < 0.05$).

CONCLUSION:

Most parents had moderate knowledge about ASD but the majority had a positive attitude with respect for childcare services. First-born children and those who were diagnosed immediately after the detection of abnormalities were associated with higher knowledge and attitudes among parents.

KEYWORDS

knowledge-attitude-practice; healthcare services; autism spectrum disorder; Vietnam

INTRODUCTION

Autism Spectrum Disorder (ASD) is a developmental disability characterized by impairments in communication and social interaction, as well as restricted, repetitive patterns of behavior, interests or activities that may persist throughout an individual's life [1]. Research has consistently shown a rising prevalence of ASD among children globally. In 2017, the World Health Organization (WHO) reported the global prevalence rate of ASD was 1:160 children [2]. By 2022, this rate was estimated to have increased, with a current average prevalence of 1:100 children, with boys consistently affected more often than girls, at an average ratio of 4.2 boys to 1 girl [3]. In Vietnam, the prevalence of ASD was estimated at approximately 1:100 children in 2018 [4].

Children with ASD and their families need access to information, services, referrals, and practical support tailored to their individual needs, which requires a comprehensive, integrated service, including health promotion, care, rehabilitation, and collaboration with other sectors such as education, employment, and social services [5]. Unfortunately, a lack of awareness and limited access to care services for children with ASD can significantly delay early diagnosis, assessment, and treatment. This disparity between the needs of caregivers and the availability of services, resources, or community support is particularly prominent in rural and suburban areas or communities where religious beliefs, cultural norms, and limited knowledge prevail. Stigma among families and society further compounds these challenges. Moreover, the concentration of care and intervention centers for children with ASD in urban centers also limits accessibility and increases waiting times for healthcare facilities [6].

Recently, growing awareness of ASD has led to an increase in the number of children diagnosed, with parents becoming more proactive in seeking early screening and medical care for their children [7]. For children with ASD, treatment plans are individualized and adjusted based on each child's unique circumstances, requiring parental involvement. Consequently, understanding parents' knowledge, attitudes, and practices regarding ASD is crucial, as it significantly influences early screening, access to care services, diagnosis, and timely intervention. This study was conducted to describe the knowledge, attitude, practice, and influencing factors regarding the utilization of ASD care services among parents.

METHODS

POPULATION AND SETTING

The study was conducted on 191 parents of children under 15 years old diagnosed with ASD who are currently enrolled in and receiving interventions and treatment at five autism care and intervention centers in Hanoi. These centers include two public institutions (National Hospital of Acupuncture; Binh Minh Primary School) and three private centers (Anh Sang Psychological Therapy Research and Counseling Center, Dai Nghia Integration Center, and Sao Mai Center). Participants were recruited based on their normal mental health, capable to communication, and ability to respond to interviews. Exclusion criteria included parents of children with other co-occurring neurological conditions such as cerebral palsy, hearing impairment, Down syndrome, etc., and those who did not consent to participate in the study.

Data collection period: from October 2023 to March 2024.

STUDY DESIGN AND SAMPLE SIZE

This cross-sectional descriptive study was part of a community intervention study in its initial investigative phase. The sample size formula for pre-post comparison community intervention studies, was determined as

$$n = \frac{\{Z(1-\alpha/2)\sqrt{2\bar{p}(1-\bar{p})} + Z(1-\beta)\sqrt{P_1(1-P_1) + P_2(1-P_2)}\}^2}{(P_1 - P_2)^2}$$

Specifically, the estimated pre-intervention knowledge rate of parents on care for children with ASD was $P_1 = 50\%$, and the estimate targeted post-intervention rate was $P_2 = 60\%$; $\bar{p} = (P_1 + P_2)/2$; $Z_{1-\alpha/2}$ represents the Confidence coefficient at

95% probability and $Z_{1-\beta}$ represents the study power at 95%. According to the formula, the required sample size was calculated to be $n = 178$. However, 191 eligible parents were ultimately recruited to participate in the study.

The sampling process involved two stages. First, we intentionally selected 05 care and intervention centers for children with ASD in Hanoi. Subsequently, participants were chosen for the study using convenience sampling methods.

MEASUREMENT

The initial scale comprised 50 items, which were developed by referring to documents and translating items from other international studies [8–10]. A pilot study was conducted with a sample of 30 individuals to evaluate the reliability of Cronbach's Alpha. Questions exhibiting a total correlation coefficient exceeding 0.3 and a Cronbach's Alpha coefficient higher than 0.7 were retained [11,12]. Following validation and expert consultation, the finalized scale for the official study encompassed the following sections:

- Section 1: Parental characteristics – Includes details about parents or primary caregivers, such as age, sex, education, economic status, care services utilized for the child, and any challenges encountered.
- Section 2: Children characteristics – Includes birth order, time of abnormality detection, time of diagnosis, time of initial intervention, and improvement level of the child.
- Section 3: Parents' knowledge regarding autism spectrum disorder: Consists of 14 True/False questions, referenced from the studies of Liu Y (2016) and Hamad S (2022) [8,9].
- Section 4: Parents' attitude toward care service for children with autism spectrum disorder: Includes 12 questions assessed on a 5-level Likert scale (from 1-Strongly Disagree to 5-Strongly Agree), based on the studies of Liu Y (2016) and Hamad (2022) [8,9].
- Section 5: Care service usage frequency: Comprises 9 questions evaluated on a 5-level Likert scale (from 1-Strongly Disagree to 5-Strongly Agree), adapted from the study of Jon Baio (2018) [10].

DATA COLLECTION AND STATISTICAL ANALYSIS

The interviewers were staff members at five facilities for children with ASD involved in the study. They participated in a training session on the questionnaire and conducted face-to-face interviews with study participants for the official research. The supervisor was the principal investigator from Hanoi Medical University.

The data was cleaned and coded using Epi Data version 3.1 software. Data analysis was performed using SPSS version 20.0.

Descriptive statistics were used to describe the current state of knowledge, attitude, and frequency of utilizing various care services for children with ASD. The knowledge and attitude of parents regarding care services were classified into two levels according to Norman's assessment guidelines (2010) [13]:

- Inadequate knowledge/ Negative attitude: scoring <75% of overall
- Sufficient knowledge/ Positive attitude: scoring ≥75% of overall

To compare the average scores of knowledge and attitude toward care services for ASD children among parents. Independent T-test was employed to compare mean scores of knowledge and attitudes between two groups, and ANOVA test was applied to compare three or more groups. Statistical significance was established at $p < 0.05$.

RESEARCH ETHICS

This study was approved by Decision No. 6812/QĐ-ĐHYHN, issued by Hanoi Medical University on December 29, 2022, and was received approval by Certificate No. 162/HĐĐĐ-VKC, issued by the ethics committee on June 23, 2023. The research was conducted with the voluntary participation of parents after being fully informed about the purpose and content of the study. Data collection was approved by the institution directly responsible for the management, care and treatment of the children. All personal information of participants was encoded and maintained in strict confidentiality, and was utilized solely for research purposes.

RESULTS

Table 1 shows that the majority of parents in the study had insufficient knowledge about ASD, with only 24.6% demonstrating sufficient knowledge, which equates to nearly a quarter of participants. Over 90% of parents correctly identified ASD as a developmental disorder, the majority also mistakenly believed it to be a psychological problem, with only 31.4% answering this question correctly. Regarding signs of ASD, over half of the parents correctly answered questions related to identifying children with ASD through manifestations such as processing better visual input than auditory input (79.6%), hyperactive and inattentive (78.5%), delayed speech/language development (66.5%), did not show social attachment (63.9%) and reduced manifest physical pain (51.8%). In terms of future development for children with ASD, 84.8% and 75.9% of parents, respectively, understood that ASD cannot develop into schizophrenia and that children can attend university. However, when coming to treatment, only 31.9% of parents were aware that ASD cannot be cured, even with early diagnosis and intervention.

TABLE 1. PARENTS' KNOWLEDGE REGARDING AUTISM SPECTRUM DISORDER (N=191)

Contents	Participants with inadequate answers (n)	Rate of correct answers (%)
ASD is a developmental disorder	172	90.1
ASD is a psychological problem	60	31.4
ASD is caused by poor parenting skills or inadequate home care	149	78.0
Children with ASD often delayed speech and language development until the age of 3	127	66.5
It is normal for children from one to one-and-a-half-year-old to have already developed definite hand preference	115	60.2
Children with delayed speech often have accompanying hyperactivity and reduced concentration	150	78.5
Children with ASD can not show social attachments, with their parents	122	63.9
ASD does not manifest as physical pain	99	51.8
Children with ASD are deliberately negative and non-compliant	87	45.5
Children with ASD often process better visual input than auditory input	152	79.6
Children with ASD do not usually grow up to be adults with schizophrenia	162	84.8
All children with ASD will be able to pursue further education at the university level	145	75.9
ASD is not curable even with early diagnosis and appropriate intervention provided	61	31.9
It is important that children with ASD receive special education services at school	159	83.2
Inadequate general knowledge	47	24.6%

About 90% of parents had a positive attitude toward care services for children with ASD as demonstrated in Table 2. The majority of parents were supportive of the need for intervention programs for children with ASD (94.2%) and regular health check-ups (91.6%). Other services, such as one-on-one therapy or scheduled therapy sessions, attending intervention

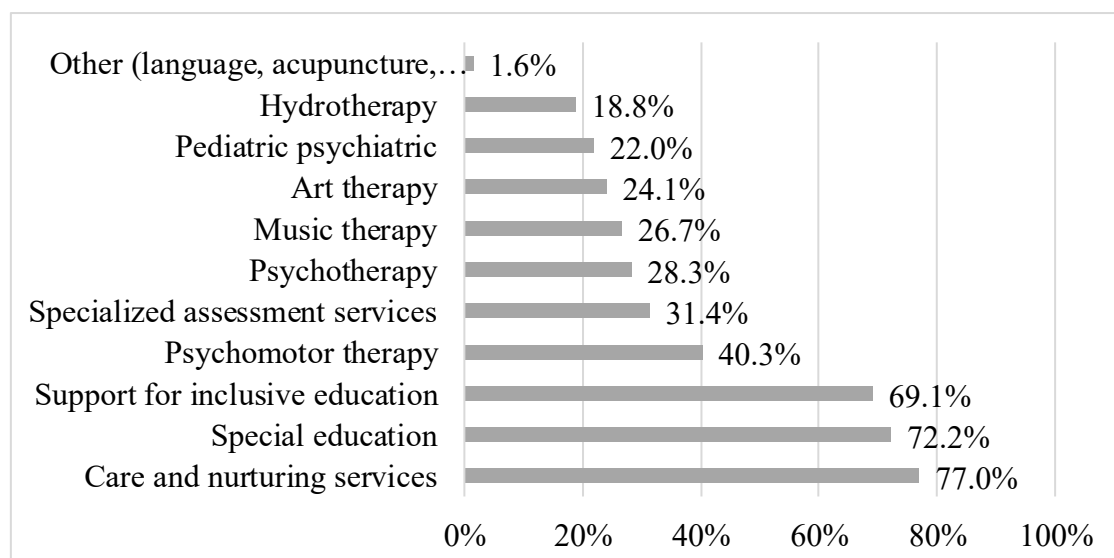
classes, studying at specialized centers or schools, and inclusive education were also well-supported by a significant portion of parents. Additionally, parents highly valued the importance of support from both family and society.

TABLE 2. PARENTS' ATTITUDE TOWARD CARE SERVICE FOR CHILDREN WITH AUTISM SPECTRUM DISORDER (N=191)

Contents	Participants with positive attitude(n)	Rate of participants with positive attitude (%)
Children diagnosed with ASD require interventions	180	94.2
Parents should schedule regular follow-up evaluations for their child to ensure timely and appropriate interventions	175	91.6
Children with ASD should receive one-on-one intervention sessions or participate in scheduled hourly sessions	168	88.0
Parents should attend intervention classes for children with ASD	164	85.9
Children with ASD should receive specialized education provided at dedicated centers or schools	160	83.8
Children with ASD should be encouraged to participate in inclusive education	157	82.2
Children with ASD should be integrated into mainstream school	134	70.2
Children with ASD should be started in kindergarten early	117	61.3
Partial financial assistance from social insurance is necessary for families with children with ASD	168	88.0
A government-provided intervention program for children with ASD is necessary	165	86.4
Parents should guide other family members regarding the intervention strategies for their child	165	86.4
Parents should observe instructional videos through mass media	147	77.0
Positive general attitude	169	88.5

Figure 1 revealed that care and nurturing services, special education, and support for inclusive education were the most frequently used services, with utilization rates of 77.0%, 72.2%, and 69.1%, respectively. In contrast, the regular utilization of other services was significantly lower, such as psychomotor therapy (40.3%), specialized assessment services (31.4%), and psychotherapy (28.3%). Hydrotherapy was the least used service, with a utilization rate of just 18.8%.

FIGURE 1. CARE SERVICE USAGE FREQUENCY (N=191)



In Table 3, our findings did not indicate significant differences between knowledge scores and general parental characteristics (including age, education level, monthly income, current care facility, and challenges in accessing services). However, notable discrepancies in knowledge and attitude scores were observed that were related to specific characteristics of the children. Parents of firstborn children diagnosed with the disorder exhibited an average knowledge score higher than those with a second child, who scored $8.90 \pm 1.91/14$. Parents of children assessed immediately after abnormalities were detected displayed a more positive attitude, scoring an average of $50.95 \pm 5.32/60$, surpassing the $48.62 \pm 7.35/60$ of parents who waited one month or more. These differences were statistically significant, with $p < 0.05$.

TABLE 3. DEMOGRAPHIC CHARACTERISTICS RELATED TO PARENTS' KNOWLEDGE AND ATTITUDE REGARDING HEALTHCARE SERVICES FOR CHILDREN WITH AUTISM SPECTRUM DISORDER (N=191)

Characteristics		Knowledge		Attitude	
		Mean±SD	p	Mean±SD	p
Characteristics of parents					
Age	<30 years old	9.09±2.33	0.745 ^a	49.27±8.95	0.809 ^a
	≥30 years old	9.23±1.84		49.64±6.34	
Level of education	<High school	8.85±1.91	0.468 ^a	49.69±5.12	0.483 ^a
	≥High school	9.24±1.89		49.59±6.77	
Monthly income	<10 million VND	8.87±2.60	0.489 ^a	48.83±7.27	0.555 ^a
	≥10 million VND	9.26±1.78		49.70±6.59	
Current care facility	Education facility	9.16±1.95	0.418 ^b	49.74±6.26	0.750 ^b
	Healthcare facility	8.57±1.51		47.86±5.93	
	Both	9.48±1.76		49.41±7.99	
Challenges in accessing services	Yes	9.31±1.62	0.475 ^a	48.83±7.30	0.112 ^a
	No	9.12±2.14		50.37±5.89	
Characteristics of the child					
Birth order	First-born	9.63±1.79	0.008 ^a	50.63±6.81	0.061 ^a
	Other	8.90±1.91		48.81±6.47	
Time of abnormality detection	<1 year old	9.26±1.81	0.099 ^b	48.89±7.31	0.396 ^b
	1-3 years old	9.33±1.81		49.96±6.81	
	>3 years old	8.38±2.40		48.05±4.38	
Time of diagnosis	Immediately	9.50±1.53	0.063 ^a	50.95±5.32	0.017 ^a
	After ≥1 month	9.01±2.10		48.62±7.35	
Time of initial intervention	Immediately	9.34±1.93	0.209 ^a	50.25±6.12	0.070 ^a
	After ≥1 month	8.99±1.82		48.43±7.43	
Improvement level	Not improved	9.40±2.07	0.825 ^a	53.00±5.39	0.248 ^a
	Improved	9.21±1.89		49.51±6.68	

^aT test; ^bANOVA test

DISCUSSION

Raising a child with autism spectrum disorder presents significant psychological challenges for parents, with a lack of knowledge being the initial problem they must overcome to take care of their child [6].

In our study, the majority of parents possessed only an average level of knowledge about ASD. Notably, only about one-fourth of the participants understood the disorder well. These findings were consistent with the study by Yaacob et al (2021), which reported that parents self-assessed their knowledge of ASD in the community as poor with nearly 50% of parents admitting to never seeking information about the said disorder. Even those who had heard of ASD did not delve deeper into understanding it until their child was diagnosed [6]. Wang F et al (2022) discovered that in China, the average

knowledge score about ASD among parents was 15 out of 20, with the highest score being 17 out of 20 [14]. Furthermore, a study conducted in Saudi Arabia in 2022 involving 500 adults revealed that over 80% of respondents had a moderate to high level of knowledge about ASD, with an average score of 20.6 out of 34 [15]. In Vietnam, Thai THP et al (2017) noted that mothers often lacked sufficient knowledge about ASD [16]. Collectively, these studies illustrate that parental knowledge of ASD was generally at an average level. Common gaps in parental understanding of ASD include misconceptions about the causes and prevalence of the disorder [14,15].

Regarding attitudes, a study in China in 2022 showed that nearly 70% of parents were optimistic about their child's prognosis. However, many admitted their lack of knowledge on how to approach behavioral issues associated with ASD [14]. Thai THP et al (2017) also observed that parents frequently felt sadness and fear that their child would struggle to integrate with peers, leading to social isolation and communication difficulties. Some parents even reported experiencing overwhelming stress due to their child's condition, with a minority expressing suicidal thoughts [16]. As a result, parents believed that ensuring their child receives the necessary care services were crucial for the child's health and the family's overall well-being. Although most parents in our study did not demonstrate a high level of knowledge about ASD, they generally held positive attitudes toward the importance of care services and the need for support from family and the community.

Previous studies had shown that demographic factors such as age, level of education, place of residence, and income are related to parents' knowledge and attitudes about ASD and the care services for affected children. Generally, parents with higher education, better income, and urban residency tend to have better knowledge and attitudes [6,14,17]. A study conducted by Yaacob et al in 2021 revealed that parents in rural areas remarkably rated their knowledge of ASD as poor [6]. Besides, Wang F et al. (2022) reported that mothers with higher education levels and better family income had a better understanding of ASD. Conversely, fathers' knowledge was inversely related to their age. Moreover, families with higher knowledge scores typically had a collective awareness of the disorder, often engaged in reading about ASD, or attended professional talks on the subject. Zhou M (2023) synthesized findings and concluded that knowledge of ASD positively correlates with educational attainment, the number of children with ASD in the community, and socio-economic status. Additionally, caregivers who received information directly from healthcare professionals rather than other sources had a better understanding of the disorder [17]. Thai THP et al (2017) also found that maternal age and education level were associated with psychological difficulties and attitudes when facing their child's ASD diagnosis ($p < 0.05$) [16].

However, some researchers have presented contrasting hypotheses. For instance, a study done by Hamad et al in 2022 found no significant correlation between parents' educational level and their knowledge about ASD [9]. In China, the longer the duration from diagnosis to access to services, the lower the parents' knowledge scores [14].

Our study did not find significant differences in parents' knowledge and attitudes based on demographic characteristics. The only factors that positively influenced average knowledge scores about ASD and attitudes toward care services were whether the child was the firstborn and if the child was diagnosed immediately after the detection of abnormalities. This difference may be attributed to our study's relatively small sample size. Furthermore, the study was primarily conducted at private care facilities, where parents using these services tend to have relatively similar education and income levels.

The findings of this study provide critical insights that can be applied to policy development, enhancing parental support initiatives, and advancing healthcare services for children with ASD. Given the identified gaps in parental knowledge, national awareness campaigns and structured educational programs should be implemented to improve understanding and reduce misconceptions. Policymakers should integrate autism-related healthcare services into public health infrastructure to ensure equitable access across both urban and rural areas. Additionally, healthcare facilities and special education centers can utilize these findings to develop tailored workshops that equip parents with essential skills for early intervention and caregiving. This study also highlights the necessity for future research to examine the long-term effects of parental education on ASD awareness and attitudes. Expanding investigations to rural regions and conducting

international comparisons would offer deeper insights into disparities in autism care. Furthermore, evaluating the effectiveness of digital training programs and remote support services could facilitate broader access to ASD-related resources. Moreover, we encourage further exploration of socioeconomic barriers that hinder access to ASD-related services, including financial constraints, insurance coverage limitations, and the adequacy of government assistance. Investigating the psychological impact on parents and families is equally vital for informing mental health policies and fostering community-based support networks. Such research will be instrumental in refining ASD services and strengthening support systems for affected families.

LIMITATIONS OF THE STUDY

There were some limitations to this study. The study was conducted exclusively at care and intervention centers for children with ASD within Hanoi. We encountered difficulties gaining access to these centers, resulting in only two public institutions agreeing to provide patient information, while three private centers were involved.

CONCLUSION

This study indicated most parents had a moderate level of knowledge about ASD, yet the majority display a positive attitude towards care services. Parents of first-born children and children who sought a diagnosis promptly after detecting abnormalities tend to have a higher level of knowledge and a more favorable attitude.

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PREVALENCE OF EMOTIONAL AND BEHAVIORAL DIFFICULTIES AND ASSOCIATED FACTORS AMONG ADOLESCENTS WITH DIVORCED OR SEPARATED PARENTS IN VIETNAM: A CROSS-SECTIONAL STUDY USING THE SDQ-25

Binh Thang Tran^{*1}, Minh Tu Nguyen², Thi Tra My Tran³, Vo Nu Hong Duc¹, Thi Dang Thu Nguyen¹, Uyen Phuong Ho¹, Thi Thu Tham Luong⁴, Thu Ha Pham Thi¹, Thuy Duong Ho Thi¹

1. Faculty of Public Health, University of Medicine and Pharmacy, Hue University, Hue, Vietnam
2. Undergraduate Training Office, University of Medicine and Pharmacy, Hue University, Hue, Vietnam
3. Department of Psychiatry, University of Medicine and Pharmacy, Hue University, Hue, Vietnam
4. Daklak Provincial Centre for Disease Control, Daklak, Vietnam

Correspondence: tranbinhthang@hueuni.edu.vn

ABSTRACT

OBJECTIVES:

This study evaluates the prevalence of emotional and behavioral difficulties, using the SDQ-25 self-report version and identifies factors associated with these difficulties, among adolescents in urban Vietnam with divorced or separated parents.

METHODS:

We conducted a cross-sectional study with 309 participants, collecting data through a self-administered questionnaire featuring the SDQ-25 self-report version for assessing emotional and behavioral difficulties.

RESULTS:

Findings indicated that 17.5% of students experienced emotional and behavioral difficulties. Among them, 15.2% had both emotional symptoms and peer issues, while 14.9% faced conduct problems, 12.3% showed prosocial behavior, and 9.4% experienced hyperactivity/inattention. Multivariable logistic regression showed that the duration since parental divorce or separation (OR = 4.34; 95% CI: 1.37 - 13.75; $p = 0.013$) and involvement in physical fights (OR = 2.58; 95% CI: 1.00 - 6.64; $p = 0.049$) were significant predictors of mental health issues in these adolescents.

CONCLUSIONS:

The study found a notable prevalence of emotional and behavioral difficulties among adolescents from divorced or separated families, who face a higher risk of these disorders. The length of time since parental divorce or separation and engagement in physical fights were identified as significant predictors of these issues.

KEYWORDS

emotional; behavioral difficulties; adolescents; divorced; separated

INTRODUCTION

Adolescence is a critical period characterized by significant emotional and behavioral development. Family structure, parental support, and interactions within the family play a crucial role in shaping these developmental outcomes [1]. Adolescents who experience adverse childhood events, such as parental separation or divorce, are at a higher risk of facing emotional and behavioral difficulties. These challenges can impact various aspects of their lives, including social, educational, and overall well-being, and may persist into adulthood [2]. Such difficulties can manifest as internalizing problems like anxiety and depression, or externalizing problems such as aggression, delinquency, and an increased vulnerability to substance use disorders or suicidal ideation in severe cases. Numerous studies have also highlighted the rise of mental health disorders, particularly emotional and behavioral issues, in children from divorced or separated families [3]. For instance, some research indicates a higher prevalence of Attention Deficit Hyperactivity Disorder (ADHD) diagnoses among children from divorced families; literature, such as Teke et al. (2015), suggests that parental divorce may act as a significant environmental stressor that can exacerbate or interact with predisposing factors to increase the risk or severity of ADHD symptoms [4]. A recent study conducted in Vietnam found that 4.6% of school students exhibited symptoms of ADHD [5]. However, there is limited data on the mental health of students from disadvantaged backgrounds in Vietnamese contexts.

The rate of marital separation or divorce among individuals aged 15 and older in Vietnam has risen from 2.06% in 2019 to 2.8% in 2024 [6]. This rise can be linked to several factors, such as lifestyle conflicts, infidelity, financial problems, domestic violence, and a transition from traditional to more modern and liberal societal norms [7].

Despite this growing concern, no studies in Vietnam have specifically measured the behavioral and emotional difficulties of adolescents with divorced or separated parents. This study aims to fill this gap by providing additional scientific evidence regarding the mental health issues faced by adolescents, particularly those with special needs circumstances. The Strengths and Difficulties Questionnaire is a leading tool for screening behavioral and emotional disorders, and it can be self-administered by teachers, parents, or students [8]. The Strengths and Difficulties Questionnaire (SDQ-25) was selected for this study due to its brevity, comprehensive assessment of emotional symptoms, conduct problems, hyperactivity/inattention, peer problems, and prosocial behavior, robust psychometric properties, established use in adolescent populations, and specific validation in Vietnam, rendering it a highly suitable instrument for our research objectives. Therefore, this study aimed to evaluate the prevalence of emotional and behavioral difficulties using the SDQ-25 self-report version and identify factors associated with adolescents who have divorced or separated parents in urban Vietnam.

METHODS

STUDY DESIGN

This is a cross-sectional study.

SETTING

This study was conducted at two secondary schools and two high schools in an urban central region of Vietnam, characterized by traditional social norms.

Data was collected in October 2022.

PARTICIPANTS

The target population consisted of students attending middle schools (grades 6-9) and high schools (grades 10-12, aged 17) who lived in families with divorced or separated parents. The selection criteria for students included attending schools within the research area, being available during data collection, agreeing to participate in the study, and obtaining consent from their legal guardians. Students were excluded if they had acute or severe health conditions (e.g., a

significant illness requiring absence from school or a known cognitive impairment) that, in the assessment of school staff or via student self-report, would prevent them from meaningfully participating in the survey and completing the questionnaire.

VARIABLES AND MEASUREMENTS

Independent variables included demographics, socioeconomic information, and behavioral characteristics.

Demographic - Socioeconomic information (students and parents): Students (age, gender, household economic status, previous academic performance (below average, adequate/good, excellent); order of birth in the family; living arrangements), Parents (highest education level, occupation, and duration since divorce or separation).

Behavioral characteristics include smoking (measured over the past 30 days based on the number of days smoked), alcohol consumption (measured over the past 30 days and assessed based on the number of days consumed), physical activity (measured over the past 7 days based on the number of days engaged in at least 60 minutes of activity per day, encompassing days of walking or biking to school or home, days with physical education classes, and days participating in sports).

Bullying (measured over the past 30 days and assessed based on the number of days bullied), the experience of violence (measured within the past 12 months and assessed based on the number of instances of violence experienced), and fighting (measured within the past 12 months and assessed based on the number of times engaged in fighting).

Dependent variable: The Strengths and Difficulties Questionnaire is a 25-item (SDQ-25) measure designed to assess behaviors, emotions, and relationships over the last six months in children and young people aged 4–17 years. There are versions of assessment by parents, teachers, and students [9]. In this study, the self-report version of the SDQ-25, which is appropriate for adolescents typically aged 11–17 years, was used for evaluation. It assesses five aspects of *emotional symptoms* (often complains of headaches, stomach-ache or sickness; many worries, often seems worried; often unhappy, down-hearted, or tearful; nervous or clingy in new situations, easily loses confidence; many fears, easily scared), *conduct problems* (often has temper tantrums or hot tempers; generally obedient, usually does what adults request; often fights with other children or bullies them; often lies or cheats; steals from home, school, or elsewhere), *hyperactivity/inattention* (restless, overactive, cannot stay still for long; constantly fidgeting or squirming; easily distracted, concentration wanders; thinks things out before acting; sees tasks through to the end, good attention span), *peer problems* (rather solitary, tends to play alone; has at least one good friend; generally liked by other children; picked on or bullied by other children; gets on better with adults than with other children), and *prosocial behavior* (considerate of other people's feelings; shares readily with other children; helpful if someone is hurt, upset, or feeling ill; kind to younger children; often volunteers to help others). The SDQ-25 has been validated among youth in Vietnam [10] and is widely used in Vietnam [11]. In this study, the students' version was used for evaluation.

Each item is scored as follows: 0 = Not True, 1 = Somewhat True, and 2 = Certainly True. For questions 7, 11, 14, 21, and 25, the corresponding scores were reversed: 2 = 'Certainly True, 1 = 'Somewhat True, 0 = 'Not True.' The overall (five-subscale) SDQ score ranges from 0 to 50, with higher scores indicating abnormal behaviors (mental disorders). Regarding classification, the SDQ-25 was categorized according to each aspect: (1) Normal: No difficulty encountered; (2) borderline, doublet, uncertainty; and (3) Abnormal: Difficulty.

SAMPLE SIZE

This study was part of a project on mental health among the youth [12]. In summary, all selected students from the four schools were invited to participate in this survey. A total of 309 students were included in the final analysis. The study participants and their guardians were informed about the purpose and content of the research.

STATISTICAL METHODS

Data are presented as frequency tables and percentages for categorical variables, along with means and standard deviations for continuous data. Univariable analyses were conducted to explore the association between each independent variable and the presence of emotional/behavioral difficulties (dichotomized SDQ total score). Categorical variables were assessed using chi-square tests or Fisher's exact tests as appropriate. All variables with a significance level ($p < 0.05$) in the univariable analysis were subsequently included in the multivariable logistic regression model. Multivariable logistic regression models were employed to identify factors associated with mental difficulties and their subscales.

ETHICAL CONSIDERATIONS

The research was approved by the Ethics Council in Biomedical Research of the University of Medicine and Pharmacy, University of Hue (approval number: H2021/424).

RESULTS

In this study, the average age of 309 participants was 14.8 ± 1.9 years, with boys making up 56.6% of the sample. Over three-quarters of the participants demonstrated good or high academic performance. More than half were categorized as having poor, near-poverty, or average financial conditions. Parental education levels were relatively high, with more than 50% having received education beyond high school. Concerning birth order in the family, most participants were either the youngest or oldest children. Following parental divorce or separation, the majority of participants lived with their mothers. This is well-presented in our first paper, which was published elsewhere [12].

Table 1 illustrates the proportion of difficulties by gender and educational level. The overall percentage of students experiencing difficulties was 17.5%, with 15.4% being boys and 20.1% being girls. This rate was higher among secondary school students (18.4%) compared to high school students (16.3%). When examining this rate across various aspects of the SDQ-25 scale, emotional symptoms and peer problems had the highest rates (15.2%), followed by conduct problems (14.9%). In contrast, only 12.3% and 9.4% of the students exhibited prosocial behavior and hyperactivity/inattention respectively.

TABLE 1 BEHAVIORAL, EMOTIONAL ISSUES BY GENDER AND EDUCATIONAL LEVEL

	Total	Sex		Educational level	
	n=309	Male n=175	Female n=134	Junior High School n=174	High School n=135
Total: mental disorder		0.305		0.723	
Normal	161 (52.1)	92 (52.6)	69 (51.5)	88 (50.6)	73 (54.1)
Threshold	94 (30.4)	56 (32.0)	38 (28.4)	54 (31.0)	40 (29.6)
Abnormal	54 (17.5)	27 (15.4)	27 (20.1)	32 (18.4)	22 (16.3)
Means $\pm$ SD	15.4 (4.9)	15.0 (4.7)	15.8 (5.1)	15.2 (5.3)	15.6 (4.3)
Emotional symptoms		< 0.001		0.087	
Normal	223 (72.2)	138 (78.9)	85 (63.4)	123 (70.7)	100 (74.1)
Threshold	39 (12.6)	21 (12.0)	18 (13.4)	27 (15.5)	12 (8.9)

Abnormal	47 (15.2)	16 (9.1)	31 (23.1)	24 (13.8)	23 (17.0)
Means±SD	4.3 (2.3)	3.8 (2.2)	4.9 (2.4)	4.1 (2.4)	4.4 (2.3)
Conduct problems	0.247		0.027		
Normal	215 (69.6)	117 (66.9)	98 (73.1)	129 (74.1)	86 (63.7)
Threshold	48 (15.5)	31 (17.7)	17 (12.7)	21 (12.1)	27 (20.0)
Abnormal	46 (14.9)	27 (15.4)	19 (14.2)	24 (13.8)	22 (16.3)
Means±SD	3.1 (1.5)	3.2 (1.3)	3.0 (1.6)	3.0 (1.4)	3.2 (1.5)
Hyperactivity	0.957		0.020		
Normal	233 (75.4)	131 (74.9)	102 (76.1)	130 (74.8)	103 (76.3)
Threshold	47 (15.2)	27 (15.4)	20 (14.9)	22 (12.6)	25 (18.5)
Abnormal	29 (9.4)	17 (9.7)	12 (9.0)	22 (12.6)	7 (5.2)
Means±SD	4.3 (1.8)	4.4 (1.9)	4.3 (1.6)	4.3 (1.9)	4.3 (1.5)
Peer problems	0.059		0.068		
Normal	154 (49.8)	82 (46.9)	72 (53.7)	90 (51.7)	64 (47.4)
Threshold	108 (35.0)	70 (40.0)	38 (28.4)	53 (30.5)	55 (40.7)
Abnormal	47 (15.2)	23 (13.1)	24 (17.9)	31 (17.8)	16 (11.9)
Means±SD	3.7 (1.6)	3.7 (1.6)	3.6 (1.6)	3.7 (1.8)	3.6 (1.4)
Prosocial behavior	0.020		0.585		
Normal	216 (69.9)	115 (65.7)	101 (75.4)	120 (69.0)	96 (71.1)
Threshold	55 (17.8)	33 (18.9)	22 (16.4)	30 (17.2)	25 (18.5)
Abnormal	38 (12.3)	27 (15.4)	11 (8.2)	24 (13.8)	14 (10.4)
Means±SD	6.5 (2.0)	6.2 (2.0)	6.9 (2.0)	6.5 (2.0)	6.5 (2.1)

Compared to gender, emotional symptoms and peer problems were more prevalent among girls, whereas prosocial behavior was more evident among boys. Observations by school stage indicated that the rates of emotional symptoms and conduct problems were high among high school students. In contrast, the rates for hyperactivity or inattention, peer problems, and prosocial behavior were found to be elevated among elementary school students (Table 1).

Table 2 lists the factors associated with these difficulties. The factors linked to difficulties included a time interval since parental divorce or separation exceeding 5 years, which was 4.34 times more likely to correlate with difficulties compared to a shorter interval (1-4 years), with a 95% confidence interval of 1.37–13.75. Students involved in fighting had a 2.58 times

higher likelihood of experiencing difficulties compared to those not engaged in physical fighting, with a 95% confidence interval of 1.00–6.64. No statistically significant associations were found with the other factors.

TABLE 2 MULTIVARIABLE LOGISTIC REGRESSION MODELS IDENTIFYING PREDICTORS OF BEHAVIORAL, EMOTIONAL DIFFICULTIES

Variables	Total	
	OR, 95%CI	p
Sex (ref=male) Female	0.99 (0.60-1.62)	0.954
Financial condition (ref= Relatively wealthy/rich) Poor/close to poverty/average	1.27 (0.77-2.11)	0.356
Educational level (ref=Junior High School) High School	1.08 (0.64-1.84)	0.773
Academic performance (ref=Good)		
Average	1.68 (0.88-3.18)	0.114
Excellent/Outstanding	1.65 (0.93-2.93)	0.089
Occupation of the mother (ref= Officer/Civil Servant/Public Servant)		
Homemaker	0.92 (0.50-1.68)	0.775
Trading	1.40 (0.73-2.68)	0.317
Occupation of the father (ref= Trading)		
Officer/Civil Servant/Public Servant	0.80 (0.37-1.76)	0.584
Homemaker	1.38 (0.72-2.63)	0.331
Birth order in the family (ref= Oldest child)		
Firstborn	0.95 (0.48-1.87)	0.887
Middle child	1.06 (0.47-2.39)	0.883
Youngest child	0.76 (0.38-1.51)	0.428
Divorce time (ref=5 years)		
1 to 4 years	1.49 (0.67-3.31)	0.331
>=5 years	4.34 (1.37-13.75)	0.013
Currently living with (ref=Mother) Father	1.27 (0.76-2.12)	0.366
Smoking (ref=Yes) No	2.14 (0.91-5.00)	0.081
Alcohol (ref=No) Yes	1.11 (0.64-1.93)	0.714
Getting into a fight (ref=No) Yes	2.58 (1.00-6.64)	0.049
Physical activities (ref=No) Yes	0.84 (0.49-1.45)	0.534

DISCUSSION

This study assessed the prevalence of emotional and behavioral difficulties among adolescents with divorced or separated parents in Vietnam, utilizing the SDQ-25. We discovered that 17.5% of the students displayed abnormal mental health scores, with variations based on gender and educational level. Furthermore, students who had been separated from one parent for over five years and those engaged in physical fights were at a higher risk for behavioral and emotional challenges.

The prevalence of emotional and behavioral difficulties observed in our study (17.5%) aligns closely with the 17.6% reported by Bui (2019) in another Vietnamese city [13], suggesting that these challenges may be widespread across different urban settings. Additionally, our findings are notably higher than the 13.4% reported by UNICEF but lower than those reported in a study in the north-central region of Vietnam [14, 15]. These differences may be due to variations in the study populations. Our focus on children of divorced or separated parents likely highlights a more vulnerable group compared to the general adolescent population in these other studies. When compared to other countries, our study's prevalence aligns with findings from Denmark, where 17.9% and 18.2% of children experiencing parental separation with sole physical custody, whether with or without a new partner, reported high SDQ scores [16]. This indicates that the emotional and behavioral challenges observed in our study were similar to those faced by comparable populations in other countries.

In our study, girls reported higher levels of emotional symptoms and peer problems, while boys exhibited greater prosocial behaviors and hyperactivity/inattention issues. These findings align with previous research; for instance, a study conducted in the Netherlands indicated that boys scored higher than girls in hyperactivity, and a larger number of boys fell into the clinical range for prosocial behavior [17]. Such gender differences suggest that mental health interventions should be specifically tailored to address the unique emotional and behavioral challenges faced by boys and girls. Additionally, differences in SDQ assessment scores were noted across educational levels. Specifically, junior high school students exhibited higher total SDQ scores compared to high school students, particularly concerning emotional symptoms, hyperactivity, and prosocial problems. However, the UNICEF report indicated that students with higher educational levels faced more difficulties than those with lower educational levels [15]. These findings highlight the necessity of personalized mental health support tailored to educational stages.

This study identified several factors linked to emotional and behavioral problems in adolescents from divorced or separated families. We found that the time since parental divorce or separation, specifically five years or more, and adolescents who engaged in fighting were significantly related to mental health disorders. ($p < 0.05$).

Furthermore, one of the key findings indicated that adolescents separated from one parent for more than five years were significantly more likely to experience emotional and behavioral issues, with an odds ratio (OR) of 4.34 and a 95% confidence interval (CI) of 1.37-12.75. This aligns with research conducted by Angelika H. Claussen, which found a similar association (OR = 4.84; 95% CI: 2.22-10.56) [18]. Before parental divorce, children may be exposed to chaotic situations within the family and inappropriate parental behaviors during the divorce process. After the divorce, children may be affected by maltreatment and lack of emotional attention from their parents for the long term. These events may cause chronic stress among these children and contribute to the high rate of depression [4]. Another study by Aniruddh Prakash Behere also provided insights into children from single-parent or divorced families who were more likely to exhibit ADHD compared to those from other family structures [19]. Additionally, long-term separation may result in inconsistent parenting, inadequate supervision, and diminished emotional support, all of which are crucial factors in the development of ADHD [20]. The depression among children whose parents are divorced may persist into adulthood and cause long-term effects on their mental health, with no publications in more recent decades for the mitigation of these issues [21].

When it comes to physical violence, our findings indicate that students who engage in fighting are 2.83 times more likely to experience peer problems, compared to others (OR=2.83; 95% CI: 1.05-7.65). Therefore, fighting can be viewed as a form of physical violence that leads to poor relationships with peers in school environments. Additionally, a study

conducted in the United States demonstrated that both being bullied and engaging in bullying behaviors among U.S. youth are linked to unhealthy relationships with classmates and heightened feelings of loneliness [22]. Furthermore, these destructive behaviors impact those involved and those who witness them. [23]. There is a link between aggressive behaviors and social psychological stress in adolescents, according to a ten-year period trend analysis. [24], and the consequences of bullying can reduce the degree of satisfaction in life and the support from friends/teachers in school [25].

These findings enhance existing literature on the negative influences impacting mental health in disadvantaged groups. Furthermore, the insights from this research will guide future initiatives aimed at improving the well-being of adolescents. This involves tackling the obstacles and difficulties encountered by children following parental separation or divorce, covering both custodial and non-custodial parents. The results highlight the necessity of fortifying family roles and incorporating school-based programs and services to alleviate these challenges and enhance mental health outcomes for this at-risk population.

LIMITATIONS

Our study faced certain limitations. Firstly, it solely concentrated on students, omitting assessments from teachers and parents with the SDQ-25, which could have offered a broader perspective on mental and behavioral disorders. Furthermore, we did not take into account the impact of COVID-19, as it could have led to considerable variance and bias in the self-reported data. Despite these limitations, our findings are significant for intervention programs in Vietnamese middle and high schools, given that other countries share similar contexts.

CONCLUSIONS

The study found a notable prevalence of emotional and behavioral difficulties among adolescents from divorced or separated families, who face a higher risk of these disorders, with 17.5% abnormal. Based on the multivariable logistic regression models, the length of time since parental divorce or separation greater than or equal to 5 years and engagement in physical fights were identified as significant predictors of these issues. In particular, regarding gender, a higher prevalence of emotional symptoms was found in females, whereas male students demonstrated a greater rate of prosocial behavior. Referring to educational level, high school students (grades 10-12) demonstrated more conduct issues, while secondary school students showed greater rates of hyperactivity. Further school programs addressed to the needs of students from broken families are essential to alleviate these challenges in this population.

Declarations -

Consent for publication:

Not applicable.

Competing interest:

The authors declare they have no competing interests.

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ARE MEDICAL STUDENTS FAMILIAR WITH PATIENT SAFETY CULTURE? A CROSS-SECTIONAL STUDY IN TÜRKİYE

Yasemin Aslan^{*1}, Orhan Zengin², Ayşegül Karaca Dedeoğlu³, Cenk Hilmi Kılıç⁴

1. Healthcare Management, Faculty of Health Sciences, Bandırma Onyedi Eylül University, Türkiye

2. Healthcare Management, Faculty of Health Sciences, Marmara University, Türkiye

3. Healthcare Management, Faculty of Health Sciences, Karabük University, Türkiye

4. Koşuyolu High Specialization Education and Research Hospital, Türkiye

Correspondence: yaseminaslan@bandirma.edu.tr

ABSTRACT

BACKGROUND:

Patient safety is a key indicator of healthcare quality. The purpose of this study is to evaluate the attitudes of medical students towards patient safety culture.

METHODS:

The population of the study, which was designed as descriptive and cross-sectional, consisted of 369 fourth, fifth-, and sixth-year students studying at Karabük University Faculty of Medicine. The sample consisted of 264 students who volunteered to participate in the study. Data were collected using a descriptive information form and the Medical Faculty Students' Attitude Scale Towards Patient Safety Culture. Data were analyzed using descriptive statistics and SPSS.

RESULTS:

Most of the students stated that they did not receive any training regarding patient safety. It was determined that the sub-dimensions with the highest mean scores regarding the patient safety culture attitude of medical faculty students were working hours (87.98(±17.64)) and teamwork (83.74(±13.69)) as the cause of error. It was also found that the lowest mean score was in the sub-dimension (31.33(±22.77)) related to those who saw professional incompetence as the reason for the mistake. In addition, it was found that students had positive attitudes regarding the sub-dimensions of working hours, teamwork, the role of the patient in the error, and the importance of patient safety in the curriculum as reasons for errors.

CONCLUSION:

Providing patient safety culture training to medical students before and during clinical practice, improving physicians' working hours, promoting teamwork, and involving patients in the care process may positively influence students' attitudes toward patient safety culture.

KEYWORDS

patient safety culture, attitude, medical students, medical error, patient safety

INTRODUCTION

Healthcare is one of the most critical sectors in terms of safety due to the life-threatening consequences of errors and system failures. Therefore, patient safety is considered a fundamental component of healthcare quality [1]. The World Health Organization (WHO) defines patient safety as the prevention or minimization of errors and risks associated with healthcare services that impact patients [2]. The WHO states that no one should be harmed while receiving healthcare services, yet there is clear evidence that globally, preventable patient harm is at high levels across both developed and developing country's healthcare systems. It has emphasized that this situation has significant human, moral, ethical, and financial consequences [2]. Among the most common adverse events are patient falls, medication errors, pressure ulcers, nosocomial infections, retained foreign objects, transfusion-related errors, wrong-site surgeries, diagnostic errors, and delays in treatment [3-5]. Medical errors are estimated to be among the most common causes of death in the United States [6].

When evaluating the causes of adverse events, it has been emphasized that there are numerous and interrelated factors that can lead to patient harm. These can be categorized as system and organization-related causes, technology-related factors, human and behavioral factors, patient-related causes, and external elements [2,7-11]. In the WHO Global Patient Safety Action Plan 2021-2030, it is stated that to implement patient safety initiatives comprehensively, efforts should be made to engage key stakeholders globally to reduce preventable harm from unsafe healthcare to the highest possible level and to ensure that all patients everywhere receive safe and respectful care. To achieve this, it is important to adopt effective leadership that prioritizes a culture of patient safety, creates a safe working environment, and ensures the safety of clinical processes. Additionally, it is important to improve communication and teamwork, involve patients and their families in policy development, research, and shared decision-making, and establish reporting systems for patient safety incidents to promote learning and continuous improvement [1].

Establishing a positive patient safety culture is one effective way to prevent adverse events, as it promotes the improvement of safety processes and outcomes. The patient safety culture of an organization is often shaped by senior management. Leaders have the potential to promote a fair and positive patient safety culture in their institutions [3]. All staff members play a critical role in fostering a culture of patient safety. Studies indicate that a positive patient safety culture is associated with fewer errors [12-14]. A positive organizational culture is linked to greater employee engagement in incident reporting, improved patient safety, and reduced mortality rates [15]. Studies conducted in Türkiye indicate that the patient safety culture has not yet been fully established, that there is insufficient reliable data on this issue, that errors harming patients are concealed, and that a large portion of medical errors are preventable [16,17].

Improving patient safety practices requires fundamental cultural change in healthcare. Two key elements of this cultural shift were identified as the early integration of patient safety practices into educational curricula and the provision of safety training for medical residents [18]. Evaluating the attitudes of medical students toward patient safety is considered essential to ensuring a proactive and effective strategy for identifying and preventing medical errors [19]. Studies highlight the importance of integrating undergraduate education that focuses on strategies for preventing medical errors, particularly for soon-to-be graduate physicians [20,21]. A study conducted in Iran to evaluate students' perceptions of patient safety and their knowledge and attitudes towards patient safety education found that only half of the students had a good level of knowledge about patient safety. The study also indicated that significant relationships exist between students' attitudes towards patient safety and their years of study, gender, and education status, and suggested incorporating patient safety into the medical education curriculum [22]. This situation highlights a common gap in pre-graduation programs, which primarily emphasize medical knowledge, technical skills, and clinical decision-making experience, while often neglecting non-technical and professional competencies such as teamwork, leadership, human factors, and risk management. In addition, recent years have seen several accreditation bodies emphasizing the urgent need to prioritize patient safety education for students in the health sciences [23,24].

Today, many medical schools have integrated patient safety education into their curricula [24]. The WHO has developed a reference curriculum for patient safety for medical students. Key topics of this curriculum include: defining patient safety, the importance of human factors in patient safety, the impact of systems and complexity on patient care, the importance of being an effective team player, understanding and learning from errors, understanding and managing clinical risks, knowledge of quality improvement methods, involving patients and caregivers in care and decision-making processes, and the importance of patient safety in interventional procedures, infection control practices, and patient safety [25]. Understanding the patient safety culture is crucial for medical students because it directly affects how they approach patient safety matters in their future practice [26]. In Türkiye, there are limited studies assessing medical students' perceptions of patient safety culture. This study aims to determine the attitudes of fourth, fifth, and sixth year medical students towards patient safety culture and to make recommendations based on the findings. The research questions for this study are as follows:

1. What is the status of medical students' education regarding patient safety?
2. Is there a significant difference between participants' descriptive characteristics and their attitudes towards patient safety culture?
3. Is there a relationship between participants' age and their status of receiving patient safety education with their attitudes towards patient safety culture?
4. Is there a significant relationship among the sub-dimensions of the patient safety culture attitude scale among medical students?

METHODS

POPULATION AND SAMPLE

The study was conducted at Karabük University Faculty of Medicine during the Fall semester of the 2023-2024 academic year, with a population comprised of 369 students: 128 from the fourth year, 149 from the fifth year, and 92 from the sixth year students. The sample included 264 students who volunteered to participate: 91 from the fourth year, 113 from the fifth year, and 48 from the sixth year students (71%, 76%, and 52% of the population respectively). According to calculations using Epi Info 7 statistical software, a sample size of 188 students—65 from the fourth year, 76 from the fifth year, and 47 from the sixth year—was deemed sufficient based on a 95% confidence level and a 5% margin of error. However, a larger number of responses were collected, and after excluding 12 surveys as outliers during data analysis, the final sample consisted of 252 students.

The reason for excluding students from the preparatory, first, second, and third years was based on expert opinions from faculty members, who indicated that these students had not yet reached a level of clinical experience and knowledge to provide meaningful input on patient safety.

DATA COLLECTION AND TECHNIQUE

In the study, data were collected through face-to-face interviews using a descriptive information form and the Medical Students' Attitudes Towards Patient Safety Culture Scale. The descriptive information form, prepared by the researchers, consisting of 6 questions, which includes participants' sociodemographic characteristics and whether they have received any education on patient safety during their training. The Medical Students' Attitudes Towards Patient Safety Culture Scale, developed by Carruthers et al. [27], was adapted into Turkish by Torun et al. [28]. The original survey's Cronbach Alpha value was reported as 0.73. The scale, designed on a 5-point Likert type questionnaire, includes nine factors and a total of 24 items as follows: patient safety training received to date (3 items), error inevitability (3 items), error reporting confidence (3 items), professional incompetence as error cause (3 items), team functioning (2 items), working hours as error cause (3 items), patient's role in error (2 items), importance of patient safety in the curriculum (2 items), and disclosure responsibility (3 items). The possible total score ranges from 24 to 120, with higher scores indicating a more positive attitude. To standardize the total and subscale scores on a 0–100 scale, the following formula can be used:

New Score = (Score - Minimum) × 100 / (Maximum - Minimum). The data collection period was from October 15 to December 31, 2023.

INCLUSION CRITERIA

- Enrolled at Karabük University Faculty of Medicine
- A fourth, fifth, or sixth year medical student
- Willingness to participate in the study

DATA ANALYSIS

In the study, descriptive statistics and the statistical programs R and Epi Info 7 were used to analyze the research data obtained from the survey application. Categorical data were presented as counts and percentages, while numerical data were analyzed using the mean ± standard deviation (Mean ± SD), depending on the normality of the distribution. The overall reliability coefficient of the scale, measured by Cronbach's Alpha, is provided in Table 2. Prior to the data analysis, outlier analysis was conducted using a Q-Q Plot to assess the normality of the data distribution, and 12 surveys with outliers were excluded from the study.

Before analyzing the data obtained in the study, normality of distribution was assessed based on skewness and kurtosis coefficients, as well as Q-Q Plots and histogram graphs. Skewness and kurtosis coefficients were calculated by dividing the Statistic value by the Std error value, with coefficients expected to fall within the ±2.58 range at a 99% confidence interval [29]. Accordingly, the skewness and kurtosis values for the sub-dimensions of the scale were seen Table 1.

TABLE 1. THE SKEWNESS AND KURTOSIS VALUES FOR THE SUB-DIMENSIONS OF THE SCALE

Sub-Dimension	Skewness	Kurtosis
Patient Safety Training Received to Date	-0.531	0.177
Error Reporting Confidence	-0.688	0.180
Working Hours as Error Cause	-0.843	0.564
Error Inevitability	-0.419	0.297
Professional Incompetence as Error Cause	0.522	0.139
Disclosure Responsibility	0.533	0.971
Team Functioning	-0.855	0.268
Patient's Role in Error	-0.795	0.028
Importance of Patient Safety in the Curriculum	-0.630	0.562

These values indicate that the data followed a normal distribution. Statistical significance was considered at $p < 0.05$. The relationships between measurement variables were assessed using Pearson correlation tests, independent two-group comparisons were conducted using the t-test, and comparisons among three or more groups were performed using Analysis of Variance (One-Way ANOVA). Tukey post-hoc tests were used to identify the sources of differences among groups.

CONFIDENTIALITY AND ETHICAL ISSUES

Ethical approval for the study was obtained from the Ethics Committee for Non-Interventional Research at Bandırma Onyedi Eylül University Health Sciences (date: September 20, 2023; number: 2023-7/125). Written permission was also obtained from the Rectorate of the university where the study was conducted (date: October 9, 2023; number: 282483/E-78436549-730.08.03-284697). Permission for the scale used in the study was acquired via email. Written informed consent was obtained from the participants after they were provided with information about the study. All research-related

information was kept confidential, and participants had the right to withdraw from the study at any point during the research process.

RESULTS

This study investigates the current state of patient safety education among medical students and its relationship with their attitudes toward patient safety culture. It also examines potential differences based on participants' demographic characteristics and explores correlations among the sub-dimensions of the Patient Safety Culture Attitude Scale.

Table 2 presents the distribution of students' scores by age and scale sub-dimensions, as well as the Cronbach's alpha values. The average age of the study participants was 23.08 (± 1.55). When examining the score distribution of scale sub-dimensions, it was found that the lowest average score (31.33 ± 22.77) was related to perceptions of professional incompetence as error cause, while the highest average scores were attributed to perceptions of working hours as error cause (87.98 ± 17.64) and teamwork-related sub-dimension (83.74 ± 13.69). In the study, students were found to have a positive attitude towards the four dimensions of the patient safety culture scale: "working hours as error cause", "team functioning", "patient's role in error", and "importance of patient safety in the curriculum".

TABLE 2. SCORE AND CRONBACH ALPHA DISTRIBUTION OF PARTICIPANTS ON AGE AND SCALE SUB-DIMENSIONS

Variable	$\bar{x} \pm SS$	Min./Max.	Cronbach alpha
Age	23.08 $\pm$ 1.55	21-29	
Patient Safety Training Received to Date	59.47 $\pm$ 23.50	0-100	0.836
Error Reporting Confidence	66.78 $\pm$ 24.13	0-100	0.859
Working Hours as Error Cause	87.98 $\pm$ 17.64	0-100	0.777
Error Inevitability	59.84 $\pm$ 13.69	8-100	0.752
Professional Incompetence as Error Cause	31.33 $\pm$ 22.77	0-100	0.815
Disclosure Responsibility	45.27 $\pm$ 16.63	0-100	0.717
Team Functioning	83.74 $\pm$ 19.21	0-100	0.877
Patient's Role in Error	79.42 $\pm$ 20.23	0-100	0.780
Importance of Patient Safety in the Curriculum	81.07 $\pm$ 20.48	0-100	0.907

The sociodemographic characteristics of the participants and their responses to statements regarding patient safety are shown in Table 3. It was found that 57.5% of the participants were female, 98.9% were single, and 44.8% were fourth-year students. 77.4% of the students stated that they had not previously attended any training on patient safety within the scope of the course, and 85.3% stated that they did not receive any training on patient safety at the institution where they did their internship period.

TABLE 3. DISTRIBUTION OF PARTICIPANTS' SOCIODEMOGRAPHIC CHARACTERISTICS AND RESPONSES TO STATEMENTS REGARDING PATIENT SAFETY

Variable		Frequency	Percentage
Gender	Female	145	57.5
	Male	107	42.5
Marrital status	Married	3	1.2
	Single	249	98.8
Family income	Income is less than expenses	26	10.3
	Income equal to expenses	132	52.4

	Income exceeding expenses	94	37.3
Year	4	91	36.1
	5	113	44.8
	6	48	19.0
Previously receiving any training on patient safety within the scope of the course	Yes	57	22.6
	No	195	77.4
Previously attending any training on patient safety at the hospital where they completed their internship	Yes	37	14.7
	No	215	85.3
Information about the Ministry of Health's training programs regarding patient safety	Yes	38	15.1
	No	214	84.9
Total		252	100.0

Comparison of the participants' variables and scale sub-dimensions' mean scores is given in Table 4. A statistically significant difference was found in the scale sub-dimension of "working hours as error cause" based on gender, with female scoring higher on average compared to male ($p<0.05$). Participants who received patient safety training within the course previously were found to have higher scores in "patient safety training received to date," "error reporting confidence," and "team functioning" compared to those who did not receive such training. Additionally, statistically significant differences were found among participants' years in the sub-dimensions of "patient safety training received to date," "error reporting confidence," "working hours as error cause," and "importance of patient safety in the curriculum" ($p<0.05$). In the post hoc (Tukey) test, differences were observed between the 5th and 6th year in the sub-dimensions of "patient safety training received to date" and "error reporting confidence," with the 5th grades scoring higher on average compared to the 6th year. Additionally, differences were found between the 4th and 6th year in the "working hours as error cause" sub-dimension, with the 6th-year showing a higher average score. Lastly, in the sub-dimension of "importance of patient safety in the curriculum," the average score of 6th-year students was higher compared to 4th and 5th year. Participants who had previously attended any training on patient safety during their internship period showed statistically significant differences in the sub-dimensions of "patient safety training received to date" and "error reporting confidence" compared to those who did not attend such training ($p<0.05$) (Table 4).

TABLE 4. COMPARISON OF STUDENTS' DESCRIPTIVE CHARACTERISTICS AND SCALE SUB-DIMENSION SCORES

Variable			Patient Safety Training Received to Date	Error Reporting Confidence	Working Hours as Error Cause	Error Inevitability	Professional Incompetence as Error Cause	Disclosure Responsibility	Team Functioning	Patient's Role in Error	Importance of Patient Safety in the Curriculum
		n	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD
Gender	Female	145	61.13 $\pm$ 21.12	67.33 $\pm$ 22.97	90.06 $\pm$ 14.92	59.37 $\pm$ 14.49	29.37 $\pm$ 21.85	44.55 $\pm$ 15.39	84.89 $\pm$ 18.29	80.26 $\pm$ 20.04	82.82 $\pm$ 18.37
	Male	107	57.22 $\pm$ 26.33	66.03 $\pm$ 25.71	85.14 $\pm$ 20.51	60.49 $\pm$ 12.57	33.99 $\pm$ 23.81	46.25 $\pm$ 18.20	82.18 $\pm$ 20.37	78.28 $\pm$ 20.53	78.71 $\pm$ 22.92
	t		1.266	0.422	2.104	0.560	1.596	0.802	1.107	0.767	1.582
	p ^a		0.207	0.673	0.037*	0.512	0.112	0.423	0.269	0.444	0.115
Year	4	91	58.75 $\pm$ 21.0	66.35 $\pm$ 20.99	85.54 $\pm$ 19.96	60.49 $\pm$ 12.17	31.59 $\pm$ 22.10	45.64 $\pm$ 17.34	82.48 $\pm$ 18.02	78.80 $\pm$ 17.71	78.23 $\pm$ 21.32
	5	113	63.13 $\pm$ 21.12	70.70 $\pm$ 21.40	87.57 $\pm$ 17.68	59.81 $\pm$ 12.30	32.77 $\pm$ 22.09	45.23 $\pm$ 15.12	83.13 $\pm$ 20.21	79.33 $\pm$ 20.47	79.41 $\pm$ 21.40
	6	48	52.22 $\pm$ 30.86	58.37 $\pm$ 32.63	93.54 $\pm$ 10.54	58.70 $\pm$ 18.85	27.43 $\pm$ 25.51	44.64 $\pm$ 18.85	87.58 $\pm$ 18.87	80.83 $\pm$ 24.19	90.39 $\pm$ 12.94

	f		3.772	85.54	3.338	0.266	0.935	0.057	1.213	0.159	6.487
	p ^b		0.024 (5>6)*	0.012 (5>6)*	0.037 (6>4)*	0.766	0.394	0.945	0.299	0.853	0.002 (6>4- 6>5)*
Previously receiving any training on patient safety within the scope of the course	Evet	57	67.36± 21.901	73.61± 19.81	88.29± 18.78	57.47± 14.09	29.38± 20.16	43.50± 14.59	87.75± 14.65	81.71± 19.18	81.21± 20.42
	Hayır	195	57.19±2 3.51	64.78± 24.95	87.88± 17.34	60.54± 13.53	31.90± 23.50	45.78± 17.18	82.57± 20.23	78.75± 20.53	81.04± 20.55
	†		2.924	2.452	0.154	1.492	0.733	0.910	2.138	0.971	0.055
	p ^a		0.004*	0.015*	0.877	0.137	0.464	0.363	0.034*	0.332	0.956
Previously attending any training on patient safety at the hospital where they completed their internship	Evet	37	69.81± 26.09	80.13± 17.94	86.97± 17.05	60.00± 11.01	30.43± 24.92	0.795± 14.53	87.18± 16.51	85.21± 17.87	80.48± 23.79
	Hayır	215	57.69± 22.62	64.48± 24.35	88.15± 17.78	59.82± 14.13	31.48± 22.44	45.78± 16.94	83.15± 19.61	78.43± 20.49	81.18± 19.92
	†		2.939	3.735	0.375	0.072	0.260	1.179	1.181	1.893	0.190
	p ^a		0.004*	0.000*	0.708	0.942	0.795	0.239	0.239	0.060	0.849

^aIndependent groups T test, ^bOneway ANOVA test, SD: Standart Deviation, *p<0.05

The relationships between participants' variables and scale sub-dimensions are shown in Table 5. A weak positive correlation was found between the age of the students and the sub-dimensions of "professional incompetence as error cause" and "disclosure responsibility" (p<0.05). It was observed that as age increased, the scores of both sub-dimensions also increased. As the average score of "patient safety training received to date" sub-dimension increases, the scores of "comfort with reporting errors," "perceptions of working hours as a cause of error," "teamwork," and "role of the patient in errors" sub-dimensions also increase. As the average scores of the "working hours as error cause" sub-dimension increase, the scores of the "error inevitability," "team functioning," "patient's role in error," and "importance of patient safety in the curriculum" sub-dimensions have increased. However, the scores of the "professional incompetence as error cause" and "disclosure responsibility" sub-dimensions have decreased in the opposite direction.

TABLE 5. RELATIONSHIP STATUS BETWEEN VARIABLES AND SCALE SUB-DIMENSIONS

Variable and Sub-dimensions		Previously receiving any training on patient safety within the scope of the course	Error Reporting Confidence	Working Hours as Error Cause	Error Inevitability	Professional Incompetence as Error Cause	Disclosure Responsibility	Team Functioning	Patient's Role in Error	Importance of Patient Safety in the Curriculum
Age	r	-0.098	-0.116	-0.082	-0.092	0.143	0.129	-0.037	-0.106	-0.084
	p	0.122	0.066	0.193	0.143	0.023	0.040	0.564	0.093	0.186
	n	252	252	252	252	252	252	252	252	252
	r		0.520	0.164	0.057	-0.090	-0.069	0.152	0.156	0.103

Previously receiving any training on patient safety within the scope of the course	p		0.000	0.009	0.370	0.154	0.272	0.016	0.013	0.102
	n		252	252	252	252	252	252	252	252
Error Reporting Confidence	r			0.196	0.098	-0.244	-0.101	0.292	0.225	0.192
	p			0.002	0.120	0.000	0.110	0.000	0.000	0.002
	n			252	252	252	252	252	252	252
Working Hours as Error Cause	r				0.218	-0.239	-0.224	0.386	0.291	0.372
	p				0.000	0.000	0.000	0.000	0.000	0.000
	n				252	252	252	252	252	252
Error Inevitability	r					0.035	-0.029	0.193	0.066	0.168
	p					0.577	0.642	0.002	0.294	0.007
	n					252	252	252	252	252
Professional Incompetence as Error Cause	r						0.192	-0.244	-0.257	-0.194
	p						0.002	0.000	0.000	0.002
	n						252	252	252	252
Disclosure Responsibility	r							-0.051	-0.224	-0.141
	p							0.424	0.000	0.026
	n							252	252	252
Team Functioning	r								0.552	0.599
	p								0.000	0.000
	n								252	252
Patient's Role in Error	r									0.497
	p									0.000
	n									252

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

DISCUSSION

Patient safety is a fundamental healthcare goal, and medical undergraduates need to acquire the abilities necessary to minimise harm to patients throughout their future practice [26]. In this study, conducted to determine the attitudes of medical students toward patient safety culture, 77.4% of the students reported that they had not received any education on patient safety as part of their coursework, and 85.3% stated that they had not received any training on patient safety during their internship or clinical rotation period at the hospital where they were training. In addition, the comfort in reporting errors and teamwork scores of those who had previously received patient safety training as part of their coursework or during their internship were found to be higher than those who did not receive training. Studies show that the patient safety attitudes of students who receive patient safety training are positively impacted [24,30,31]. Recent studies suggest that interprofessional patient safety education can improve students' knowledge, attitudes, and behaviors related to patient safety. However, there's still limited evidence that these educational gains directly translate into measurable improvements in clinical outcomes [32,33].

In the study, it was determined that the sub-dimensions with the highest mean scores regarding the patient safety culture attitudes of medical faculty students were the "working hours as a cause of error" and "teamwork" sub-dimensions. Studies conducted in Jordan, Pakistan, China, and Malaysia found that students gave the highest scores to these two sub-dimensions [23,26,34,35]. Similarly, research from Hong Kong, Tunisia, and Singapore identified the "working hours as a cause of error" sub-dimension as the one most highly rated by students [36,37]. Long working hours have been found to be a significant risk factor for burnout among residents, which in turn is a major cause of medical errors [38,39]. A systematic review and meta-analysis aimed at examining the relationship between long working hours and accidents and injuries

found that working more than 55 hours per week is associated with an increased risk of adverse events [40]. These findings emphasize the importance of improving working hours and providing breaks for physicians in Türkiye, who work under intense schedules, to enhance patient safety practices and reduce the risk of errors. In addition, it has been stated that effective planning and promoting work-life balance are important to reduce the risks associated with long working hours [23]. Similarly, students think that effective multidisciplinary teamwork and teaching the principles of teamwork can prevent medical errors. It is important to recognize that effective collaboration and communication can prevent errors and improve patient outcomes. The literature findings support the study results [23,36,37,41,42]. One of the main reasons why students value teamwork is their belief that collaboration across different disciplines is essential for delivering quality healthcare within the complex and multidisciplinary structure of the healthcare sector. Additionally, students feel the need for support and guidance during their clinical training to make accurate decisions regarding patient care.

In the study, it was determined that females had a higher average score than males regarding working hours as a reason for errors. Similar study results can be found [23,43]. The reason for this could be that women, due to assuming different roles in their daily lives, may be more sensitive to long working hours in terms of time management.

Student age was weakly and positively correlated with the "professional incompetence as error cause" and "disclosure responsibility" sub-dimensions, and this correlation was statistically significant. A significant difference was found between students' year of study and the sub-dimensions of "professional incompetence as an error cause" and "disclosure responsibility", with scores increasing as the year of study advanced [35]. This result may suggest that, as clinical experience increases, students are more likely to evaluate error causes from a system-based perspective and develop a greater sense of responsibility for error disclosure. Contrary to the findings of the present study, a multicenter cross-sectional investigation in Jordan found no significant differences between pre-clinical and clinical medical students in terms of their perceptions of professional incompetence as an error cause and disclosure responsibility [23]. In another study conducted by Koleilat et al. [44], no significant differences were found among students' age groups regarding the sub-dimensions of "professional incompetence as an error cause" and "disclosure responsibility".

The study shows that students have a positive attitude towards the sub-dimensions of the "patient's role in errors" and the "importance of patient safety in the curriculum". In deciding on the desired level of positive attitude in a field, Nordén-Hägg et al. [43] suggested a stringent cutoff point such as ≥ 75 out of 100. In a multicenter cross-sectional study conducted to evaluate the attitudes of medical school students in Jordan towards patient safety, it was found that the students exhibited a positive attitude towards patient safety and that they were positive about the principles and practices supporting patient safety [23]. In a study conducted on senior medical faculty students in Pakistan, it was similarly found that students had a positive attitude towards patient safety practices [34]. In addition, most students expressed that it is crucial to prioritize patient safety education within the medical school curriculum, emphasizing that this education should extend beyond the classroom to clinical settings. They believe that learning about patient safety issues will contribute to their development as more experienced physicians. Studies have shown that medical school students know that including patient safety competencies in the medical curriculum is vital in providing high-quality care and minimizing harm to patients, similar to the study findings [23,34,35]. Contrary to the study findings, a study conducted in China found that more senior students had less positive perceptions of the importance of patient safety in the curriculum [26].

There is a significant negative correlation between "professional incompetence as error cause" and "error reporting confidence" ($r = -0.244$, $p = 0.000$). This indicates that as the perception of professional incompetence as a cause of errors increases, students' confidence in reporting errors significantly decreases. In other words, students who perceive themselves or their colleagues as professionally incompetent tend to have lower confidence in reporting errors. Sullivan et al. [45] found that medical students experience difficulties in reporting professional incompetence, and that their reluctance to report colleagues' professionalism violations is influenced by the curriculum and clinical environment. Lee et al. [46] reported that medical students exhibit lower willingness to disclose their errors and predominantly attribute error reporting to human factors, such as fatigue and inadequate training, as primary root causes. Swinfen et al. [47] reported that medical students have low confidence in error reporting due to a lack of experience and insufficient role models in the clinical environment.

A positive and significant correlation was found between "error reporting confidence" and "team functioning" ($r = 0.292$, $p = 0.000$). This indicates that when team functioning is perceived more positively, students' confidence in reporting errors also increases significantly. Studies show that teamwork positively impacts error reporting behavior [48-50]. Heier et al. [51] found significant improvements in interdisciplinary error communication skills and perceptions of team functioning among medical students following a training program aimed at enhancing interdisciplinary communication skills. A study examining the relationship between teamwork perception and clinical error reporting among nurses in two teaching hospitals in Korea found that nurses with higher team communication scores were more likely to report clinical errors to their managers and the patient safety department [52]. In a study evaluating medical students' attitudes towards patient safety in Jordan, it was reported that while students scored highly in the area of team functioning, they received lower scores in reporting error causes, such as professional incompetence [23].

The results of our study indicate that as medical students' scores on the subdimension of perceived importance of patient safety in the curriculum increase, their confidence in reporting errors also tends to increase, revealing a weak but positive correlation between these two variables. Alser et al. [41] found that medical students who received structured patient safety education as part of the curriculum exhibited more positive attitudes toward patient safety culture, although they remained neutral regarding their confidence in reporting errors. Mohsin et al. (19) found that a structured educational program for medical students could enhance their confidence in reporting errors. A systematic review revealed that the integration of patient safety education into medical school curricula has positive effects on students' knowledge, attitudes, and skills. However, it emphasized the need for more structured and hands-on training to improve error reporting behaviors [24].

This study is limited to data collected from voluntary participation of fourth, fifth, and sixth year medical students enrolled at Karabük University Faculty of Medicine during the fall semester of 2023-2024, from October 15th to December 31st, 2023.

CONCLUSION AND RECOMMENDATION

The results of this study indicate that few medical students receive training on patient safety, yet those who do demonstrate more positive attitudes toward a safety culture. This finding highlights the need for systematic educational interventions. Students believe that improving working hours, strengthening teamwork, involving patients in care, and integrating patient safety education into the curriculum are essential steps toward enhancing patient safety culture. To address these needs, it is recommended that medical school curricula be revised to include mandatory patient safety courses. These should be supported not only theoretically but also through clinical practice. Additionally, training faculty members in this area would enhance the practical relevance of the study.

Integrating patient safety education into the curriculum can help cultivate future physicians who are more sensitive to safety issues, less fearful of admitting mistakes, and more committed to transparency. It may also promote interdisciplinary collaboration, align medical education with global standards, and improve public trust in the healthcare system. This study contributes foundational knowledge regarding the importance of patient safety education in a state university setting and can inform future research aiming to enhance safety culture among medical students. However, since the findings are based on self-reported data, future studies should explore students' actual behaviors and the effectiveness of educational interventions in shaping those behaviors. Particularly, multicenter and longitudinal studies are recommended to assess changes in students' attitudes over time.

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A QUALITY IMPROVEMENT PROJECT: REDUCING NON-COMPLIANCE RATES TO THE WRITING AND APPROVING THE DISCHARGE SUMMARY AT KFMMC-DHAHRAN

Rehab Y. Al-Ansari^{1*}, Mohammed Ahmed Shehri², Fritz Esquerro³, Sultan Shaher Otaibi³, Muhanad Ali Alghamdi³, Abdulelah Fawzi Alharbi⁴, Abdulaziz Saad AlShamrani⁴, Nawaf Zakary⁴, Nada Rajab Alzahrani⁴.

1. Hematology Unit, Internal Medicine Department, King Fahad Military Medical Complex, Dhahran, Kingdom of Saudi Arabia
2. Department of health informatics, KFMMC-Dhahran-Saudi Arabia, King Fahad Military Medical Complex, Dhahran, Saudi Arabia
3. Department of health informatics, King Fahad Military Medical Complex, Dhahran, Saudi Arabia
4. Internal Medicine Department, King Fahad Military Medical Complex, Dhahran, Kingdom of Saudi Arabia

Correspondence: dr_rehab10000@hotmail.com

ABSTRACT

BACKGROUND & AIM:

More than 300,000 active patients' medical records are kept at our institute. In 2021 only 19% of respondents (consultant in charge of the patient) agreed to the discharge summary (DC). Consequently, a corrective action plan was put into place to increase the compliance rate to policy to at least 90%.

METHODS & CONTEXT:

This is an observational, retrospective study undertaken at tertiary medical center. Around 1,600 health informatic (HIS) records for patients who required admission to the hospital for more than 24 hours and were for patients of any age were selected for this study. An audit team to monitor compliance with writing /approving policies for the DC summary was established. Furthermore, correction action plans were implemented and the auditing for compliance was monitored.

RESULT:

Our interventions have significantly improved the quality of discharge documentation as well as increased the rate of compliance to writing/approving the DC summary up to $\geq 90\%$ by June 2023. The rate of DC summary delinquency was also reduced to $< 10\%$. Moreover, no printing of discharge summaries also was of great value in ink and paper use with cost reductions of 13,327 SR (\$USD3,551) by Y 2023.

CONCLUSION:

The quality of DC summary documentation and the rate of delinquent DC summary reports can be improved by applying health informatics restrictive measurement and quality monitoring tools.

KEYWORDS

quality of care, discharge summary, patient safety, patient satisfaction, delinquency

INTRODUCTION

At KFMMC– Dhahran, we have more than 600,000 patient's files including for both genders and different age groups. Currently, 50% of the files are active for either outpatient care visits (including emergency area, clinic, primary health care, day case units) or admission to inpatients care (critical and non-critical areas). Since 2016, we have been using self-building electronic health informatics system (HIS) for admission, progression, consultation and discharge, as well as for laboratory, radiology, intervention records and orders. A management of information (MOI) committee is one of the Medical Services Division's (MSD) committee which ensures the implementation of an improvement action to adjust points of concern in the HIS to reach the high-quality of standards in patient care that met Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) and Joint Commission International (JCI) as well as Healthcare Information and Management System Society (HIMMS) needs. The concern of non compliance in writing or approving the discharge summary was raised to the committee by the head of medical records. For the retrospective data during 2021 that was collected, approximately 19,269 patients were discharged from the hospital. However, the compliance rate for approved discharge summaries was down to as low as 19% and did not exceed 31%. So, action was taken by implementing corrective action plans to raise the compliance rate to 90% or more.

Junior physicians have typically responsible for writing discharge statements. Their knowledge level and type of training on this subject may have varied, whether it was official or informal. Too frequently, junior staff members under pressure view discharge summaries as less important, and it's possible that they haven't received enough guidance or supervision on how to write effective summaries.

The discharge summary, which provides factual and pertinent information to support ongoing care, should enable the safe transition of patients from the hospital environment back into the community. Nonetheless, discharge summaries frequently contain errors. A 2002 audit of 149 case notes from five hospitals in England and Wales was conducted by the Royal College of Physicians. Seventy-seven of the 87 printed discharge summaries that were included in the patient notes had no diagnosis, 19% had no procedure, 2% had no follow-up plans, and 75% did not tell the general practitioner (GP) about the patient's previous conversations on their care [1]. Other studies in the literature have identified similar issues with prescribing errors and accuracy.

Only 53% of general practitioner practices stated they received discharge summaries in time to be beneficial either "all" or "most" of the time, according to a 2009 Care Quality Commission (England) report [1]. Just 27% of general practitioner offices stated that discharge summaries were "hardly ever" or "never" wrong or incomplete, whereas 81% of practices stated that information regarding prescribed medications was "all" or "most" of the time inaccurate or incomplete on discharge summaries. Although delays of three months to a year are more usual, in one case—which was reported by the NHS Alliance—a patient received a discharge statement eleven years after it was scheduled [1].

At the King Fahd Military Complex (KFMMC) Dhahran, we noticed defects in discharge summary filling then compliance to approving. So, for the importance and seriousness of this issue we created this project aiming to reach a high compliance rate that matched JCI and CBAHI requirements.

METHODS:

OVERVIEW OF INTERVENTION

During 2021, the compliance rate to approve the discharge summaries was not exceeding 3%. By January 2022, action was taken by implementing corrective action plans to raise the compliance rate to a target of 90% or more to maintain better patient care at KFMMC-Dhahran. To achieve good compliance with JCI standard of the ACC-8013 policy which mandates that the patient is to get a discharge summary upon discharge. Moreover, this was seen to improve patient experience at KFMMC-Dharan.

SPECIFIC AIMS

In this study, an audit and review task to assess, analyze and process corrective intervention was taken aiming to:

- Increase the compliance to the writing and approval of the discharge summary to reach the compliance target of 90% of discharges.
- Improve compliance rates to meet the Essential Safety Requirements JCI standard - as in the access to care and continuity care (ACC) - 8013 chapter - standard 4.2 (patients should have a discharge summary upon discharge from the hospital).

TIMELINE

- Our project was established at the King Fahd Military Medical Complex which is located at Eastern Province of the country. There were defects and non compliance to writing and approving discharge summaries prior to Y 2023.
- We are dealing with 300,000 active medical records and where more than 10,000 patients require admission each year. Retrospective closed chart auditing was applied to monitor the compliance to writing and approving the discharge summary.
- The Quality Safety Team approved this study after we discovered the vital issue in non compliance to writing and/or approving the discharge summaries that were identified before January 2023.
- We initiated this study after the implementation of the project and retrospectively collected data between January 2021 to December 2022 as well as a corrective action plan with further auditing for compliance to the implementation of high-quality discharge summaries based on CBAHI and JCI standards after January 2023 until September 2023.
- This study was conducted and facilitated/collaborated by Medical Administration through In-Patient setting, Medical Record Department, Information and Technology Department, and Continuous Quality Improvement and Policy Service (CQI-PS) Department.

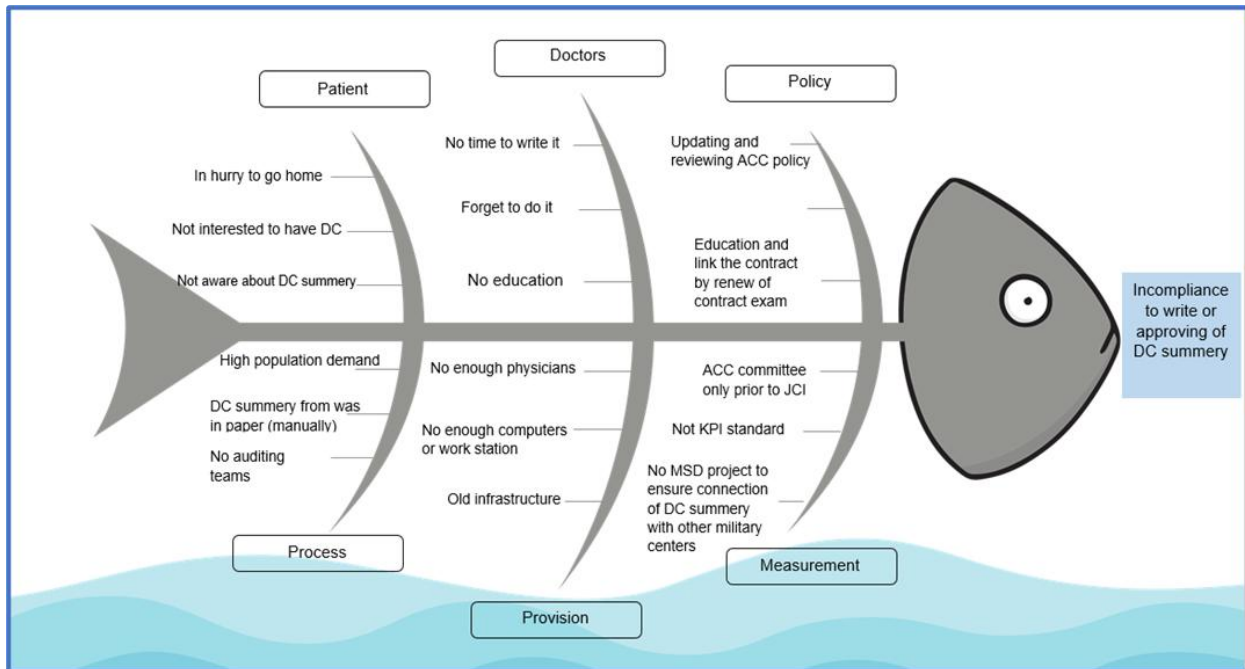
INTERVENTION

Prior to January 2017, the discharge summary used was written manually. During 2017 and 2018, there was no clear data about the compliance rate of completing discharge summaries, however, retrieval of records showed low compliance rates and a high number of deficiencies in completion the discharge summary form.

To initiate the corrective action plan, we studied the possible reasons and obstacles behind high non-compliance rates in the writing and approving the discharge summaries. A fishbone map was created for better understanding of the precipitating factors and to make the targeted corrections plan (Figure 1). A corrective action plan team was created for such a purpose.

The audit team included a physician member, in-patient care nursing member, representative from patient relations, medical record and health informatics team members. The auditing started by retrieving closed file for completion of discharge summary (all part of discharge summary from date, time, admitting and discharge diagnosis, course in the hospital, intervention and management, discharge condition and type of discharge, regular or against advice, as well as discharge medication, diet instruction, wound care, follow up plan and instruction about criteria to educate the patient about when to visit the hospital). Not only that, but also compliance of approving of discharge summary by consultant in charge on the case was also monitored.

FIGURE 1 : FISHBONE VIEW FOR NON-COMPLIANCE TO WRITING AND APPROVING DISCHARGE SUMMARY



Due to non-compliance of the writing of the discharge summary which was on paper before Y2017, and after initiation of health informatics system (HIS), we started our intervention by implementing the discharge summary in the HIS. Since then, we have created an educational session using hospital wide and/or departmental lectures. However, despite that we were still facing very low rates of compliance to approving discharge summaries and the maximum compliance rate was around 30% /month. Further action was taken and by December 2021 the adjustment of discharge summary forms and mandating of writing discharge summaries were made. Close record auditing of the inpatient care was established in Y2021 and was evaluating the compliance rate through Y2020 and Y2023.

Furthermore, by December 2022 we created an alarm mechanism to notify HIS about missing discharge summaries or no approval. Reviewing and updating discharge summary policy at KFMMC-Dhahran, ACC chapter (ACC – 8013) was reviewed and updated on January 2023 to match edition 7th of JCI references. On January 2023, we implemented the SMS remainder system for consultants to approve the final DC report. We stopped printing DC summaries and make them available at KFMMC through an application that was created in January 2023. Actions taken are highlighted in Table 1.

TABLE 1: PROJECT CORRECTIVE ACTION PLAN AND PROGRESS

Area of Concern:	Recommendations	Action Taken	Urgency	Progress/ Update
Creating discharge summary in the system	Creating discharge summary in HIS	Creating discharge summary in HIS	January 2017	Done
No education about using discharge summary	Staff education by creating hospital wide lectures.	Hospital wide lecture Followed by visiting main department to ensure further education	November 2017 Then periodically	Done

Health informatics defect, no mandating of writing discharge summary	Sending to IT via HIS/MOI committee for re adjustment of discharge summary form and mandating of writing discharge summary	Adjustment of discharge summary form and mandating of writing discharge summary	December 2021	Done
Reviewing and updating discharge summary policy at KFMMC-Dhahran.	Reviewing and updating discharge summary policy at KFMMC-Dhahran.	Reviewing and updating discharge summary policy at KFMMC-Dhahran. ACC chapter (ACC – 8013)	January 2023	Done
Monitoring of the rate of compliance to the written and approval of discharge summary.	Close record auditing of the inpatient care. A quarterly auditing for compliance	Close record auditing of the inpatient care.	January 2021-sept 2023	Done
No alarms to notify about missing discharge summary or no approval	Creating an alarm to notify about missing discharge summary or no approval	Creating an alarm to notify in HIS about missing discharge summary or no approval	December 2022	Done
No reminder for consultant to approve final DC report	Creating SMS reminder for consultant to approve final DC report	Creating SMS reminder for consultant to approve final DC report	January 2023	Done
Wastage of DC paper by unnecessary printing	Stop printing DC summary and make it visible at KFMMC application	Stop printing DC summary and make it visible at KFMMC application	January 2023	Done

DATA COLLECTION AND MEASURES

The data was collected from the health information system and hospitalization records. The cost of ink drum and paper were detected from the materials management records.

In this current project we measured the following:

- Measuring compliance with doing and approving discharge summaries per month
- Measuring delinquency rate from DC summaries per month
- Measuring cost savings from paper and ink per year

% Of approved DC summaries per month :

One measure was used that reflects the reduction of delinquency and incompliance to completion of DC summary or approval, with the key performance indicator measured by applying numerator (N)/ denominator (D) values. The numerator was Approved DC summaries written per month x 100. On the other hand, the denominator was (D) total number of discharged patients per month.

(N) Total number of Approved DC summaries written per month x 100

(D) Total number of discharged patients per month

% delinquency rate from DC summary per month

The key performance indicator measured by applying numerator (N)/ denominator (D) values. The numerator was total number of delinquency rates from DC summaries per month x 100. On the other hand, the denominator was (D) Total number of discharged patients per month.

(N) Total number of delinquency rates from DC summery per month x 100

(D) Total number of discharged patients per month

Cost saving from paper and ink per year

The cost saving was determined by calculating the exact cost of paper and ink package and the capacity of paper can be printed per each paper and ink drum per year, then compared saving from Y2021 to Y2023.

DATA ANALYSIS

A descriptive statistic and simple quantity and quality data analysis were established. The graph was drawn from data collected and tabulated in Microsoft Excel sheets. The graphs of pre and post corrective action plan were clearly emphasizing present of the problem and dramatic improvement after establishment the improvement project which started on Jan 2021 and then monthly until September 2023. Moreover, an actual cost for both paper and ink were detected from materials management then we calculated the cost reduction per year from no printing intervention from Y2021 to September Y2023. Furthermore, problems and action plan and progression over the time were used. The collected data was analyzed by using the statistical analysis performed with SPSS (Statistical Package for Social Sciences) Package with version 27.

The study had been proposed for publication after approval from the Armed Forces Hospitals Eastern Region Institutional Review Board. Moreover, all data which was collected in this study was used only for the purpose of this study. Patients' names were not collected; instead, each file was audited for present and compliance or writing the discharge summary and was encoded with number, used further in analytical purpose.

PROCEDURES

The Armed Forces Hospitals Eastern Region Institutional Review Board (IRB), protocol # AFHER-IRB- 2024-025, approved this study. Consent is not required for retrospective data collection. No human or animal tissue was used. The Quality Safety Panel approved this study after finding the vital issue of delays in writing or/and approval of discharge summery prior to January 2022. This study was conducted in collaboration with the Medical Department through the Inpatient Department, the Information and Technology Department, the Finance and Budget Department, and the CQI-PS Department.

RESULTS

We initiated this study after the implementation of the project and retrospectively data collected between January 2021 to December 2022 and correction action plan with further auditing for compliance to implementation of high-quality discharge summary based on CBAHI and JCI standard after January 2023 until September 2023.

After creating an action form starting with using and implementing a DC in the HIS to run an education lecture periodically, creating alarming, mandating writing and creating SMS to approve DC as well as auditing in monthly base the compliance to write and approve DC summary. Moreover, reviewing and updating ACC -8013 policy to be compliant to JCI 7th editions standard.

Unfortunately, auditing of the discharge summary approval's percentage through Y2021 & 2022 to September Y2023 showed significant increase in the compliance rate to 90% or more (Figure 2 Tables 2 A, B, C).

FIGURE 2 : RUNTIME CHART FOR COMPLIANCE OF DISCHARGE SUMMERY BETWEEN Y2021 TO SEPTEMBER 2023.

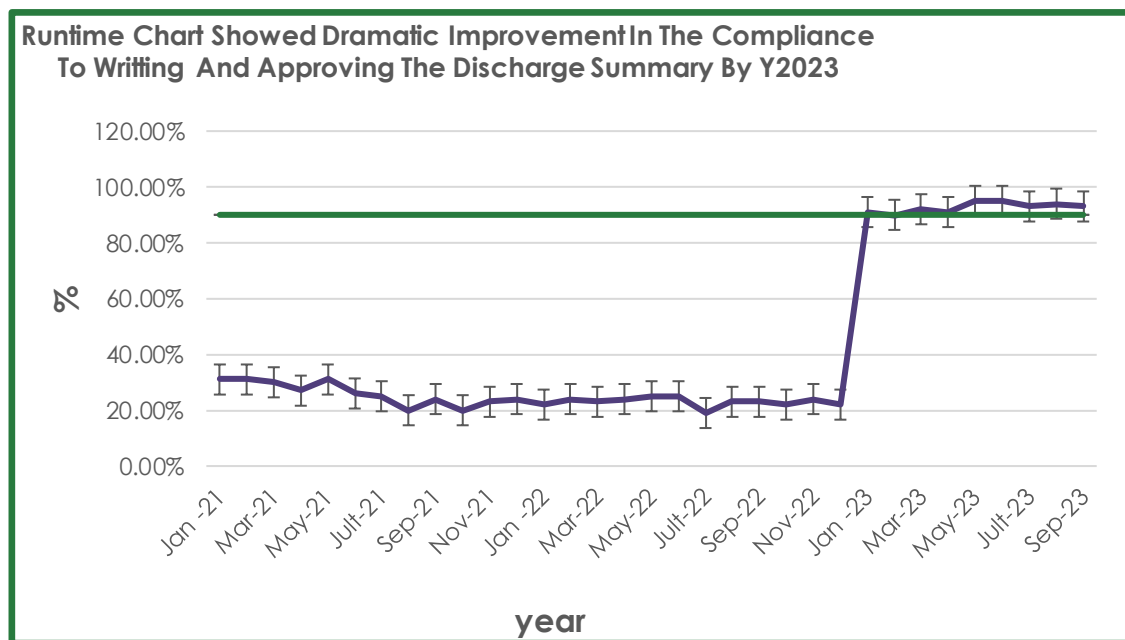


Table 2: (A) showed % of DC summary approval during 2021 (B) during 2022 (C) during 2023 .

Month	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Total
Approved DC summary	478	442	495	402	416	428	337	332	415	367	435	443	4990
Total # of discharged patient	1553	1446	1627	1488	1330	1616	1374	1651	1694	1817	1860	1813	19269
% of approved DC summary	31%	31%	30%	27%	31%	26%	25%	20%	24%	20%	23%	24%	26%

(Table 2 -A)

Month	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Total
Approved DC summary	347	347	440	356	406	428	337	245	376	401	414	380	4512
Total # of discharged patient	1549	1430	1876	1458	1602	1723	1374	1314	1655	1793	1758	1703	19495
% of approved DC summary	22%	24%	23%	24%	25%	25%	19%	23%	23%	22%	24%	22%	23%

(Table 2 -B)

Month	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Total
Approved DC summery	1571	1471	1642	1336	1729	1547	1292	1248	1534	13370
Total # of discharged patient	1549	1430	1876	1458	1602	1723	1374	1314	1655	13,981
% of approved DC summery	91%	90%	92%	91%	95%	95%	93%	94%	93%	95.6%

(Table 2 -C)

As a result, delinquency rates to discharge summaries between y2021 to September 2023 were reduced to less than 10% (Figures 3&4).

FIGURE 3: RUNTIME CHART FOR THE RATE OF DELINQUENCY TO DISCHARGE SUMMARY BETWEEN Y2021 TO SEPTEMBER 2023.

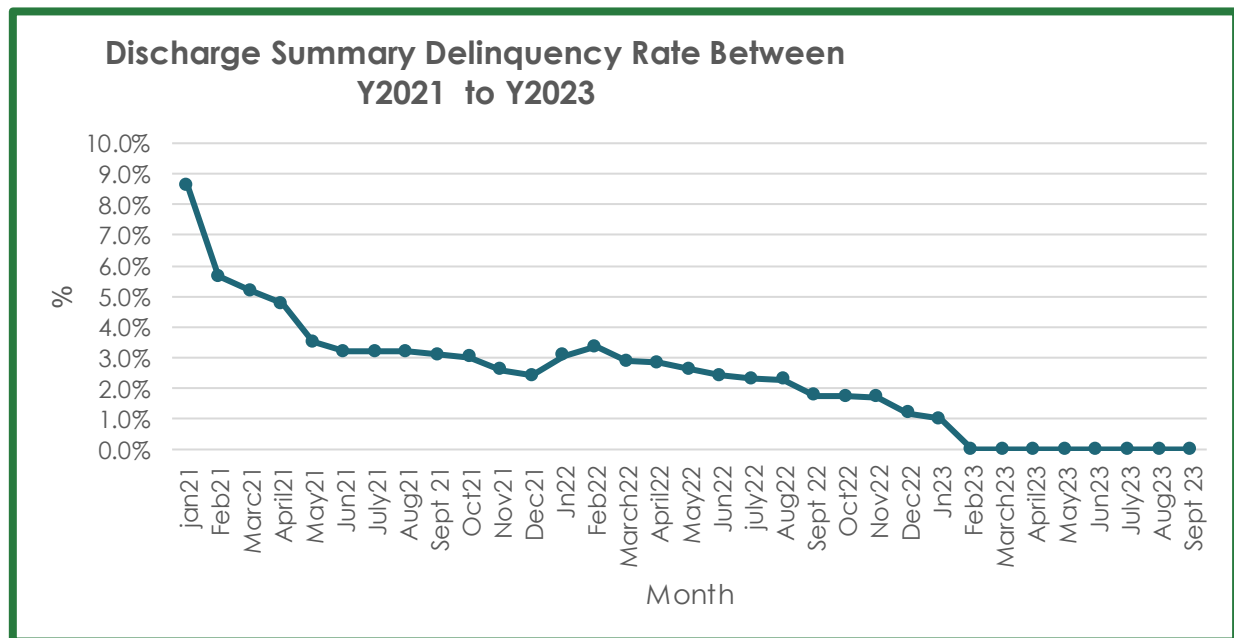
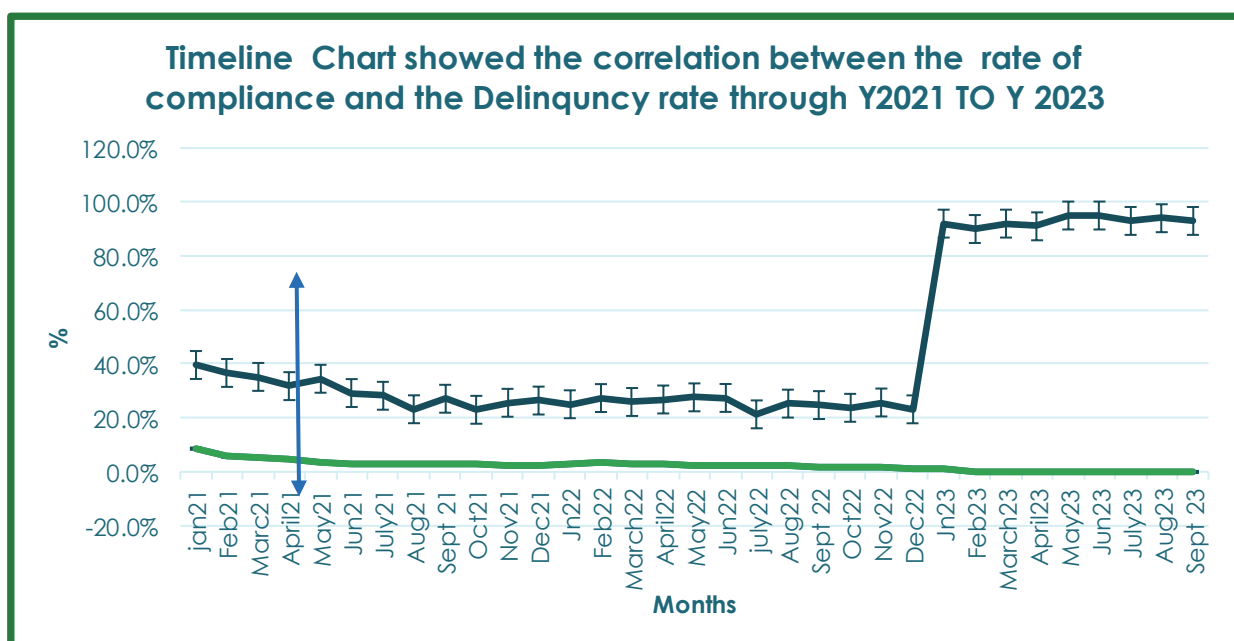
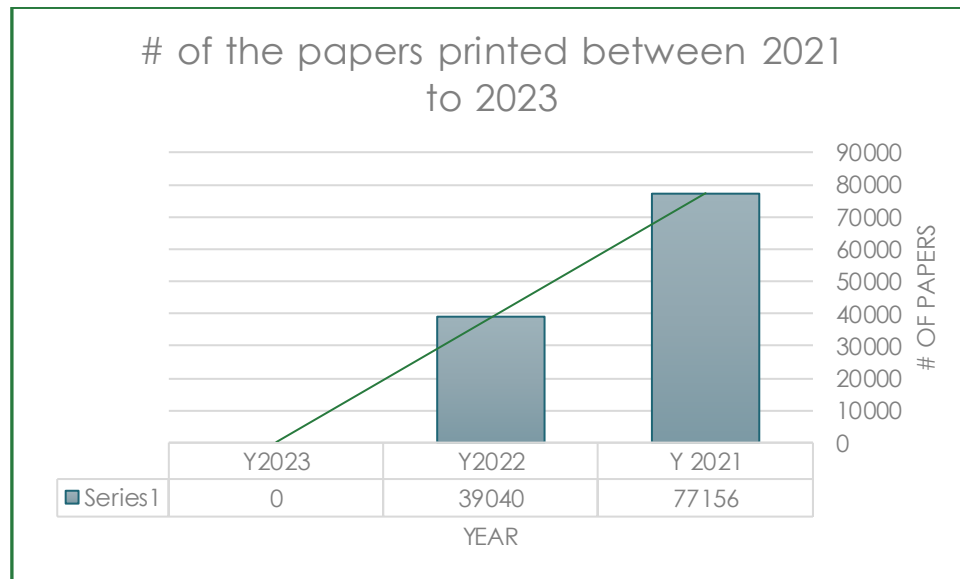


FIGURE 4: TIMELINE CHART FOR BOTH THE RATE OF DELINQUENCY TO DISCHARGE SUMMARY AND PERCENTAGE OF APPROVED DISCHARGE SUMMARY BETWEEN Y2021 TO SEPTEMBER 2023.



Regarding Stop printing DC summary and make it visible at KFMMC application, the data showed a total of 77,156 pieces of paper for DC summaries were printed during 2021, this number reduced to 39,040 pages by y 2022 and zero pages were printed during Y2023 (Figure 5).

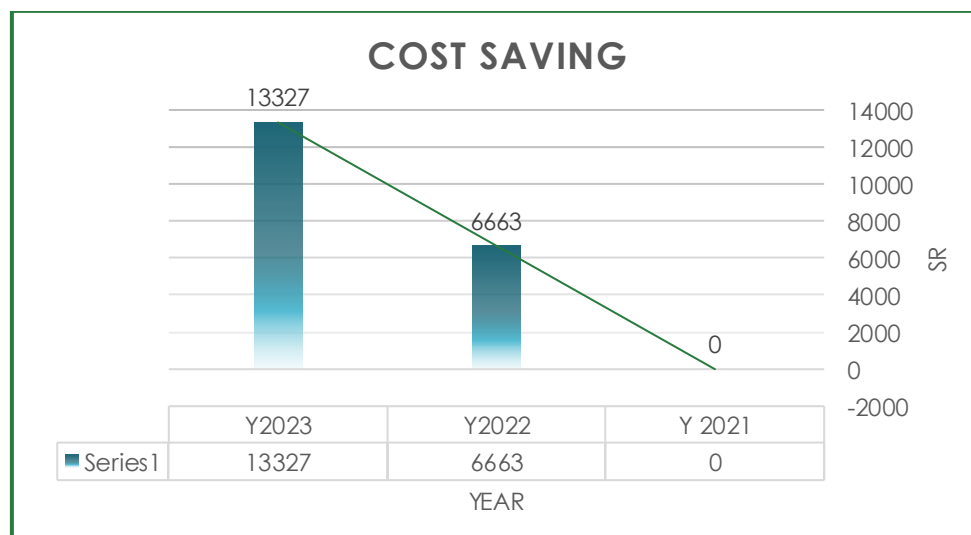
FIGURE 5: THE NUMBER OF THE PAPERS PRINTED WITH IMPLEMENTATION OF STOP PRINTING DC SUMMARY AND MAKE IT VISIBLE AT KFMMC APPLICATION BETWEEN Y2021 TO SEPTEMBER 2023.



Based on our materials management records, the cost of each paper box that contained 500 sheets of paper is 10.2 SR, and the cost of each ink drum (black, yellow and cyan) are (288, 510 and 894SR respectively). The toner magenta cost is 839SR. Each drum of ink is enough to print 11,500 pieces of paper. So, during 2021 we printed 77,156 pages which needs 7 drums of black, yellow and cyan ink, so, the total ink drums cost for 2021 will be $7 \times (894 + 288 + 510)$ which will be around 4752 SR. On the other hand, each paper box is enough for 500 pages that meant we used 155 boxes of papers with a cost of 1581 SR. Adding to that 7 magentas per year which will be $839 \times 7 = 5,873$ SR. A total cost lost from printing discharge summaries during Y2021 will be $5,873 + 1581 + 4752 = 13327$ SR.

During 2022 the cost reduction was almost 50% as the amount of paper printed for DC summaries was 39,040 pages from 77,156 pages in Y2021. roughly calculating a cost saving of 6663 SR. Furthermore, by the year 2023 with no more printing any paper, the cost saving is 13327SR (Figure 6).

FIGURE 6: THE COST SAVING AFTER IMPLEMENTATION OF STOP PRINTING DC SUMMARIES AND MAKE IT VISIBLE AT KFMMC APPLICATION BETWEEN Y2021 TO SEPTEMBER 2023.



DISCUSSION

The importance of the discharge summary is well evidenced, both anecdotally and in the literature. It is well acknowledged that better discharge paperwork is necessary to enable patients to receive safe and efficient after-hospital care. Individual interventions, including teaching or feedback, have been the subject of previous research. With a thorough overhaul of discharge documentation instruction and feedback, our continuous quality improvement effort seeks to raise the standard of discharge documentation at our hospital.

The smoother transition of patient care is undoubtedly a function of improved discharge summaries. According to a recent study, patients who received the recommended information in their discharge summaries had lower readmission rates after being hospitalized for heart failure exacerbations [2]. A different study discovered that when discharge summaries were improved, patients who had neck-of-femur fractures had higher prescription rates for denosumab [3]. More research revealed that when efforts were made to enhance post-tonsillectomy summaries, patients' satisfaction with their discharge summaries increased [4].

Nowadays, many patient record systems are computerized, including in our hospital. This enables the pre-population of discharge summaries with data taken straight from the patient notes, this may have benefits for the completion of discharge summaries. In a previous study, electronic discharge summaries were found to have a higher likelihood of accurately reporting medication changes than paper summaries [5]. Naturally, great care needs to be taken to make sure this is completed accurately, that the most recent documentation is included, and that no subsequently made changes are overlooked.

Superior discharge documentation directly benefits patients in addition to healthcare providers. Based on a comparison of follow-up appointment attendances and non-attendances, patients were found to be significantly more likely to attend their appointment if the appointment time was included in the discharge summary as opposed to not including it [6,7].

Approximately 3,500 patients are discharged from the Royal Devon & Exeter Hospital (RD&E), a sizable teaching facility, each month. Among these patients, the national target of two working days after discharge for discharge summaries to be sent to GPs is not met by 22.6% of the patients [8]. This result simply goes with our earlier pre-intervention findings, which showed that only 19% of respondents approved the discharge summary. Additional steps to improve quality included educating doctors, auditing compliance with writing and signing, approving DC summary forms, and reminding patients to finish DC summary forms within 48 hours of patient discharge. All of these actions have been previously studied and shown to yield positive results [9].

LIMITATIONS

This study carried some limitations; the first limitation is the shortage of staff such as IT programmers at KFMMC-Dhahran which makes further change in the HIS system is difficult and limited to the changes that have been done to date. The second limitation is the unavailability of auditing teams in each department to follow up the compliance of physicians and their quality performance.

CONCLUSION

The quality of DC summary documentation, patient safety, and the rate of delinquent DC summary reports could all be improved by lowering the non-compliance rate with writing or approving the discharge summary by implementing an electronic DC summary, mandating process, with notification and SMS reminder about the missing written or approving DC summary, along with continuous auditing and educational sessions.

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PUBLIC PERCEPTIONS AND UTILIZATION OF COMMUNITY PHARMACIES AND PHARMACISTS: A QUALITATIVE STUDY IN INDONESIA

Muhammad Qowiyul Amin¹, Tasya Hardina Adha², Anna Wahyuni Widayanti^{3*}

1. Master Student in Pharmacy Management, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia
2. Master Student in Pharmaceutical sciences. Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia
3. Department of Pharmaceutics, Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia.

Correspondence: wahyuni_appt@ugm.ac.id

ABSTRACT

BACKGROUND:

Pharmacists in community pharmacies are essential healthcare providers, offering high-quality and affordable drug services. However, in some countries and notably in Indonesia, they are often wrongly perceived as drug dispensers. This misconception is fuelled by a low pharmacist-to-population ratio, limited counselling, and infrequent interactions with pharmacists. Understanding these perceptions is crucial for enhancing pharmacy services and ensuring communities can access quality and affordable healthcare.

OBJECTIVE:

To assess the knowledge and perceptions of individuals regarding pharmacists and the utilization of community pharmacies in Semarang and Palembang, Indonesia.

METHODS:

Qualitative phenomenological research was conducted using in-depth interviews. Participants were recruited through purposive sampling from Semarang and Palembang Cities from October through December 2021. The inclusion criteria: aged >18 years, having visited a community pharmacy within the last 6 months, and possessing good communication skills. The interviews were recorded, transcribed verbatim, and analysed thematically using a deductive approach guided by the KAP framework.

RESULTS:

We included 22 participants in this study. Most participants recognized community pharmacies as drug shops and considered pharmacists as regular employees rather than healthcare professionals. Only a few participants had received counselling from pharmacists. Participants frequently purchased Over the Counter (OTC) medications such as analgesics and antipyretics from community pharmacies. Occasionally, they also bought antibiotics, antihypertensive, and other drugs. There are several factors that participants took into account when visiting community pharmacies such as accessibility, drug availability, and drug quality.

CONCLUSION:

Pharmacists must lead patient-centred care initiatives to address public health disparities and solidify their indispensable role within healthcare systems.

KEYWORDS

pharmacist, community pharmacy, perception, knowledge, pharmacies utilization

INTRODUCTION

The role of health services is strategic in enhancing public health [1]. As a critical component of healthcare systems, community pharmacies provide accessible pharmaceutical services through pharmacists, who are positioned to deliver patient education, resolve drug therapy issues, and promote appropriate medication use [2, 3, 4, 5]. Ideally, these pharmacies should offer pharmaceutical advice to all societal segments, including underserved populations, by providing affordable services such as reducing hospitalization costs linked to inadequate care or adverse drug reactions [6, 7, 8]. In Indonesia, national standards mandate comprehensive pharmaceutical services, including prescription assessment, drug dispensing, counselling, and therapy monitoring, ensuring high-quality care for pharmacy customers [9].

Despite this potential, global studies highlight systemic underutilization. Pharmacies are seldom consulted for minor illnesses, even in populations with high prevalence rates [10, 11]. Public perception remains a barrier: few individuals view pharmacists as patient-centered professionals, often associating them with commercial motives [6, 12]. In Indonesia, this gap is more pronounced. Pharmacists are predominantly perceived as drug sellers or cashiers [13], despite their capacity to provide clinical services like medication counselling, treatment evaluation, and health promotion [14].

Compounding this issue is the scarcity of pharmacists, particularly in rural areas, which limits direct public interaction and perpetuates misconceptions [15]. While Indonesia enforces robust pharmaceutical service standards [9], the lack of pharmacist availability undermines their implementation. This disconnect between policy and practice restricts opportunities for pharmacists to demonstrate their healthcare contributions, further entrenching their marginalized professional image.

Positive public perception of pharmacists correlates with reduced medication errors, emphasizing the need to align community understanding with pharmacists' roles [11]. To address this, our study explores public knowledge and perceptions of pharmacists and community pharmacy utilization in Semarang and Palembang, Indonesia, representing diverse urban and healthcare landscapes.

METHODS

STUDY DESIGN

This study was designed qualitatively with face-to-face semi-structured interviews to get a deeper understanding of how individuals interpret their experiences [16]. This study uses a phenomenological approach to find out the important phenomena in the participants' lives [17]. The phenomena investigated in health research may have to do with people's health and sickness, medical treatment, or systems for delivering healthcare that are viewed, used, or experienced subjectively [18]. In this research, the phenomenon studied was the perception of pharmacists and community pharmacy utilization among the people of Semarang and Palembang City, Indonesia.

LOCATION AND PARTICIPANTS

This study was conducted in Semarang and Palembang city from October until December 2021. Semarang is the capital city of Central Java Province and is located on Java Island, the most populous island, inhabited by more than 151.6 million people, or about 56.10% of Indonesia's total population, while Palembang is the capital city of South Sumatra Province, located on Sumatra Island, the second most populous island inhabited by more than 58.6 million people, or about 21.68% of Indonesia's total population [19].

The inclusion criteria for participants included people who were over 18 and who had used a community pharmacy over the previous six months. Participants with health education backgrounds or who worked in medical institutions were excluded from this study. Participants were recruited using purposive methods until saturation of themes was achieved. The participants get the first information about the study from an announcement on the researcher's social media. If they consented to participate and met the criteria, they were asked to sign an informed consent, and the researchers would then provide more information.

DATA COLLECTION

The interview guide developed for this study could be expanded depending on participants' responses. The questions posed to the participants were prepared based on a research framework that had been developed from the Knowledge, Attitude, and Practice (KAP) theory [20]. All interviews were conducted by the first and third authors and an undergraduate student specializing in social pharmacy with a qualitative research focus, actively trained in qualitative research methodologies. During the study, the interviewers were supervised by the second author, a lecturer specializing in social pharmacy research with over five years of experience in qualitative studies.

The semi structured interview guidelines were divided into two sections. The first section was about sociodemographic data from the participants which included age, gender, job, education, and disease history. The second section is the main question that was made into three groups as the theme of this study. The first one was knowledge and perception about community pharmacies; the second was knowledge and perception about a pharmacist; and the last was the factor that influences and inhibits the use of community pharmacies.

The main questions were as follows: 1) What do you think about pharmacists? Could you please tell me anything you know about pharmacists? 2) Could you please tell me about your experience of visiting pharmacies? 3) What are the barriers or difficulties you experience when visiting pharmacies? 4) What is your intention or motivation to go to pharmacies? Pilot testing was carried out on two people from Semarang and Palembang City. This pilot testing was conducted to assess whether the questions that have been developed are easy to understand and can all be answered as the researcher expected. To minimize bias, all participants were encouraged to clarify their responses during the interview process. The saturation was achieved at the 9th and 11th interview in Semarang and Palembang respectively; however, additional interviews were carried out further to confirm the saturation of the data.

DATA ANALYSIS

The interview data were transcribed verbatim in the original language (Bahasa Indonesia) and analysed using the original transcripts. Interview accuracy and consistency were verified by cross-checking the transcripts with audio recordings. After analysis, the data were translated into English by professional translators. The analytical process comprised three stages: (1) preparation (comprehensive data familiarization), (2) organization (data reduction and thematic categorization aligned with the KAP framework: Knowledge, Attitude, and Practice (experience in visiting community pharmacies)), and (3) reporting (presentation of findings in tables and narrative prose). Analysis began during data collection and continued until saturation was achieved through iterative thematic analysis, with recruitment continuing until no new themes emerged, halting further data collection. Coders independently analysed the data, then convened to resolve discrepancies, compare similarities/contrasts, and identify common themes. All authors participated in discussions to finalize coding, ensuring accuracy. Consensus on coding outcomes preceded result interpretation.

ETHICS APPROVAL

Ethics approval was submitted to and granted by the Ethics Committee of the Faculty of Medicine, Public Health, and Nursing (FKKMK) UGM and has been approved with the approval number Ref. No. KE/FK/1093/EC/2021.

Prior to the interview, participants were informed about the study, and written informed consent was obtained as confirmation of their consent. The researcher keeps participant information private and excludes it from research papers and publications. Souvenirs were given out as a thank you to the participants.

RESULTS

Twenty-two people from Semarang and Palembang participated in this qualitative study. The participants were between the ages of 21 and 67. The participants' educational backgrounds varied, whereas the majority of them had graduated from high school (Table 1). The results of this study described some community pharmacy and pharmacist issues from the participants' point of view that affect how they use community pharmacies. According to the conceptual framework we used to construct the study, we divided these problems into three categories: knowledge and perception of community pharmacies; knowledge and perception of pharmacists; and experience on visiting community pharmacies. Examples of quotes that fall into these categories are included in Table 2.

TABLE 1. CHARACTERISTICS OF PARTICIPANTS IN THIS STUDY

Characteristics	Participants	
	Number	Percentage (%)
Gender		
Male	9	41
female	13	59
Age (years)		
18-39	9	41
40-59	10	45
60-79	3	14
Education		
Elementary School	3	14
Junior High School	2	9
Senior High School	10	45
Undergraduate	5	23
Postgraduate	2	9
Occupation		
Students	4	18
Housewives	5	23
Employees	6	27
Retired	2	9
Civil servants	2	9
Teacher	1	5
Private employee	2	9

TABLE 2. THEMES, SUBTHEMES, CATEGORIES, AND CORRESPONDING SAMPLE QUOTES IDENTIFIED IN THIS STUDY

Themes	Subthemes	Categories	Sample Quotes
Knowledge and perception on	Knowledge about community pharmacy	Knowledge about community pharmacy	"A pharmacy is similar to a drug store as it sells medications but is required to have a legal permit and a pharmacist. Subsequently, pharmacies need to follow their own regulations and guidelines." (Participant 4)

community pharmacy			"Pharmacies in general are places that provide medicines, including herbal medicines, and also provide consultation with pharmacists. It's more convenient for us than making a doctor's appointment" (Participant 5).
	Perception about community pharmacy	Perception of drug availability	"Usually, if there's a pharmacy in a doctor's clinic or hospital, the medicine availability is good. But if the pharmacy is far away from the city, the availability of the drug is bad" (Participant 20)
			"The OTC medicines are completely available, however, most of the prescribed medicines are not available in several pharmacies, so sometimes it's hard to find them" (Participant 12)
		Perception of community pharmacy's services	"A pharmacy must prioritize the maintenance of medicine quality. Providing inappropriate medications to patients can result in the loss of consumer trust and loyalty, which, in turn, can have severe financial consequences, potentially leading to bankruptcy." (Participant 9).
			"I've had instances where the pharmacist provided me with costly medications without my consent. On another occasion, when I purchased minoxidil, I received the incorrect concentration percentage." (Participant 13)
Knowledge and perception on pharmacist	Knowledge about pharmacist	Knowledge about pharmacist	"A pharmacist is someone who has completed a bachelor's degree in pharmacy and continues in the pharmacist profession program. The pharmacist is in charge of everything, including drug issues at the pharmacy. " (Participant 6)
			"I've heard about pharmacists, but I don't know what they do. I only know pharmacy; I believe pharmacists and pharmacies are the same thing" (Participant 17)
	Perception about pharmacist	Perceptions of pharmacists in general	"Generally, pharmacists wear a uniform. In my opinion, the pharmacist's availability doesn't matter for me. I just paid for the medication I needed, bought it, and that was it." (Participant 7).
			"As far as I know, the pharmacist does not work at the front desk; she works from behind. The pharmacist prepares the medicine, and after that, the medicine is given to us by the front desk person." (Participants 19)
		Perceptions of pharmacist consultation	"There are several pharmacies that have counselling facilities. The counselling was conducted in-person with the pharmacist and is informative and helpful. Other pharmacies, however, don't always offer consultation services.." (Participant 5).

			"The pharmacist's counsel usually only focuses on when, how, and how much to take the medication. However, they did not discuss the side effects of the medications.." (Participant 13) "According to my observations, counselling is available in the hospital pharmacy, but I've never seen it at a community pharmacy. I never asked the pharmacist about a drug; instead, I prefer to look it up on the internet on my own." (Participant 7).
Experience on visiting community pharmacies	Community pharmacy utilization	Commonly purchased medications	"The most common drugs that I bought were OTC drugs like paracetamol, vitamins, and sometimes I bought antibiotics as well" (Participant 1).
			"Due to a more than 10-year history of heart disease and hypertension, I must take medication every day. So I purchased bisoprolol, ramipril, and amlodipine as my routine medicines." (Participant 21)
		Frequency of visits	"I'll visit the pharmacy once a week because my family has a tendency to stockpile medications. We are confident that the pharmacy will provide guaranteed medications, which we would then resell, but only for OTC drugs" (Participant 1).
			"Depending on the situation and condition, it is typically necessary to buy only OTC drugs like paracetamol, indigestion medications, and dental care products." (Participant 15)
		Behaviour in treating minor illnesses	"I'll go to the pharmacy first, and if it gets worse, I'll go to the public health center" (Participant 8).
			"I'm an old-fashioned person, so I won't take medication if I'm feeling sick. I'll scrape (kerokan in Bahasa) first, and then I'm good to go. I only take medicine if it's necessary" (Participant 3).
			"If it's just a minor illness, I usually choose to rest, eat a lot, or take vitamins instead of taking medicine. because of my stigma that medicine is poison, I prefer vitamins." (Participant 19)
	Enabling factors in community pharmacy use	Motivations for choosing community pharmacies	"To buy a medicine and its affordability in terms of price and distance. Because making an appointment with a doctor is expensive, I prefer go to the pharmacy" (Participant 1)
			"To buy some medicines such as vitamins, supplements, and others common drugs that are used daily. I'd rather go to pharmacy because it's a legal and trusted place to buy

			drugs, also the drugs are safe and guaranteed" (Participants 20)
		Considerations in community pharmacy selection	"Facilities that are available at the pharmacy. Some pharmacies don't have accessibility for wheelchair users. So I hope that every pharmacy is aware of this and furthermore I hope that pharmacy will not charge more than the standard price for the medication. " (Participant 7)
			"The first consideration is the price; I prefer the cheaper ones. Second is the speed of the services, and third is the availability of the medicine" (Participant 20)
	Barriers to community pharmacy utilization	Barriers to community pharmacy utilization	"Incomplete medicine dispensing equipment. I had an experience when I wanted to buy a medicine for my child, it had to be crushed before use, but it turned out there was no grinding tool available in the pharmacy, so I grind it myself at home using a spoon" (Participant 10).
			"The problem is related to the queue, sometimes I have to wait so long to get the prescription drug due to the patient queue and the compounding time. Another obstacle that I experience was related to the drugs availability" (Participant 12)

KNOWLEDGE AND PERCEPTION OF COMMUNITY PHARMACY

Most participants recognized that pharmacies were basically stores selling medicines, including over the counter (OTC) medicines, prescription medicines, vitamins, and supplements. Some participants further indicated that pharmacies also provided health tests (e.g., blood glucose, uric acid, cholesterol, and blood pressure tests) and consultations with pharmacists. Some participants mentioned that pharmacies were required by law to open a business and to ensure the quality of medicines they sold.

Perceptions of pharmacies centered on medication availability and service quality. Most participants reported that the medications they needed were consistently available, particularly common drugs like paracetamol, though prescription medications were less accessible. However, during the COVID-19 pandemic, some participants faced challenges obtaining vitamins. Participants also believed a pharmacy's location significantly influenced medication availability. Regarding services, most participants viewed pharmacies positively due to their friendly, efficient, and professional staff, and emphasized that good service encouraged repeat visits. A minority, however, criticized instances of being offered medications at high prices without prior consultation.

KNOWLEDGE AND PERCEPTION ON PHARMACIST

Most participants demonstrated limited understanding of pharmacists' roles, often perceiving them as regular pharmacy employees. Some could not distinguish pharmacists from other staff, while others conflated pharmacists with pharmacies entirely. A minority, however, provided detailed descriptions of pharmacists' responsibilities.

Participants generally viewed pharmacists as working behind the scenes, with no tangible impact on their experience. One participant explicitly stated that a pharmacist's presence (or absence) made no difference, as they perceived no direct benefits from pharmacist interactions. Most noted that pharmacists rarely provided counselling; when they did, interactions focused narrowly on dosing instructions, omitting critical details like potential drug interactions or side effects.

EXPERIENCE ON VISITING COMMUNITY PHARMACIES

A. Commonly purchased medications

Most participants visited pharmacies to purchase OTC medications for minor health complaints or to fulfill other health-related needs. Some reported buying antibiotics without prescriptions, while others regularly obtained prescription medications for chronic conditions like hypertension and diabetes.

B. Frequency of visits

Participants fell into two categories: those who visited pharmacies frequently (to stockpile OTC medications for resale or manage recurring prescriptions) and those who visited only when necessary.

C. Behaviour in treating minor illnesses

Many participants preferred pharmacies as their first choice for minor illnesses. If symptoms persisted after using pharmacy medications, they consulted doctors or visited public health centers. A minority opted for alternative remedies (e.g., rest, vitamins, or traditional practices like scraping), avoiding medications due to beliefs that they were “harmful like poison.”

D. Motivations for choosing community pharmacies

Participants favored pharmacies for their perceived simplicity and affordability compared to doctor visits, which often incurred additional consultation and diagnostic fees. They also trusted pharmacies as regulated sources of safe medications.

E. Considerations in community pharmacy selection

Key considerations included medication availability, pricing, service quality, convenient location, facilities, and drug suitability for their needs.

F. Barriers to community pharmacy utilization

Long wait times during peak hours were the most common issue. Others faced difficulties obtaining specific dosage forms (e.g., pediatric formulations) or encountered frequent stock shortages.

DISCUSSION

This study underscores how socioeconomic and educational disparities shape public interactions with pharmacies. Participants with higher education and income exhibited better understanding of pharmaceutical services, aligning with global evidence that health literacy correlates with educational access and socioeconomic status [21, [22]. Conversely, those with limited education and informal sector employment lacked awareness of pharmacists' roles [23], reflecting systemic inequities in healthcare access. Such gaps perpetuate underutilization of pharmacies as health hubs, despite their potential to bridge primary care needs in underserved communities.

Regarding drug availability, participants noted pharmacies reliably stock OTC medications like paracetamol [24], yet this commercial focus often overshadows regulatory compliance. For instance, during COVID-19, vitamin shortages occurred due to surging demand [25], while non-prescription antibiotics remained widely available—a direct violation of Government Regulation No. 51/2009 [26]. This misalignment between practice and regulation, particularly concerning antibiotic accessibility [27], risks long-term public health consequences, such as antimicrobial resistance [28]. Similarly, the prevalence of OTC purchases (e.g., analgesics, vitamins) [29] highlights pharmacies' prioritization of market demand over adherence to prescribing standards, further eroding trust in their clinical role. This gap likely stems from weak enforcement of Indonesia's drug regulations, allowing profit-focused practices to undermine patient safety.

Patient satisfaction with pharmacies hinges on operational factors like location, speed, and drug availability [30, 31], yet critical gaps persist in pharmacist-patient interactions. While dosing instructions are commonly provided, counselling on side effects, lifestyle adjustments, or chronic disease management is neglected [32], mirroring global shortcomings in

pharmacist communication [27]. This transactional approach contradicts Indonesia's regulatory mandate for pharmacist-led services [26] and undermines their potential in health promotion, medication safety, and emergency response [33, [34, 35]. For example, inadequate guidance on antibiotic use [27] or compounding services [9] exacerbates medication misuse, illustrating how operational pressures (e.g., long wait times, staffing shortages) compromise quality care.

To address these challenges, reforms must align pharmacy practices with public health objectives. Strengthening enforcement of Regulation particularly for antibiotic prescriptions and compounding standards [9] [27] [26] could curb non-compliance driven by commercial interests. Simultaneously, integrating public health training into pharmacy curricula would equip pharmacists to deliver comprehensive counselling, fostering trust and aligning services with WHO frameworks on primary healthcare [33]. Increasing public awareness about the roles and services of community pharmacies [36], expanding delivery services for vulnerable groups [37] and prioritizing patient education over mere transaction efficiency could further reposition pharmacies as equitable healthcare access points.

The main limitations of this study arise from the researcher's dual role as both data collector and interpreter. Due to the researcher's background as a pharmacy student, the focus may have leaned toward ideal healthcare protocols rather than patient-centered priorities like convenient pharmacy locations or affordable drug prices. Although efforts were made to reduce bias such as clarifying participant responses during interviews and discussing findings with fellow researchers. Additionally, recruiting participants solely through social media likely skewed the sample toward tech-literate urban populations, excluding rural communities. Expanding the inclusion period to six months also introduced recall bias, particularly among infrequent pharmacy users who may have described idealized rather than actual experiences.

CONCLUSION

High pharmacy utilization for minor illnesses is contrasted by low community knowledge of pharmacists' roles. To bridge this gap, pharmacists must take an active role in initiating patient education on medication use risks and chronic disease control with the support of mandatory counselling protocols and national health promotion campaigns. Future research should employ quantitative studies to measure the impact of pharmacist engagement on patient adherence and health outcomes, with expanded focus on rural Indonesia to address systemic healthcare disparities.

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AUTHORSHIP CONTRIBUTIONS

AWW conceptualized the study. MQA and THA analysed and interpreted the data. MQA drafted the article, reviewed and edited the manuscript. All authors read and approved the final version of the manuscript.

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COST EFFECTIVENESS OF CONTRACTING OUT VACCINATION SERVICES IN TWO DISTRICTS OF SINDH, PAKISTAN

Shiraz Shaikh*, Kashif Shafique

School of Public Health, Dow University of Health Sciences Karachi, Pakistan

Correspondence: shiraz.shaikh@jsmu.edu.pk

ABSTRACT

OBJECTIVES

To determine the differences in costs of providing vaccination services in contracted and non-contracted primary care facilities, and to analyze their effectiveness using vaccination volume data

DESIGN

Comparative case study

SETTING

The study was conducted from October to December 2024 in two contracted and two non-contracted districts in Sindh Province, Pakistan. Five primary healthcare centers were selected from each district. The CORE PLUS tool was used to estimate the costs.

MAIN OUTCOME MEASURES

Data on actual vaccination volumes, standard treatment guidelines, catchment population, staff salaries, vaccines and supplies, work distribution time, and operating costs were collected for a period of one year. Annual average costs and vaccination service volumes per 10,000 population were estimated and compared between contracted and non-contracted facilities. The incremental cost effectiveness ratio (ICER) was calculated by dividing the incremental costs by the incremental vaccination service volumes per 10,000 population.

RESULTS

The overall annual standard cost of vaccination services per 10,000 population was 14.8% higher in contracted facilities. Contracted facilities spent significantly more on salaries ($p=0.028$) and operating costs ($p<0.001$). A positive difference of 559.86 incremental vaccination doses per 10,000 population was observed in contracted facilities. The incremental cost effectiveness ratio (ICER) indicates that to provide one extra dose of vaccine, an additional \$US1.87 were spent in contracted facilities. Average cost per DALY averted was \$US137.12, which was within the threshold for contracting out to be a cost-effective intervention.

CONCLUSION

Contracting vaccination services resulted in higher service provision costs but was also effective in increasing service volumes.

KEYWORDS

cost effectiveness, contracting, vaccination services

INTRODUCTION

Childhood vaccination is one of the most important and cost-effective public health interventions for reducing child mortality, saving between 3.5 and 5 million lives annually [1]. However, one in every five children still lacks access to vaccines, with the majority residing in low and lower middle income countries [2]. Expanding vaccination coverage among underserved populations in these countries is currently a top priority to achieve the global goal of vaccines for all. Several demand-side and service delivery improvement interventions have been introduced to improve vaccination services in these settings. One such intervention is contracting out the management of services. The evidence on the effect of contracting on vaccination coverage, however, remains mixed. While some studies reporting significant benefits [3-5], others show no substantial effect [6,7]. Vaccination coverage in Pakistan ranges from 66% to 76.5%, while in Sindh province, it is around 49% to 64.7% [8-10]. To address the low coverage in Sindh, the management of the vaccination program was contracted out to a private non-government organization in two districts in 2017 [11]. While most studies assess the effectiveness of different interventions by evaluating service delivery indicators, there is limited evidence on the costs and cost effectiveness of these approaches [12]. Such studies are important to support planning and budgeting in low-resource settings. This study examines the differences in the costs of providing vaccination services in contracted and non-contracted primary care facilities and analyzes their effectiveness using vaccination volume data from both types of facilities.

METHODOLOGY

The study was conducted from October to December 2024 in two contracted districts (Dadu and Khairpur) and two non-contracted districts (Larkana and Sukkur). Twenty Basic Health Units (BHUs), which are the main primary healthcare centers in rural areas, were selected, including 10 contracted and 10 non-contracted facilities. One data collector, MBBS doctors, were hired and trained to collect data from each district. Data collectors submitted completed forms to the Principal Investigator in Karachi daily, who provided regular feedback on data quality. During the review process, completeness and accuracy was ensured. The data was stored in excel file. Data was collected for the period from July 2023 to June 2024.

To estimate the costs of providing vaccination services at the selected facilities, the CORE PLUS tool was used. This tool has been applied in several developing countries to estimate the costs of various primary healthcare services [13-16]. It calculates standard costs for different service categories based on the number of services provided in accordance with standard treatment guidelines (STGs). Separate CORE Plus files were developed for each BHU, incorporating data on actual annual vaccination volumes, STGs, the list and cost of vaccines included in the vaccination program, as well as catchment population, staff salaries, work distribution time, and operating costs. Vaccination volumes were obtained from routine BHU records. These included all vaccines administered to children from birth to 15 months of age: Bacillus Calmette Guérin (BCG), Hepatitis B, oral polio vaccine (OPV), injectable polio vaccine (IPV), pentavalent (PV), pneumococcal vaccine (PCV), rotavirus vaccine, measles-rubella (MR) vaccine, and typhoid conjugate vaccine (TCV). STGs defined the time required by each vaccinator to provide a specific service and the supplies needed. To calculate work distribution time, onsite interviews were conducted with the vaccinators to determine the average time spent on direct service delivery (e.g., administering vaccines) and administrative tasks (e.g., staff meetings, reporting, vaccine inventory maintenance, and temperature charting).

Vaccine prices were obtained from UNICEF's vaccine pricing data as of December 31, 2023 [17]. The information on the catchment populations, staff salaries, and operating costs was collected from the vaccination program's administrative office. Operating costs included utilities, stationery, transport, repairs, and maintenance.

The study was approved by the Institutional Review Board of Dow University of Health Sciences (IRB No. DUHS/IRB/2024/198). Official permission was obtained from the Director General Health Services Sindh to conduct the study.

DATA ANALYSIS

Costing analysis is performed to identify the context-specific needs for adequate resource allocation and financial sustainability. The bottom-up approach for costing services identifies all resources required to provide a service in a given period of time and also explores the cost drivers, including both direct and indirect costs [18-20]. Additionally, cost effectiveness analysis helps in comparing the costs and outcomes of two different interventions. This analysis helps identify the more effective approach in terms of service volumes and any associated incremental costs [21].

For the costing analysis, since the catchment populations of the selected facilities ranged from 10,210 to 44,000 people, overall costs and vaccination volumes were standardized per 10,000 population. This was done by dividing each facility's total estimated costs and volumes by its catchment population and then multiplying by 10,000. The average annual standard cost of vaccination services, along-with a breakdown into salaries, vaccines and supply costs, and operating costs, was compared between contracted and non-contracted facilities. The percentage difference in expenditure was calculated by dividing the non-contracted facility expenditures with those of contracted facilities. The average cost per service (overall and by vaccine) and the average number of vaccinators available per 10,000 population were also estimated and compared. Differences in average service volumes and staffing were analyzed using the Independent T-Test. All cost estimates, which did not meet the assumptions of normality, were compared using the Man-Whitney U Test. A p-value of <0.05 was considered statistically significant.

To assess cost effectiveness, the incremental cost effectiveness ratio (ICER) was calculated by dividing the incremental costs by the incremental vaccination service volumes per 10,000 population. Incremental costs were obtained by subtracting the average costs per 10,000 population in non-contracted facilities from those in contracted facilities. Similarly, incremental vaccination service volumes were computed by subtracting the average vaccination doses per 10,000 population in non-contracted facilities from those in contracted facilities.

DALYs averted per vaccine dose were estimated using the data from the global burden of disease data, vaccine efficacy figures, and coverage duration assumptions relevant to lower middle income countries. Estimates for Hepatitis B, PV, Rota, PCV and MR were acquired from Vaccine Impact Modelling Consortium (VIMC) data [22-23]. For BCG, OPV, IPV, TCV, DALYs averted per dose were derived from literature-supported assumptions [24-28]. Table 1 provides details of these assumptions. Cost per DALY averted was derived by dividing each vaccine's ICER by its estimated DALYs averted per dose. This allowed direct comparison with cost-effectiveness thresholds. All estimated costs were converted from Pakistani rupees (PKR) to US dollars (US\$) based on exchange rate as of December 31, 2023, with one US\$ equal to 281.5 PKR.

TABLE 1: ASSUMPTIONS USED TO ESTIMATE DALYS AVERTED PER VACCINE DOSE

Vaccine	Source	Conversion
BCG	Trunz BB 2006 (24) Menzies NA 2021 (25)	Cases prevented per 100,000 doses: 40 DALYs per case: 12.1 DALYs per dose: $(40 \times 12.1) / 100,000 = 0.004$
OPV	GPEI 2024 (26) Auzebbergs M 2025 (27)	1 case prevented per 625 doses DALYs per case=14 DALYs per dose: $14/625=0.022$
Hep B	Toor J etal 2021 (22)	270 DALYs per 1000 fully vaccinated children with 3 Doses 90 per dose per 1000 children= $0.09/\text{dose}$
IPV	GPEI 2024 (26) Auzebbergs M 2025 (27)	1 case prevented per 625 doses DALYs per case=14 DALYs per dose: $14/625=0.022$
ROTA	Toor J etal 2021 (22)	44 DALYs per 1000 fully vaccinated children with 2 Doses 22 per dose per 1000 children= $0.022/\text{dose}$
PENTA	Toor J etal 2021 (22)	160 DALYs per 1000 fully vaccinated children with 3 Doses 53.3 per dose per 1000 children= $0.053/\text{dose}$

PCV	Toor J et al 2021 (22)	190 DALYs per 1000 fully vaccinated children with 3 Doses 63.3 per dose per 1000 children=0.063/dose
MR	Toor J et al 2021 (22)	420 DALYs per 1000 fully vaccinated children with 2 Doses 210 per dose per 1000 children=0.21/dose
TCV	Phillips MT 2023 (28)	0.67 DALYs per 1000 doses=0.00067/dose

RESULTS

The availability of vaccination staff per 10,000 population was higher in contracted facilities compared to non-contracted facilities (Table 2). A significantly higher volume of services were provided by contracted facilities. The overall annual standard vaccination services costs per 10000 population were 14.8% higher in contracted facilities; however, this difference was not statistically significant ($p=0.059$). Vaccines and supplies accounted for nearly two thirds of the of the total costs (63.2% in contracted and 66.2% in non-contracted), followed by salaries and operating costs. While there was no significant difference in expenditures on vaccines and supplies ($p=0.151$), contracted facilities spent significantly higher on salaries ($p=0.028$) and operating costs ($p<0.001$).

TABLE 2: COMPARISON OF THE SERVICE VOLUMES, COSTS AND STAFFING OF VACCINATION SERVICES PER 10,000 POPULATION AT CONTRACTED AND NON-CONTRACTED FACILITIES

	Contracted Facilities Mean (SD)	Non-contracted Facilities	Percentage Difference	p-value
Average Service Volumes	5116.12 (596.42)	4556.26 (426.70)	+10.9	0.027
Average staffing	0.98 (0.32)	0.51 (0.11)	+47.9	0.001
Costs				
Average Salaries cost	US\$=2393.62 (476.37) 33.6% of total costs	US\$=1955.3 (448.6) 32.2% of total costs	+18.4	0.028
Average Vaccines and Supplies cost	US\$=4502.31 (896.01) 63.2% of total costs	US\$=4020.11 (922.47) 66.2% of total costs	+10.8	0.151
Average Operating Costs	US\$=227.96 (45.37) 3.2% of total costs	US\$=97.16 (22.29) 1.6% of total costs	+57.4	<0.001
Average Total Standard Cost per 10,000 population (Min-Max)	US\$=7123.92 (1417.75) (5477-9401)	US\$=6072.65 (1393.45) (4459-8800)	+14.8	0.059
Independent T-Test applied to compare service volumes				
Man-Whitney U Test applied to compare staffing and all cost				

No statistically significant differences were found in overall or individual average cost per service between the two groups (Table 3). The overall average cost per service was \$US1.47 in contracted facilities and \$US1.42 in non-contracted facilities. The highest average cost per service was observed for rotavirus vaccines, followed by IPV and TCV.

A positive difference of 559.86 incremental vaccination doses per 10,000 population was observed in contracted facilities (Table 4). Incremental volumes were particularly higher for OPV, PV, PCV and MR vaccines. The incremental cost effectiveness ratio (ICER) indicates that an additional \$US1.87 was spent in contracted facilities to deliver one extra dose of vaccine. ICERs were particularly higher for rotavirus, IPV, TCV and Hepatitis B vaccines. The average cost per DALY averted was \$US137.12.

TABLE 3: COMPARISON OF AVERAGE COST PER VACCINE DOSE IN CONTRACTED AND NON-CONTRACTED FACILITIES (\$US)

	Contracted	Non-contracted	p-value
BCG	0.28 (0.07)	0.26 (0.09)	0.171
Hep B	1.22 (0.21)	1.16 (0.29)	0.129
OPV	0.20 (0.05)	0.19 (0.07)	0.183
PV	2.02 (0.21)	1.96 (0.29)	0.096
PCV	0.73 (0.21)	0.65 (0.25)	0.129
Rota	3.23 (0.21)	3.17 (0.29)	0.095
IPV	2.53 (0.21)	2.47 (0.29)	0.095
MR	0.78 (0.10)	0.74 (0.14)	0.118
TCV	2.23 (0.21)	2.17 (0.29)	0.095
Total	1.47 (0.17)	1.42 (0.22)	0.105
Man-whitney U Test applied			

TABLE 4: INCREMENTAL COSTS (\$US) AND INCREMENTAL VACCINE DOSES PER 10,000 POPULATION IN CONTRACTED AND NON-CONTRACTED BHUS

	Annual Average costs (US\$)			Annual Average service volumes			ICER IC/IV	DALY/ Dose	Cost per DALY averted
	C	NC	IC	C	NC	IV			ICER/DALY
BCG	77.29	66.86	10.43	267.07	257.56	9.51	1.09	0.004	272.50
Hep B	330.49	295.08	35.41	267.07	257.56	9.51	3.72	0.090	41.33
OPV	220.28	173.19	47.09	1034.48	912.18	122.30	0.38	0.022	17.27
PV	1674.27	1401.54	272.73	816.49	713.90	102.59	2.65	0.053	50.00
PCV	623.49	489.44	134.05	817.90	717.97	99.93	1.34	0.063	21.26
ROTA	1778.34	1566.71	211.63	545.81	496.86	48.95	4.32	0.023	187.82
IPV	1348.64	1235.29	113.35	531.07	501.85	29.22	3.87	0.022	175.90
MR	450.78	335.93	114.85	562.06	460.13	101.93	1.12	0.21	5.33
TCV	620.28	508.57	111.71	274.18	238.21	35.97	3.10	0.0067	462.69
Total Doses	7123.89	6072.65	1051.24	5116.12	4556.26	559.86	1.87		Average=137.12
C=Contracted, NC=Non-contracted, IC=Incremental Costs, IV=Incremental Volumes ICER=Incremental Cost-effectiveness ratio DALY=Disability adjusted life years Red highlighted Costs/DALY indicate that values surpass thresholds recommended by Ochalek et al.									

DISCUSSION

This study provides insights into the cost differences in the provision of vaccination services under two distinct management models and evaluates their effectiveness based on vaccination volumes achieved by each. Overall, expenditures in contracted facilities were significantly higher for salaries and operating costs. This additional expenditure contributed to better human resource availability and higher volumes of vaccination services. Incremental volumes were particularly greater for OPV, PV, PCV and MR, suggesting better continuity of vaccination post-birth in the contracted districts.

Although overall costs were higher in contracted facilities, the cost per service was nearly identical. This finding supports the concept of the economies of scale, whereby the cost per service decreases as service volumes increase due to greater operational efficiency [29]. As expected, the cost per service was highest for more expensive vaccines such as rotavirus, IPV, and TCV.

This study found that vaccines and supplies constituted almost two thirds of the total costs followed by salaries and operating costs. In contrast, other studies on costing of vaccination programs have reported salary expenditures to exceed vaccines and supply costs [30-33]. This discrepancy may be attributed to the broader scope of those studies, which included district and provincial level management and transport salaries as well as fewer vaccines in their programs. Since this study was conducted at the facility level, the vaccination and supply costs covering a package of nine different vaccines outweighed the salary costs, which only included the salaries of vaccinators.

The overall ICER was \$US1.87, with values ranging from \$US0.38 to \$US4.32 for individual vaccines. As anticipated, higher ICERs were observed for more expensive vaccines. While few studies are available on incremental volumes of vaccination services resulting from contracting [3-5], there is no evidence available on cost effectiveness of contracting vaccination services. ICERs of other interventions aimed at improving vaccination coverage have ranged from \$US0.66 to \$US161.95 per child vaccinated, depending on the context, intervention costs, and the number of vaccines included. These interventions include community education campaigns [34-36], mop-up campaigns [37,38] and improvements in service availability [39].

The average cost per DALY averted was \$US138.7, ranging from \$US5.33 to \$US462.69 across individual vaccines. According to the World Health Organization, an intervention is considered cost-effective if the cost per DALY averted is less than average GDP per capita [40], which was \$US1574 for Pakistan in 2024 [41]. However, more recent thresholds account for country's economic capacity and health system feasibility, and recommend for a more conservative cutoff of \$US138–175 per DALY averted for Pakistan [42]. Using both thresholds, the average cost per DALY averted shows that contracting out was a cost-effective strategy. Nevertheless, costs per DALY were higher for vaccines with a lower effect on DALYs- such as BCG, ROTA, IPV and TCV- exceeding the threshold suggested by Ochalek et al.

LIMITATIONS

There are a few limitations in the study that may have led to underestimation of costs. First, the cost estimates exclude district level management and supervisory costs, focusing only on staff directly involved in provision of vaccination services. Second, the cost analysis was conducted solely from the provider's perspective and did not include costs incurred by service users, such as travel and time. Third, only recurrent costs were considered; capital costs, such as infrastructure and equipment, were excluded. Although, UNICEF estimates for cost per vaccine dose account for expected wastage, actual wastage data for the evaluation facilities was not available. Additional limitations include small scale of the study; limited to catchment areas of 20 facilities; and the skewed nature of data, which restricted the performance of a sensitivity analysis.

CONCLUSION

Contracting vaccination services resulted in higher service provision costs but also proved to be effective in increasing service volumes. This study lay the foundation for conducting similar assessments on a larger scale and over a longer

duration of time in future to assess the feasibility and long-term benefits of scaling up contracting management of vaccination services. Similar exercises for other health service reforms should also be conducted to enhance the allocative and technical efficiency of health services.

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FACEBOOK SENTIMENT ANALYSIS ON HEALTHCARE OF TIMOR-LESTE: ANALYSING PUBLIC PERCEPTION THROUGH SOCIAL MEDIA

Cristovão De Alexandria Barros, Marcelo Amaral Mali, Evalisa Adão Mendonça, Osmenia de Jesus Neto*

Timor-Leste National Institute of Public health, Timor-leste (INSP-TL)

Correspondence: crisbarros@iuj.ac.jp , ivanzeruwsky@gmail.com

ABSTRACT

This study investigates public sentiment toward healthcare in Timor-Leste using Facebook comments from four pages: the Ministry of Health, Guido Valadares National Hospital, ANTIL, and Jornal Independente.

Data from November 2023 to November 2024 were analyzed using Natural Language Processing (NLP) techniques, including Python's VADER sentiment analyzer. The study categorized sentiments as positive, neutral, or negative and identified key healthcare themes, such as medicine availability, good healthcare policy, poor healthcare management, and health services.

From the 2,095 comments analyzed, results reveal that positive sentiment dominates at 58.4%, followed by neutral (22.7%) and negative (18.9%). Comments on institutional pages showed predominantly positive sentiments, attributed to posts highlighting achievements and activities. Conversely, news agency posts received more negative sentiments due to coverage of issues like medicine shortages and hospital service criticisms.

The findings demonstrate the significant role of agenda-setting and social media framing in shaping public perceptions of healthcare. This analysis highlights the need for strategic communication and reforms in healthcare delivery to address public concerns. It underscores the importance of using social media as a tool for gathering public feedback and enhancing healthcare policies in Timor-Leste.

KEYWORDS

Timor-Leste, social media, Ministry of Health, Facebook, agenda-setting, sentiment analysis, healthcare

INTRODUCTION

BACKGROUND

Timor-Leste has improved its national health system since independence in 2002. However, there are still many public health issues facing the country. Based on the WHO [1] report, 23 % of Timorese women of reproductive age are anaemic, 47 % of children below five years of age are stunted, and 8.6 % suffer from acute malnutrition. Maternal mortality is still high, with 195 per 100,000 live births, and still 57% of births are attended by qualified health professionals [2]. In addition,

almost half of its population (42%) lives below the national poverty line [3]. The child mortality rate is 48.6 deaths per 1,000 live births, which is considered high in the region [4].

Regarding the internet usage, according to Kemp [5], Timorese Facebook users are 578.5 thousand, and internet users are 742.4 thousand. The Facebook users constituted 42.2 % of the population. With the number of internet and social media users that are quite high, it is very helpful for the public to get information about health and can have a positive impact on the government through their interactions and comments regarding the health services they receive and their satisfaction. That way, the government can improve what problems need to be fixed in the health sector. Of course, this can only be achieved through research related to social media sentiment analysis to find out public perception.

Significant obstacles confront Timor-Leste's healthcare system, including ongoing medicine shortages, a lack of public confidence, and social media criticism. Political meddling, poor inventory control, and a lack of coordination have all been blamed for stockouts, which have left health institutions without necessary medications [6]. Furthermore, even with free public healthcare, access is still unequal, with richer people using services at a rate that is almost twice as high as that of poorer populations. This is mostly because of transportation issues and bad experiences with medical personnel [7]. Due to decreased service usage brought on by fear of infection, the COVID-19 pandemic made these problems worse and further damaged public confidence in the system of healthcare [8].

Social media has developed into a forum for voicing discontent, drawing attention to structural flaws and the need for better healthcare delivery. This emphasizes how urgently reforms are needed to improve service quality and accessibility [9]. The state of healthcare in Timor-Leste is characterized by significant challenges and opportunities for improvement. Preventive health measures, such as health screenings for non-communicable diseases (NCDs), remain underutilized, particularly among males, rural residents, and those with lower education levels and income [10]. Additionally, traditional medicine plays a crucial role in rural healthcare, with many individuals relying on indigenous practices alongside formal healthcare systems, indicating a complex landscape of medical pluralism [11]. Access to healthcare is framed as a fundamental human right, yet disparities persist, particularly affecting vulnerable populations [12]. Maternal and child health services face quality issues due to resource constraints, inadequate infrastructure, and limited training for health workers [13]. As evidence, a study conducted in Europe showed that health professionals are increasingly using digital technologies, and there is a pressing need for further training to enhance their skills in this area [14]. Therefore, addressing these multifaceted issues is essential for improving health outcomes in Timor-Leste.

Medicine stockouts in Timor-Leste significantly impact healthcare outcomes and patient satisfaction. Research indicates that stockouts of essential medicines occur frequently, with community health workers experiencing shortages nearly one-third of the time, which is substantially higher than health centres [15]. This situation leads to increased out-of-pocket expenses for patients, poor adherence to treatment regimens, and overall dissatisfaction with healthcare services [15]. Factors contributing to these stockouts include poor coordination, inadequate inventory management, and a weak logistics system [6]. These systemic issues hinder the effective distribution of medicines, exacerbating the problem and affecting patient care. Furthermore, the lack of reliable data and infrastructure complicates efforts to address these shortages [6]. The cumulative effect of these challenges not only undermines health outcomes but also diminishes patient trust in the healthcare system, highlighting the urgent need for comprehensive reforms to improve medicine availability and patient satisfaction in Timor-Leste [16,17].

Moreover, the integration of culturally appropriate training and standard treatment guidelines is essential for improving medicine use and addressing stockouts. However, the lack of infrastructure and resources complicates these efforts, further diminishing trust in the system [6,18]. Thus, addressing these systemic issues is crucial for rebuilding public confidence in healthcare services in Timor-Leste.

Sentiment analysis, which offers understanding of patient experiences and attitudes, is essential to comprehending how the public views healthcare in Timor-Leste. This method, which makes use of natural language processing, enables medical professionals to evaluate the opinions expressed in social media, including patient reviews, among other types of feedback. Stakeholders can pinpoint opportunities for development and raise the standard of healthcare services by

examining this data. Sentiment analysis aids in assessing patient feedback by exposing their expectations of medical professionals as well as their degree of satisfaction [19].

The accuracy of sentiment analysis in understanding public perception is influenced by several key factors. Firstly, the choice of algorithms plays a crucial role; for instance, the NLTK Vader algorithm demonstrated superior performance in analysing sentiments related to COVID-19 vaccination, outperforming others like TextBlob and Flair NLP in accuracy [20]. For social media text analysis, including microblogs, VADER's rule-based method works well as it uses a sentiment lexicon with intensity ratings and is still a popular option because of its ease of use and efficacy. VADER is especially well-suited for social media content analysis due to its capacity to handle emoticons, acronyms, and online lingo [21,22,23].

LITERATURE REVIEW

Previous research on sentiment analysis in healthcare, particularly in developing countries, highlights the growing importance of extracting insights from patient feedback to enhance healthcare services. A systematic review emphasizes the role of cognitive analysis in understanding user opinions, especially post-COVID-19, to improve healthcare systems through advanced machine learning techniques [19]. Another study discusses the application of sentiment analysis to assess patient attitudes, which is crucial for improving service quality and patient satisfaction during hospitalization [24]. Moreover, the introduction of specialized tools like SentiWordNet Adjusted Vader Sentiment Analysis (SAVSA) demonstrates a tailored approach to understanding emotional tones in medical contexts, addressing challenges faced by conventional methods [25]. Research indicates that social media platforms are valuable sources of patient opinions, which can significantly influence health-related policymaking and service recommendations. However, challenges such as language peculiarities and data privacy remain critical considerations in the effective implementation of sentiment analysis in these settings [26]. Overall, these studies collectively underscore the potential of sentiment analysis to transform healthcare delivery in developing countries.

Social media has become a crucial forum for public debate, greatly impacting healthcare policies by enabling in-the-moment interaction between the public and decision-makers. It improves public health literacy and community engagement by acting as a channel for the dissemination of health information, raising awareness, and influencing policy changes [9,28]. Health organizations may publish educational content and collect public opinion on social media platforms like Facebook, Instagram, and Twitter. This information can be used to influence policy choices and rally support for health initiatives [29,30]. But the spread of false information presents problems as it might skew public perception and prevent people from making well-informed decisions [9]. Therefore, social media requires rigorous management to preserve the trustworthiness of information and to protect public health interests, even when it provides chances for advocacy and involvement [30].

Government postings on Facebook can result in more attention in mainstream media, demonstrating the reciprocal interaction between social media platforms and conventional media agendas [31]. By influencing how news stories are shared and how people engage with them, private news organizations have a big impact on public opinion on Facebook. They play a variety of roles, including news presentation, user interaction, and the influence of bias and dependability on public opinion. Content produced by private news organizations is frequently more intensely engaged with by consumers in private contexts than in public ones. This implies that in private groups, conversations on news stories are more complex and intimate [32].

Users choose news that is untrustworthy and slanted to the right, suggesting that the kind of material that is disseminated might influence public opinion in favour of viewpoints [32]. Moreover, Facebook and other social media platforms act as arenas for conflicting narratives, where news framing may sway social movements and rally political support [33].

RESEARCH PROBLEM

Community perceptions of health services in Timor-Leste vary. Will influence their behaviour, such as preference for medical consultation at the private clinic, loss of trust in public health facilities, and loss of trust in the effectiveness of the drug from public hospitals. In addition, there is almost no research about the sentiment analysis of healthcare in Timor-

Leste. There are many criticisms on Facebook related to healthcare issues in Timor-Leste; people tend to generalize the responses on social media (Facebook) and take the conclusion based on those comments. There are a lot of debates and comments on social media regarding medicine stockouts, intra-hospital deaths of patients, and health services in general. That is why, with this research, the authors intend to present what exactly is the public sentiment towards healthcare is for a one-year period.

OBJECTIVES

The objectives of this study are to analyse public sentiment towards healthcare services in Timor-Leste based on comments from Facebook pages and to identify key issues and concerns raised by the public.

RESEARCH QUESTIONS

- What are the predominant sentiments (positive, negative, neutral) in Facebook comments about healthcare in Timor-Leste?
- Which issues are most frequently discussed and criticized?
- How do sentiments differ between different Facebook pages (Ministry of Health, National Hospital, news agencies)?

MATERIALS AND METHODS

STUDY DESIGN

This is a quantitative method study that used descriptive and exploratory design. First, a descriptive design because the primary focus of this study is to describe the sentiments expressed in Facebook comments related to healthcare in Timor-Leste for a one-year period. With this design, the authors are trying to understand the distribution of sentiments (positive, negative, neutral) and the nature of the issues discussed. Exploratory design because there is limited existing research on public sentiment towards healthcare in Timor-Leste as expressed on social media. With these research designs, this study aims to uncover new insights and patterns in public opinion that have not been previously documented.

RESEARCH METHODOLOGY

Sampling Method

This study used purposive sampling, a non-probabilistic sampling method, as it targeted specific Facebook pages and specific posts related to healthcare issues. The population of this study is all comments on healthcare issues from November 2023 until November 2024. The sample of this study is all comments from posts about healthcare issues on four Facebook pages mentioned earlier for a one-year period.

The inclusion criteria in this study are all comments in Portuguese, Tetum, English, or any other language from posts relevant to healthcare services. The exclusion criteria are posts outside of healthcare issues, comments from posts not related to healthcare issues, spam, unrelated topics, duplicate comments, stickers, images, links, and emojis.

Facebook is the most used social media platform in Timor-Leste, making it the most relevant for this study. In December 2024, Facebook accounted for about 94% of mobile social media use, while Instagram and Twitter (X) were much lower, around 1.3% and 0.9%. In 2018, there were already around 390,000 Facebook users, about 30% of the population. Because of this wide reach, focusing only on Facebook makes sense, and excluding Instagram and Twitter is reasonable given their low use in the country. In addition to that, at the time of the assessment, there was no official page on Twitter (X) or Instagram of the targeted institution [34,35,36].

Data Collection

This study used secondary data, and the source of the data is comments from the posts related to healthcare issues for a one-year period collected from four Facebook pages. Two official Facebook pages of health institutions and two Facebook pages of news agencies (public and private news agencies). These pages are "Palácio das Cinzas" of the Ministry of Health of Timor-Leste, "Guido Valadares National Hospital—HNGV," "Jornal Independente," and "ANTIL" (Tatoli

National News Agency). The data are the user's comments on Facebook posts related to healthcare from these pages over a one-year period (November 2023-November 2024). The data were manually extracted and downloaded as Excel files using the Exportcomments.com tool. Data extracted are in Excel format, and there is one Excel file per post. Those separated files were then later merged as one file using a merger tool from Aspose.app.

Data Analysis

After cleaning the unnecessary columns and deidentification process, the data is then translated into English by the researchers manually and with the use of tools such as Google Translate.com and Tetun.org and later will be revised manually. The fact that Google Translate's accuracy in translating medical terms is limited [37] including Tetun, the Timor-Leste official language, means that human assistance is frequently required to improve AI-generated translations when translating culturally sensitive words, especially from Tetun into English. Several studies have shown that manual translation of comments in research might generate possible bias. Priyansha et al. [38] highlight the difficulty of maintaining cultural subtleties in translations and recommend employing sophisticated natural language processing models to give cultural sensitivity precedence above literal correctness.

In this research, during data translating, almost all comments are written in short sentences or abbreviated sentences, and some are mixed with other languages. So, it is very difficult and takes time to translate into English with Google Translate. In the translation phase, our research team fixes and completes the comments sentence structure so that it can be understood well by the translation machine (Google Translate and tetun.org). Useless words and emojis are removed during the data cleaning and translation process. Each comment is revised to make sure its meaning or significance is maintained, preventing deviation from the original meaning. Then, the results of the English translation were reviewed again manually to see whether they were really the same as the actual meaning of the comment.

The data is then processed using the programming language Python on Google Collab with the use of VADER and Lexicon libraries and the NLTK and Panda libraries for converting all words into lowercase, removing punctuation and stop words, and then tokenizing each word. Later, the VADER sentiment analyser was used to create a sentiment score for each word and finally interpret them into 3 categories, such as positive if the sentiment score is > 0.05 , negative sentiment if the score is < -0.05 , and neutral if the score is between -0.05 and 0.05 . Finally, after the results were obtained, the Matplotlib library was used to generate a visual graphic of the result, and the WordCloud library was used to generate a word cloud of the comment words.

The categories of positive, negative, and neutral were developed in order to adequately represent the wide variety of human emotions that are conveyed through text. A sophisticated comprehension of attitudes is made possible by this categorization, which is essential for applications in opinion mining, product evaluations, and social media. Since not all neutral feelings are created equal, the sentiment scores, which range from -0.05 to $+0.05$, are used to quantify the degree of neutrality. Since neutral attitudes may affect decision-making, this categorization is crucial for companies and organizations to appropriately assess public opinion [39]. Therefore, according to Bandyopadhyay et al. [40], this scoring approach can increase the precision of sentiment recognition, especially in situations with mixed emotions when sentiments may overlap.

ETHICAL CONSIDERATIONS

The data are obtained from an openly accessible public source, which is Facebook posts and comments, where the authors, both page admins and users, have accepted the Facebook (Meta) terms of service regarding the data use and privacy. Therefore, the consent information for both page admins and users is not needed. Even though, ethically, the authors of this study will keep secret the user's information through deidentification during data processing. Also, the data were stored in a password-protected computer where only authors had access. These data will be eliminated five years after the publication of this study. Therefore, no approval is needed from the Research Ethics Committee.

RESULTS

DESCRIPTIVE STATISTICS

From one year's period of comments extracted, the Ministry of Health's page "Palácio das Cinzas" got the highest number of comments. It is because the page is actively posting daily many activities of the minister and her vice ministers, such as meetings, speeches, site visits, and inaugurations. The page also actively posts health-related promotions, job vacancies, and many more. However, for the private sector news agency "Jornal Independente," the posts about health were fewer, and that is why the number of comments is also fewer.

TABLE 1: DISTRIBUTION OF COMMENTS FROM FOUR PAGES

No	Name of page	# of Posts	Percentage	# of Comments	Percentage
1.	Palácio das Cinzas	361	79.7%	1708	81.5%
2.	Guido Valadares National Hospital-HNGV	57	12.6%	162	7.7%
3.	Jornal Independente	12	2.6%	32	1.6%
4.	ANTIL	23	5.1%	193	9.2%
	Total	453	100%	2095	100%

SENTIMENT DISTRIBUTION

This section shows the sentiment distribution according to two categories. First, health institutions pages, and second, news agencies' pages. The sentiment distribution for "Palácio das Cinzas," the official page of the Ministry of Health of Timor-Leste (Figure 1), shows that from 1708 total comments, more than half of the comments (62.94 %) are positive, neutral sentiment accounts for 22.6%, and negative sentiment accounts for 14.46%, which is the lowest.

FIGURE 1: SENTIMENT ANALYSIS OF COMMENTS ON PALACIO DAS CINZAS POSTS

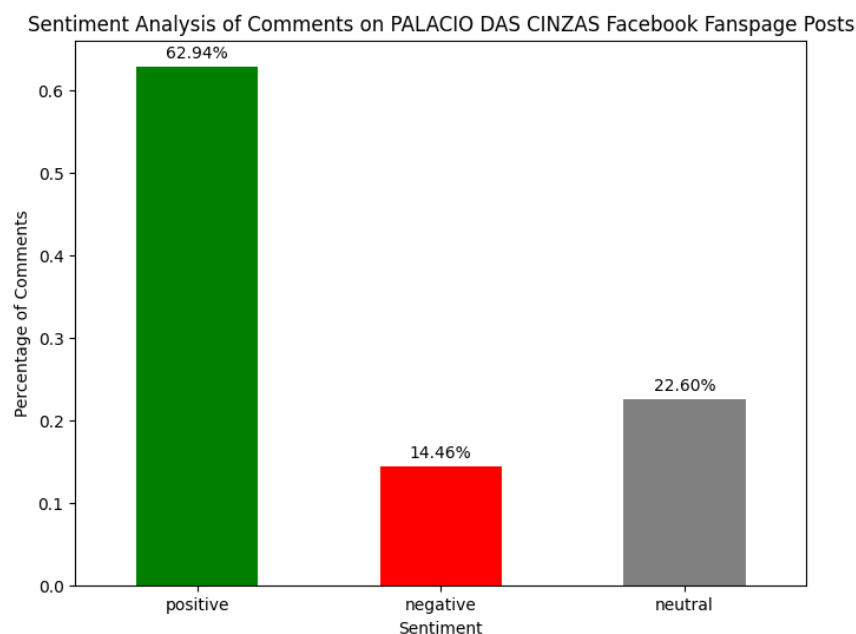
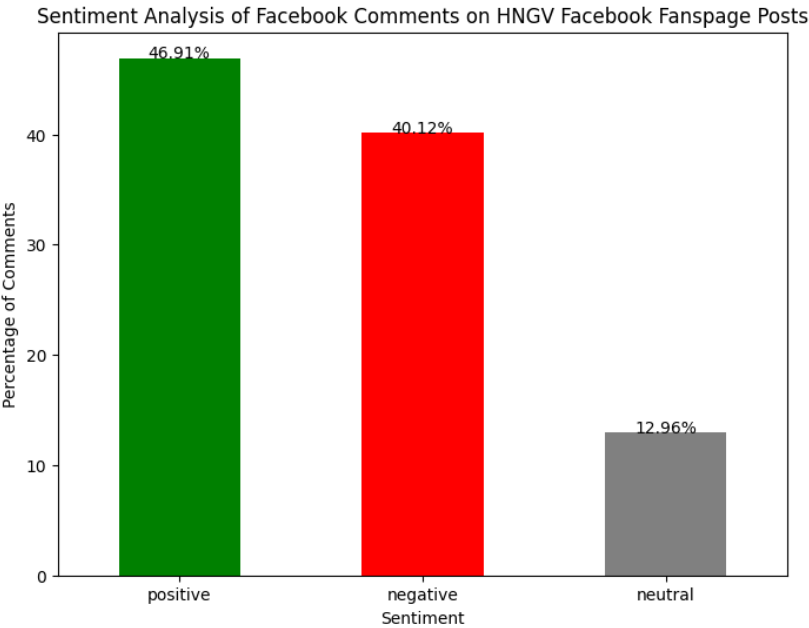


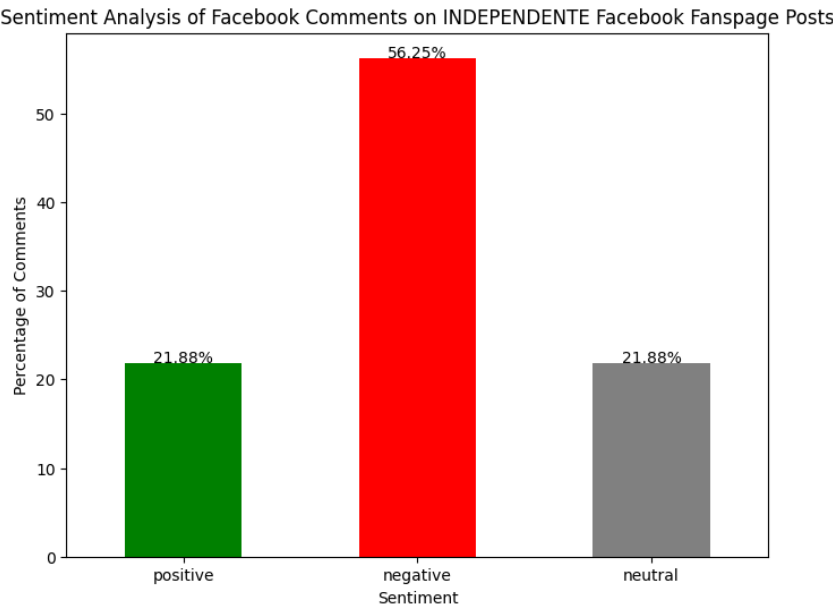
Figure 2 shows that from 162 total comments on the "Guido Valadares National Hospital-HNGV" page, 46.91 % are positive sentiment and 40.12 % are negative sentiment. The neutral sentiment is the lowest, with 12.96 %.

FIGURE 2: SENTIMENT ANALYSIS OF COMMENTS ON GUIDO VALADARES NATIONAL HOSPITAL-HNGV



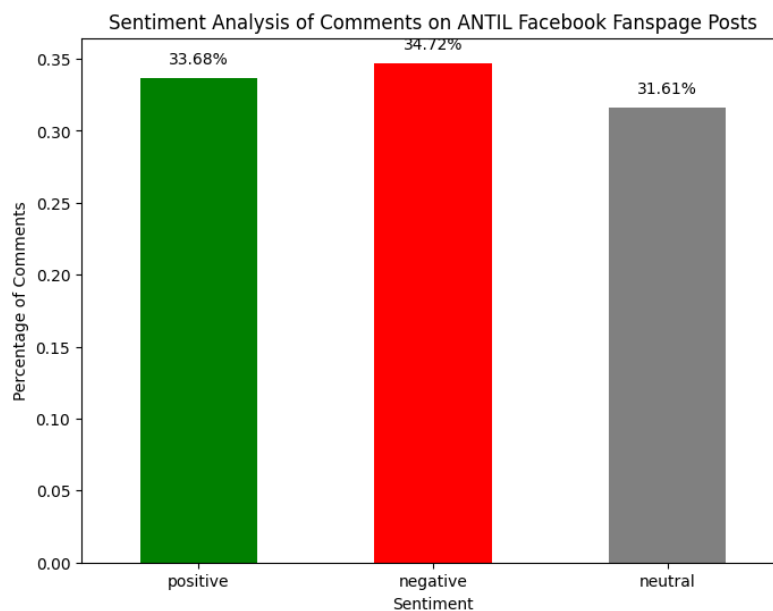
For section two, which is the news agencies, both private and public news agencies have results that are different from the health institutions. The “Jornal Independente,” a private news agency with a total of 32 comments in this study, has more than half (56.25 %) of comments with negative sentiment and an equal percentage of positive and neutral sentiment with 21.88%, as shown in Figure 3.

FIGURE 3: SENTIMENT ANALYSIS OF COMMENTS ON JORNAL INDEPENDENTE POSTS



The sentiment distribution of comments on the official page of “ANTIL” (TATOLI: Agencia Noticioso de Timor-Leste.IP), a public news agency, from the total 193 comments, 34.72 % are negative, 33.68 % are positive, and 31.61 % are neutral (Figure 4).

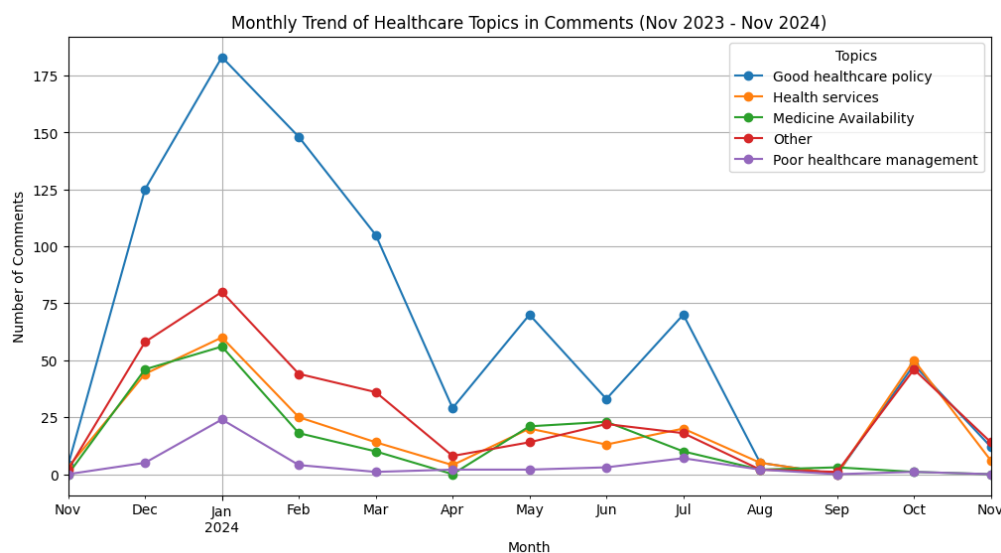
FIGURE 4: SENTIMENT ANALYSIS OF COMMENTS ON ANTIL POSTS



THEMATIC ANALYSIS

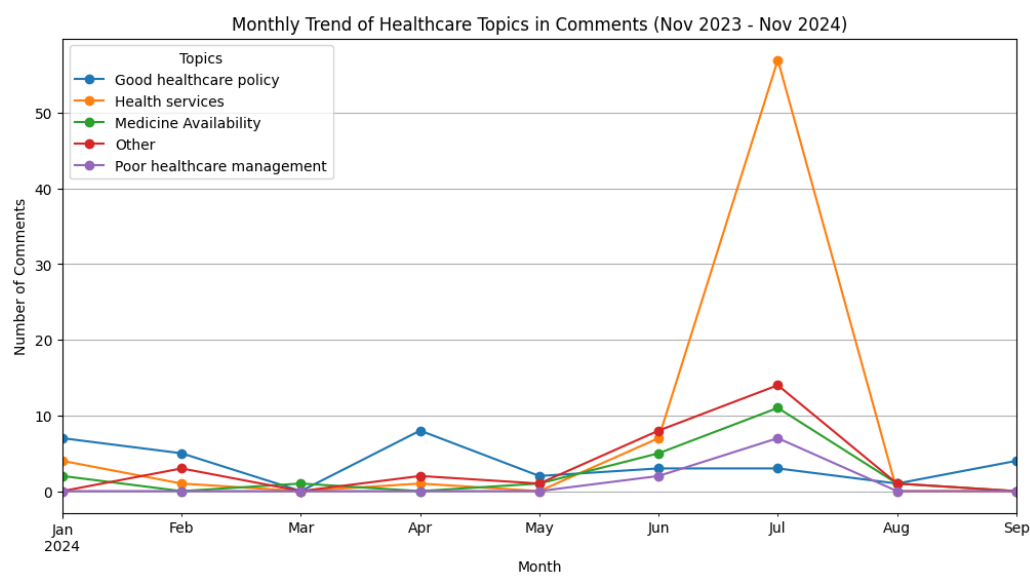
From all those comments, the authors organized them into four main themes. First, "Medicine Availability," which encompasses all the following words: medicine, buy, pharmacy, private pharmacy, private, stockout, stock out, drugs, drug, stock, vaccine, same, infpm, and import. Second, "Health Services" encompasses the following words: hospital, referral, private clinic, patient, disease, health post, health center, doctor, doctors, nurse, midwives, medicine, clinic, people, HNGV, die, ambulance, death, private, public, facilities, and facility. Third, "Poor healthcare management," which encompasses the words "stupid, liar, less, dismiss, incapacity, fired, management, investigate, no capacity, blame, blaming, people, blaming each other, wrong, worst, corruption, lie, problem, media, and defend. Fourth, "Good healthcare policy" encompasses the words "good, good management, congratulations, interview, congratulation, result, name, vacancy, published, municipality, good job, job, good work, vacancy, best, smart, intelligence, excellent, support, better, her excellency, resolve, thank, thanks.

FIGURE 5: MONTHLY TREND OF HEALTHCARE TOPICS IN COMMENTS FOR MOH PAGE



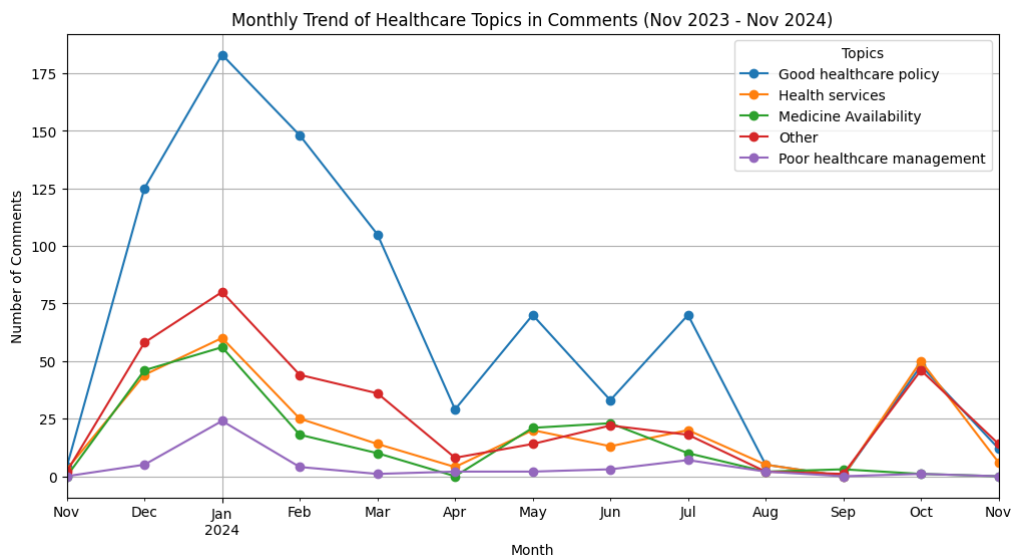
According to the topics debated in comments on the MoH page for one year (Figure 5), the Good healthcare policy and Medicine availability themes are the most debated since November 2023. However, this trend decreased in April and increased again during April-July until it decreased in August. There is also another topic that the authors did not identify, which increased from November 2023 until April 2024.

FIGURE 6: MONTHLY TREND OF HEALTHCARE TOPICS IN COMMENTS FOR HNGV PAGE



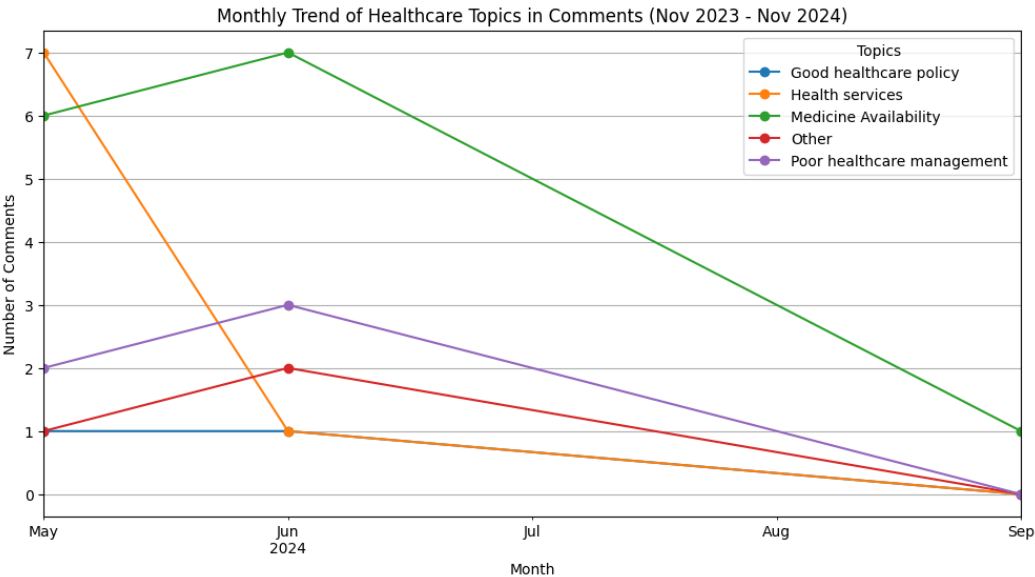
On the other side, comments on the HNGV page for one year show Health services theme is the most debated during June and August 2024. Other topics that the author did not mention were also highly debated from May to August 2024, as shown in Figure 6.

FIGURE 7: MONTHLY TREND OF HEALTHCARE TOPICS IN COMMENTS FOR ANTIL PAGE



The public news agency ANTIL page shown in Figure 7 had an increased number of comments on Good Healthcare Policy topic from November 2023 until August 2024. Health Services and Medicine Availability also moderately debated during November 2023 to April 2024.

FIGURE 8: MONTHLY TREND OF HEALTHCARE TOPICS IN COMMENTS FOR JORNAL INDEPENDENTE PAGE



The theme identified on a private news agency (Jornal Independente) shows that Medicine availability topics are the most debated from May until September 2024. Poor Healthcare Management theme also frequently mentioned in May to June 2024 (Figure 8).

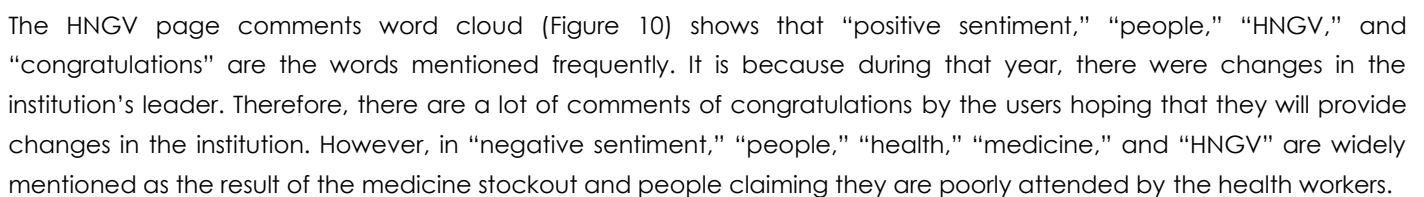
FIGURE 9: POSITIVE, NEUTRAL, AND NEGATIVE SENTIMENT WORD CLOUDS OF MOH PAGE



As an official social media page of the Ministry of Health of the country, most of the posts are related to the activities of the ministry and vice ministers, such as meetings, campaigns, inaugurations, and job vacancy information. Those posts generated many positive comments, such as "good job" and "congratulations," because it shows they are working well. Job announcements give people hope to apply, and that generated many positive comments by the users. However, a significant part of users still commented about the issue of intra-hospital deaths, the dissatisfaction of the patients' relatives whose loved ones had been poorly attended by the health workers, and the medicine stockout that the country is facing at the moment.

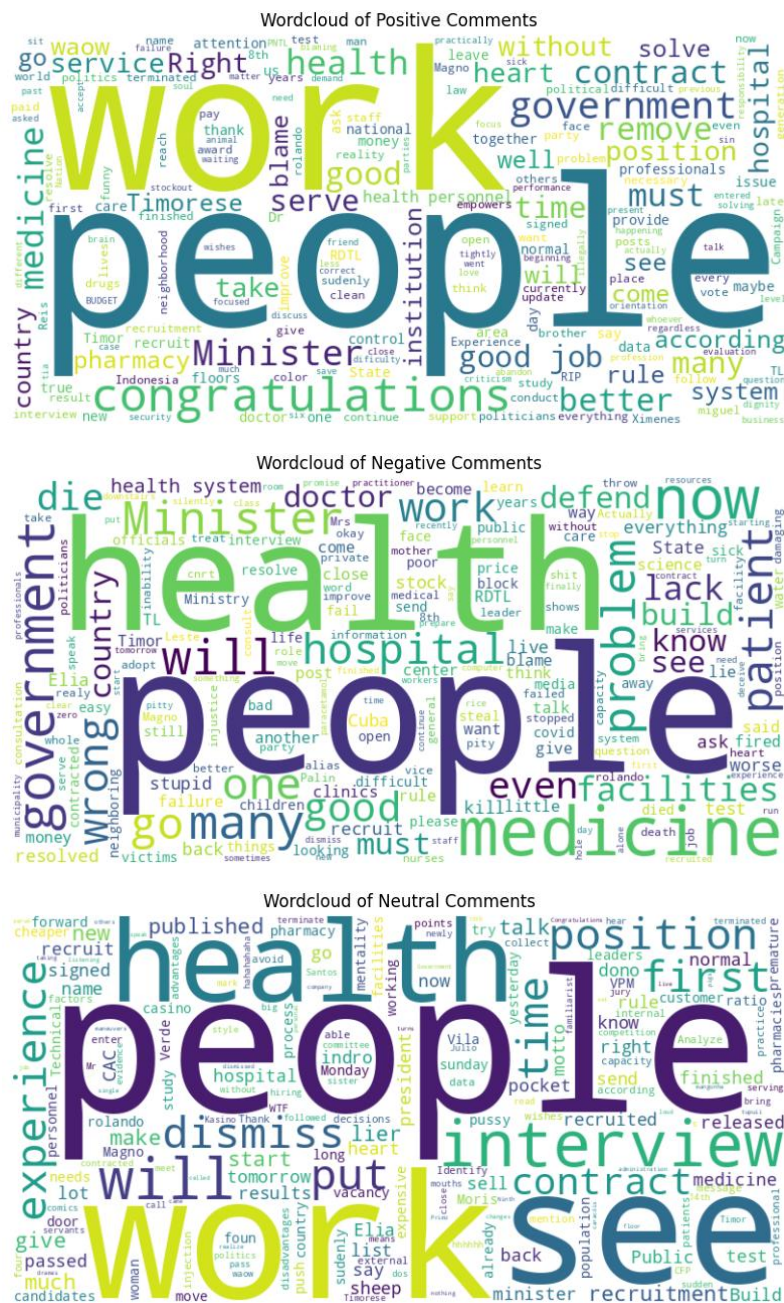
FIGURE 10: POSITIVE, NEUTRAL, AND NEGATIVE SENTIMENT WORD CLOUDS OF HNGV PAGE





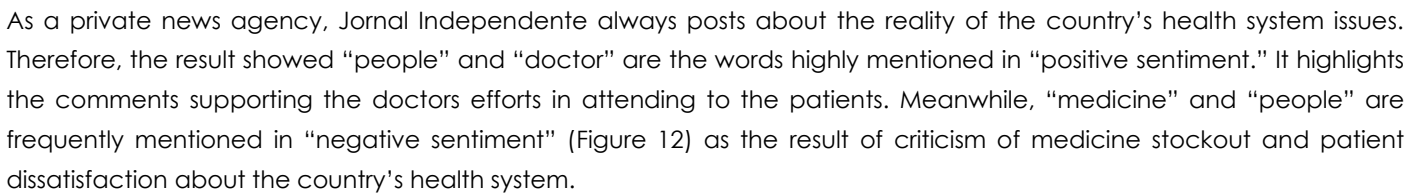
In general, concerns around hospital conditions, medicine shortages, intra-hospital death, and the quality of healthcare are reflected in the most used words. Terms like "hospital" mentioned 85 times, "people" 52 times, "medicine" 48 times, "health" 42 times. Terms like "criticism" (30 times), "defend" (30 times), and "reality" 38 times draw attention to public discontent and demands for openness. The frequent use of "death" (22 times), and "emergency" (15 times) denotes significant problems with patient care. Although the word "work" (25 times) frequently appears in expressions like "good work," context indicates that it is occasionally used in a sardonic or critical manner. Thus, this study shows that there is a heavy emphasis on healthcare systems failures, as evidenced by the many references to public uproar, accountability, and resource shortages.

FIGURE 11: POSITIVE, NEUTRAL, AND NEGATIVE SENTIMENT WORD CLOUDS OF ANTIL PAGE



From the public news agency (ANTIL) page, the word cloud shown (Figure 11) The phrase “people” and “work” are highly mentioned words in “positive sentiment.” People are commenting on the agency's posts, expecting the newly appointed health institution's leader to improve the health services and solve the medicine stockout the country is facing at that time. On the other side, “people,” “health,” and “medicine” are frequently mentioned in “negative sentiment” because, again, the medicine stockout, poor health services, and people dying in hospitals are hot topics during the study period.

Generally, the words “medicine” appears most frequently (28 times), raising concerns about shortages and stockouts. “People” mentioned 25 times and “health” 22 times, suggesting conversations on access to public healthcare. Additionally, “work” mentioned 20 times, “government” 18 times, and “minister” 14 times reflect political complaints. The terms “hospital” 16 times, “service” 15 times, and “system” 12 times; imply discontent with the medical establishment. Moreover, “Contract” mentioned 9 times, “recruit” 8 times, and “staff” 9 times all allude to issues with hiring. In conclusion, the most urgent difficulties include governance issues, low service quality, and shortages. Problems with medicine availability, healthcare administration, and political meddling in Timor-Leste's health sector are revealed by this study.



Generally, the words "People" which is mentioned 18 times, is the most often mentioned word. This implies that human experiences or problems impacting individuals are at the heart of the conversations. Meanwhile, in medical context, the terms "medicine" mentioned 16 times, "doctors" 11 times, and "hospital" 9 times; all suggest a focus on medical services and healthcare. This represents health-related worries or conversations, perhaps in relation to a medical emergency or persistent problems. The government and private sector related terms such as "government" which is mentioned 6 times and "private" 8 times imply conversations about the functions of various healthcare sectors, potentially tackling concerns related to healthcare policy or access.

COMPARATIVE ANALYSIS

From the result shown in Table 2, the positive sentiment was more dominant on institutions' (National Hospital-HNGV and MoH) official pages than on both public and private news agencies (Jornal Independente and ANTIL). Negative sentiment was found to be more dominant in comments in the private news agency (Jornal Independente) and slightly higher in the public news agency ANTIL.

The reasons behind a huge difference in sentiment on public institutions and news agencies are that public institutions have a higher number of healthcare-related posts that predominantly address achievements issues, seminars and inauguration activities, job vacancies, and other topics related to the good part of the healthcare services in the country. Meanwhile, the news agency has fewer posts related to healthcare issues, which leads to fewer comments. Their posts are mainly about "hot" issues regarding medicine stockouts, poor health management and policy, intra-hospital patient death, poor health infrastructures, partialism and favouritism in health institutions, malnutrition among children under five years old, and other healthcare-related issues that triggered an increasing number of opinions and comments among Facebook users.

TABLE 2: SENTIMENT DISTRIBUTION ACROSS PAGES

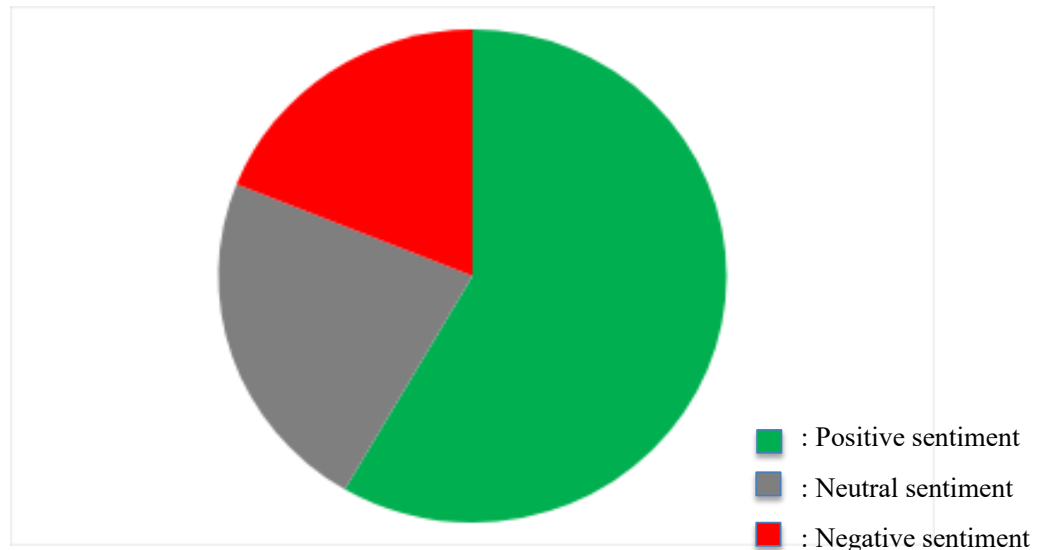
No	Name of fanpage	# of comments	Sentiment					
			Positive	%	Negative	%	Neutral	%
1.	Palácio das Cinzas	1708	1075	87.9%	247	62.2%	386	81.3%
2.	Guido Valadares National Hospital-HNGV	162	76	6.2%	65	16.4%	21	4.4%
3.	Jornal Independente	32	7	0.6%	18	4.5%	7	1.5%
4.	ANTIL	193	65	5.3%	67	16.9%	61	12.8%
	Total	2095	1223	100%	397	100%	475	100%

This study found that overall, from a total of 2095 comments on 453 healthcare-related posts within a one-year period, 58.4 % are positive sentiment, followed by neutral sentiment with 22.7% and negative sentiment with 18.9%, as shown in Table 3 and Figure 13.

TABLE 3: OVERALL SENTIMENT RESULT

Sentiment	Comments	Percentage
Positive	1223	58.40%
Neutral	475	22.70%
Negative	397	18.90%
Total	2095	100.00%

FIGURE 13: OVERALL SENTIMENT



DISCUSSION

The overall sentiments of Facebook users' comments on healthcare related posts from four official pages of health institutions and news agencies (public and private) are "Positive" with 58 % from a total 2,095 comments, Neutral sentiment with 23 %, and following with 19 % of Negative sentiment. This result answers the research question that the Positive sentiment is the one that predominant in Facebook comments during November 2023 until November 2024.

The "Medicine availability", "Good healthcare policy" and "Health services" are broad themes that most frequently discussed and criticized. There are differences in the sentiment result of comments between health institution (national hospital and the MoH) and news agency (public and private). Majority of comments from healthcare institutions' pages are "Positive sentiment" while "Negative sentiment" predominantly in comments from news agencies. According to the findings of this study, the differences happen because posts from the official's pages of healthcare institutions such as from the Ministry of Health and HNGV (national hospital) mainly about the important activities of the leaders of these institutions like meetings, seminars, speeches, site visits, inaugurations, and job vacancies. Meanwhile, Jornal Independente as a private news agency, generally posted about the principal issues that the community facing regarding healthcare system such as medicine stock out, health services quality, poor health management, poor health facilities, malnutrition, and intra-hospital deaths of patient. On the other hand, the public news agency (ANTIL) was more moderated in publishing these issues compared to the private news agency.

Over the course of almost two years (March 2020–February 2022), a study by Ravenda et al. [41] performed sentiment analysis on 151,738 Facebook posts from 274 Spanish hospital pages. Posts on security precautions and situational updates had a more negative tone, reflecting the gravity of the epidemic and the difficulties hospitals were facing, but posts about vaccines had a more optimistic tone and showed an emphasis on public advice and comfort. Therefore, this study confirmed the result of our study where the stockout of medicine, intrahospital deaths, and poor healthcare services triggered negative sentiment. However, posts related to the inauguration, the minister's activities such as meetings, and job vacancies received positive sentiment. This suggests that during the COVID-19 outbreak, hospitals utilized Facebook to control public opinion, modifying their communication tactics in response to the changing situation and meeting the audience's demand for direction and confidence. reflecting the gravity of the epidemic and the difficulties hospitals were facing.

Facebook's role in spreading internet news is crucial in influencing public opinion. People's perceptions of issues can change significantly because of the way private agencies provide news [11]. This study confirmed the authors' study in

which comments in private news agency's Facebook page were predominantly negative sentiment than the public institution pages.

According to the study from Afiq et al. [27], a total of 1852 Facebook reviews from 48 public hospitals in Malaysia were examined for, which concentrated on how patients felt about the quality of the services they received. With the use of machine learning sentiment analyzer, the study found 27.9% as negative and 72.1% as positive. Even though the author's study sample does not match with the sample of this study, in this case, the result is almost same because from 2095 comments 58 % was positive.

According to the Kemp [5], the Facebook users in Timor-Leste are 578.5 thousand in early 2024. Therefore, with the finding of this study showed even though, more than half comments shown positive sentiment; there is still big portion of user who have negative sentiment towards healthcare system in Timor-Leste. This reflects the use of social media such as Facebook in Timor-Leste that has increased rapidly. Almost everyone who uses a smartphone has a Facebook account.

Facebook is very important in everyday life. Many people use Facebook to access news and other issues. one of the issues is related to the availability of medicines, health services, and other issues related to health. With the results of this study, decision makers from the Ministry of Health can find out what public sentiment really is about the health sector. Based on that, they can make the right decisions to improve the health problems this country is facing and can enhance patient care. In addition, the results of this study are very useful for health institution's Facebook page admins to be more careful in posting news or articles, which can influence public opinion to become negative. Thus, it can impact the performance of health workers and can reduce the level of public trust on Timor-Leste's healthcare system.

LIMITATIONS

The number of comments from news agencies is smaller compared to comments from health institution pages. Ideally, the data should be the same in the number of comments from 4 pages for a fair comparison, and this is one of the limiting factors in this study. Moreover, the results of translated comments may not reflect the true meaning of the comments, as this is influenced by the researcher's capacity to translate the comments from other languages into English. Another important point is the incapacity of machine learning to interpret sarcasm during the sentiment scoring and analysis process. Therefore, we suggest incorporating advanced NLP techniques like transformer-based models in future studies to improve sentiment detection accuracy with the reason; these models are very expressive because they can encode long-range relationships in input sequences via self-attention methods [42].

FUTURE RESEARCH

With these limitations, the authors recommend future studies to be related to other social media platforms such as Tik-Tok, YouTube and Instagram because Timor-Leste users are increasing over time. The author really hopes that there will be a sentiment analysis study using other methods to get more accurate results so that they are useful as evidence to be used for decision making by policy makers.

CONCLUSION

This study sheds light on public sentiment toward healthcare in Timor-Leste, leveraging Facebook comments as a lens to understand public perception. The findings reveal a predominance of positive sentiment on institutional pages, driven by posts showcasing achievements and policy initiatives, while negative sentiment was more prevalent in comments on news agency posts highlighting systemic challenges such as medicine shortages and healthcare management issues. Key themes such as medicine availability, good healthcare policy, poor healthcare management, and health services underscore the complexity of public expectations and experiences with the healthcare system.

The results demonstrate the critical role of social media as a platform for public discourse, providing valuable insights for policymakers and stakeholders. By addressing the concerns raised in online discussions and enhancing communication strategies, healthcare leaders can build trust, improve service delivery, and prioritize reforms that resonate with public

needs. Future studies could expand the scope of sentiment analysis to other social media platforms and explore longitudinal trends to further support evidence-based decision-making in healthcare policy and management.

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HOW DO META-ORGANIZATIONS REACH COLLECTIVE ACTION? A COMPARATIVE STUDY OF DIGITAL TRANSFORMATION IN HEALTHCARE

Chien-Hung Chen¹, Chih-Yuan Wang^{*2}, Zhao-Hong Cheng¹, Kune-Ping Shieh²

1. Department of International Business, National Kaohsiung University of Science & Technology

2. Department of Business Administration, National Sun Yat-Sen University

Correspondence: chihyuan.wang@cm.nsysu.edu.tw

ABSTRACT

OBJECTIVE:

To investigate how meta-organizations and traditional hierarchical organizations differ in their approaches to facilitating collective action in digital transformation initiatives within healthcare settings.

DESIGN:

A comparative case study utilizing primary data collection for the meta-organization case and secondary data analysis for the traditional organization case.

SETTING:

Comparing Abc Dental Group (a meta-organization of 12 dental clinics in Taiwan) and Princess Alexandra Hospital (a traditional hierarchical public hospital in Australia).

Main outcome measures: Decision-making processes, implementation strategies, knowledge sharing mechanisms, and alignment approaches for digital transformation initiatives.

RESULTS:

Meta-organizations rely on collaborative decision-making, voluntary implementation, peer learning networks, and identity-based alignment. Traditional organizations employ centralized decision-making, structured implementation, formal training, and authority-based alignment.

CONCLUSIONS:

Organizational structure fundamentally shapes collective action approaches in digital transformation. Meta-organizational distributed approaches particularly suit contexts requiring clinical autonomy and adaptation to diverse environments, while traditional centralized approaches promote consistency in critical systems. These findings extend meta-organization theory by identifying specific mechanisms that overcome limited formal authority challenges.

KEYWORDS

meta-organizations, collective action, digital transformation, healthcare management

INTRODUCTION

In an increasingly interconnected and rapidly evolving world, meta-organizations have emerged as a significant organizational form shaping the practices, norms, and collective actions of their member organizations [1,2]. Comprising organizations rather than individuals, they play crucial roles in various domains like industry associations and business alliances [3]. However, meta-organizations face distinct challenges fostering collective action due to limited formal authority and member autonomy [4].

Despite their growing prevalence, research on how meta-organizations overcome these challenges and promote collective action, especially compared to traditional organizations, remains scarce. This gap is particularly relevant for digital transformation, a critical collective action for organizational adaptation and competitiveness [5]. This study addresses this gap by examining how meta-organizations and traditional organizations facilitate collective action in digital transformation and the factors influencing their effectiveness.

We chose the healthcare sector due to its rapid digital transformation, diverse structures, and the societal impact of successful collective action. By comparing Abc Dental Group (ADG), a meta-organization of 12 dental clinics located in Taiwan, with Princess Alexandra Hospital (PAH), a traditional hierarchical hospital, we aim to provide insights into collective action processes across different organizational forms.

This research contributes to theory and practice by extending meta-organization theory and collective action in digital transformation. It also offers practical insights for healthcare managers and policymakers on fostering effective collective action across diverse organizational structures.

LITERATURE BACKGROUND

META-ORGANIZATIONS: CONCEPT AND CHARACTERISTICS

Meta-organizations consist of other organizations as members, characterized by limited formal authority and voluntary cooperation [1,2]. They feature member autonomy, organizational heterogeneity, and unique legitimacy challenges [4,6].

COLLECTIVE ACTION IN META-ORGANIZATIONS AND TRADITIONAL ORGANIZATIONS

Collective action refers to pursuing a common goal by a group of actors [7]. In organizational contexts, it involves coordination and cooperation among multiple organizations for shared objectives [8]. Meta-organizations and traditional organizations differ in their approaches. Traditional organizations rely on formal authority structures and shared goals [9], while meta-organizations must use alternative mechanisms like trust-building, negotiation, and shared norms [4]. Member heterogeneity can also hinder collective action [3]. Despite challenges, meta-organizations can promote collective action through soft power, governance structures, and consensus-building [2,10].

DIGITAL TRANSFORMATION AS A CONTEXT FOR STUDYING COLLECTIVE ACTION

Digital transformation, integrating digital technologies into business and society [5], presents new challenges and opportunities for collective action. Rapid technological change demands novel adaptation and collaboration [11]. Meta-organizations, such as industry associations, facilitate digital transformation by setting standards, sharing knowledge, and pooling resources [1]. However, digital transformation also poses unique challenges for collective action in meta-organizations, including rapid technological pace, uncertainty, and the digital divide between members [4,5]. This divide often manifests as disparities in access to IT infrastructure, varying levels of staff digital literacy, or differing capacities for technology adoption among member entities.

GAPS IN THE LITERATURE AND RESEARCH QUESTIONS

Despite growing interest, several gaps remain. First, comparative studies on collective action differences between meta-organizations and traditional organizations in digital transformation are lacking [1,12]. This study fills this by investigating their approaches to technological change.

Second, existing research often focuses on single cases or organizational forms [8,13], limiting understanding of similarities and differences. By comparing ADG (meta-organization) and PAH (traditional organization), this study provides a more comprehensive analysis of how different organizational forms facilitate collective action.

To address these gaps, this study compares how meta-organizations and traditional organizations facilitate collective action in healthcare digital transformation. By examining ADG and PAH, we aim to answer:

1. How do meta-organizations and traditional organizations differ in their approaches to facilitating collective action in the context of digital transformation?
2. What are the key factors that influence the effectiveness of collective action in these different organizational forms?

This comparative analysis contributes to a nuanced understanding of collective action in diverse healthcare organizational structures, where complexity and critical digital transformation make collective action both challenging and crucial.

RESEARCH METHODOLOGY

This section outlines the research design, data collection, and data analysis methods employed to investigate how meta-organizations and traditional hierarchical organizations differently influence collective action in healthcare digital transformation, using a comparative case study approach with primary and secondary data.

RESEARCH DESIGN

This study employs a comparative case study approach [14] examining Abc Dental Group (ADG), a meta-organization of 12 dental clinics in Taiwan, and Princess Alexandra Hospital (PAH), a traditional public hospital within Queensland's Metro South Hospital and Health Service, which comprises five hospitals. This study focuses solely on PAH, leveraging secondary data from Eden et al. (2019, 2020, 2022), which specifically examines PAH's digital transformation initiatives. Cases were selected for representativeness, comparable digital transformation initiatives, data availability, and contrasting organizational structures within healthcare to ensure depth in analyzing collective action mechanisms within a single hierarchical entity while maintaining comparability with ADG's meta-organizational structure.

DATA COLLECTION AND ANALYSIS

Data for the ADG case was collected through semi-structured interviews with key informants (CEO, board members, clinic representatives), participant observation during meetings, and document analysis. For PAH, we utilized secondary data from published research [15–17]. The primary data for ADG enabled in-depth, context-specific insights into decision-making and knowledge-sharing processes, offering greater granularity through direct stakeholder perspectives. In contrast, PAH's secondary data, drawn from Eden et al. (2019, 2020, 2022), provided a robust but less granular view, constrained by the original studies' focus and reporting. These sources (Eden et al., 2019, 2020, 2022) were chosen for direct relevance to PAH's digital transformation, peer-reviewed publication, and authors' expertise, ensuring high credibility. Data analysis followed an iterative coding process [18], using both deductive and inductive approaches to identify key themes. To mitigate primary-secondary data asymmetry, systematic content analysis was applied to secondary sources, cross-referencing information for consistency and reliability. This rigor ensured robust triangulation of findings, enhancing comparative depth. Trustworthiness was ensured through data triangulation, member checking, and peer debriefing [19] (e.g., cross-referencing ADG interview data with meeting notes and clinic documents; validating ADG findings with clinic representatives; verifying consistency across multiple secondary sources for PAH [15–17]; and discussing coding with external researchers).

ETHICAL CONSIDERATIONS

This study, examining organizational collective action in digital transformation, was exempt from formal IRB review under Taiwan's Ministry of Health and Welfare "Human Research Act" (Article 5), as it involved semi-structured interviews and secondary organizational data without direct human intervention or sensitive personal information. The research proposal was approved by the Doctoral Dissertation Proposal Oral Examination Committee at National Sun Yat-Sen University, ensuring ethical and academic rigor. Participants were informed of the study's purpose, assured anonymity and confidentiality, and provided voluntary consent.

RESEARCH FINDINGS

CASE 1: ABC DENTAL GROUP (META-ORGANIZATION)

ABC Dental Group (ADG) represents a meta-organization comprising 12 member dental clinics located in Taiwan. Our analysis revealed several key characteristics of how this meta-organization approached collective action in digital transformation initiatives.

Decision-making process

ADG exhibited a collaborative, distributed decision-making process. The central organization facilitated rather than commanded. Digital transformation initiatives required consensus from member clinics, as one owner explained: "We have a voice in major decisions. The group presents options, and we discuss them during quarterly meetings before moving forward." This led to longer timelines but stronger clinic buy-in.

Implementation strategy

Digital technology implementation followed a gradual, voluntary approach. ADG introduced new systems as optional resources for clinics to adopt at their own pace, recognizing member autonomy and varying capabilities. The central organization provided support via shared resources, including technical assistance and training. As the CEO noted: "We can't force clinics to adopt new technologies. Instead, we demonstrate the benefits and provide support for those who choose to implement them."

Knowledge sharing mechanisms

Knowledge sharing was critical. The organization established formal and informal peer learning channels: quarterly meetings, online forums, and clinic visits. Early adopters served as champions, sharing experiences and best practices. This peer-to-peer exchange effectively diffused innovations. One clinic manager described: "Learning from other clinics that have already implemented the system was far more valuable than any formal training. We could see how it worked in practice and what challenges to expect."

Alignment mechanisms

ADG aligned member interests with digital transformation goals through financial incentives (group discounts, shared implementation costs) and emphasizing collective benefits (enhanced patient experiences, improved data sharing). ADG also fostered a shared identity as a "progressive dental network," motivating participation.

CASE 2: PRINCESS ALEXANDRA HOSPITAL (TRADITIONAL ORGANIZATION)

Princess Alexandra Hospital (PAH) represents a traditional hierarchical organization within the Australian public healthcare system. As a major public hospital within Queensland's Metro South Hospital and Health Service, which comprises five hospitals, PAH is the focus of this study. Our analysis of secondary data from [15–17] revealed distinct patterns in its approach to digital transformation.

Decision-making process

PAH demonstrated centralized decision-making for digital transformation. Authority resided with senior management, influenced by government policies. As Eden et al. (2022) noted, "Digital transformation decisions were made by the executive leadership team in alignment with state health department directives. [17]"

While staff consultation occurred, final decisions remained with leadership, resulting in rapid decisions but variable staff buy-in. This centralized approach, characteristic of traditional hierarchies, leverages formal authority for enforcement, aiming to reduce system variability and maintain control—a contrast to the emergent actions in meta-organizations. From a complex science perspective, this structure seeks order and predictability within a system.

As a public hospital, PAH operated within Queensland's state health department guidelines, reflecting institutional theory's normative, mimetic, and coercive pressures [20], particularly regarding data privacy and interoperability. In contrast, ADG faced establishing legitimacy without formal authority.

Implementation strategy

PAH's implementation strategy followed a structured, organization-wide approach. Digital transformation initiatives were implemented according to predetermined schedules and protocols, with limited departmental flexibility. Eden et al. (2020) observed that *"the hospital adopted a phased but mandatory implementation approach, with clear deadlines for each department to transition to the new digital systems."*[16]

This ensured consistency but sometimes created resistance when departments were unprepared. This structured implementation reflects traditional strategies for large-scale change, relying on predefined processes and compliance for collective outcomes, differing from meta-organizations' voluntary adoption. It represents a more top-down, command-and-control approach to managing system complexity.

Knowledge sharing mechanisms

Knowledge sharing at PAH occurred primarily through formal channels and structured training programs. The organization invested significantly in professional development and training sessions to prepare staff. According to Eden et al. (2019), *"The hospital established a Digital Hospital Training Team that provided comprehensive training to all staff members prior to implementation."*[15] While effective for basic skill development, these formal mechanisms were sometimes less responsive to emerging challenges and context-specific needs compared to ADG's peer learning.

Alignment mechanisms

PAH employed formal authority and organizational policies for alignment. Compliance was often mandatory, supported by performance metrics and accountability. Eden et al. (2022) noted that *"staff performance evaluations incorporated measures related to digital system adoption and proficiency."*[17] The organization also emphasized digital transformation's alignment with the hospital's mission of providing high-quality patient care, creating a values-based rationale.

CROSS-CASE COMPARISON

Our comparative analysis revealed significant differences in how meta-organizations and traditional organizations approach collective action in digital transformation across four key dimensions:

Authority and autonomy

The meta-organization (ADG) operated with limited formal authority, necessitating consensus. The traditional organization (PAH) exercised formal authority. This fundamental difference influenced all aspects of collective action.

Implementation timeline and flexibility

ADG's approach resulted in variable implementation timelines, accommodating diverse capabilities but challenging network-wide integration. PAH's structured approach ensured consistent implementation but sometimes created stress when timelines misaligned with departmental readiness.

Knowledge diffusion patterns

Knowledge sharing in ADG occurred via distributed, peer-to-peer networks; PAH relied on centralized expertise and formal training. Both had strengths: ADG's peer learning fostered context-sensitive adaptation; PAH's structured training ensured comprehensive coverage.

Beyond immediate implementation, ADG's peer-to-peer model likely enhances long-term innovation capability and staff retention by fostering continuous, self-directed learning crucial for evolving digital healthcare. PAH's formal training, conversely, ensures foundational competency across a large workforce, vital for consistent system-wide operations, though potentially less agile in fostering emergent innovation.

From a complexity science perspective, ADG exemplifies complex adaptive systems with emergent collective action through local interactions [21], enabling adaptation to diverse conditions, while PAH employs structured approaches to manage complexity.

This distinction is supported by Richards-Green et al. (2024), who found that healthcare leaders in complex environments demonstrate agility and adaptability—a key component of their **'wholistic-developmental'** leadership model that parallels the flexibility seen in meta-organizational approaches [22]. In contrast, traditional structures like PAH align with what these researchers described as conventional leadership domains, emphasizing structured implementation and formal training to promote system integration and risk management.

Sustainability of change

While PAH achieved faster initial implementation, ADG's approach may have advantages for long-term sustainability. High member buy-in and ownership in the meta-organization created stronger foundations for continued engagement. These findings demonstrate that meta-organizations and traditional organizations employ fundamentally different mechanisms to achieve collective action in digital transformation, each with distinct advantages and challenges, as summarized in Table 1.

TABLE 1: KEY DIFFERENCES IN COLLECTIVE ACTION MECHANISMS: META-ORGANIZATION VS. TRADITIONAL ORGANIZATION

Dimension	Abc Dental Group (Meta-organization)	Princess Alexandra Hospital (Traditional organization)
Decision-Making Process	Collaborative and distributed; consensus required from member clinics	Centralized; decisions made by executive leadership team aligned with health department directives
Implementation Strategy	Gradual and voluntary; clinics adopt at own pace	Structured and organization-wide; phased but mandatory with clear deadlines
Knowledge Sharing	Peer-to-peer networks; early adopters as champions	Formal channels and structured training programs; Digital Hospital Training Team
Alignment Mechanisms	Financial incentives; shared identity as "progressive dental network"	Formal authority; performance metrics; alignment with hospital mission

Table 1 summarizes the key distinctions between the meta-organization (ADG) and the traditional organization (PAH) across four critical dimensions of collective action: decision-making process, implementation strategy, knowledge sharing,

and alignment mechanisms. These dimensions were selected as they represent the core operational aspects through which organizations facilitate digital transformation and highlight the fundamental structural differences between the two organizational forms.

DISCUSSION

This study's findings contribute to our understanding of how organizational structure influences collective action in digital transformation initiatives, particularly in healthcare settings. The comparative analysis of ADG (a meta-organization) and PAH (a traditional organization) reveals important theoretical and practical implications.

THEORETICAL IMPLICATIONS

Our findings extend Ahrne and Brunsson's (2008) meta-organization theory [2] by identifying specific mechanisms that overcome limited formal authority challenges: collaborative decision-making, voluntary implementation, and peer learning networks.

These mechanisms align with recent healthcare leadership research by Richards-Green et al. (2023, 2024), which emphasizes that leaders in complex environments require perspective-taking capacity beyond technical skills and benefit from '**wholistic-developmental**' approaches that balance personal growth with creating supportive environments [22,23].

In meta-organizations, this integration of individual development with collaborative processes provides alternatives to hierarchical control systems and facilitates collective action through shared goals rather than formal authority structures. However, a balanced perspective also highlights potential downsides of such distributed leadership and collaborative governance, including slower decision-making due to consensus requirements and potential ambiguity in accountability. Understanding these trade-offs deepens the nuanced comprehension of collective action in meta-organizations.

Furthermore, our study enriches collective action theory by demonstrating how different organizational structures shape the conditions for successful collective action. In meta-organizations, collective action emerges through distributed processes that emphasize member autonomy and peer influence. This contrasts with traditional organizations, where collective action is more directly shaped by formal authority and centralized coordination.

These findings suggest that collective action theory should more explicitly account for organizational structure as a key determinant of how collective action processes unfold. Additionally, our research advances understanding of digital transformation in healthcare by highlighting how organizational structure influences technology adoption and implementation.

The findings suggest that the success of digital transformation initiatives depends not only on the technologies themselves but also on the organizational structures through which they are implemented. Meta-organizations may be particularly well-suited for digital transformations that require adaptation to diverse local contexts, while traditional organizations may have advantages for transformations requiring rapid, consistent implementation.

PRACTICAL IMPLICATIONS

For healthcare policymakers, our findings suggest: (1) avoiding one-size-fits-all regulatory approaches by recognizing fundamental differences between organizational forms; (2) supporting hybrid models that combine meta-organizational flexibility with traditional organizational consistency; Such hybrid models might centralize critical infrastructure (e.g., EHR integration) while empowering member units for localized innovations (e.g., patient apps). Challenges include balancing top-down directives with grassroots initiatives and navigating tensions between standardization and local adaptation. and (3) developing differentiated evaluation metrics that acknowledge varying success factors across organizational forms.

LIMITATIONS

This study has several limitations that should be acknowledged. First, the comparison between a dental meta-organization and a public hospital introduces potential confounding factors beyond organizational structure, including differences in regulatory environments, professional cultures, and resource availability.

Crucially, this comparison now spans two distinct national healthcare systems (Taiwan for ADG, and Australia for PAH). This introduces significant contextual variations beyond just sectoral differences (dental vs. public hospital). While our primary focus remains on organizational form, these cross-national and sectoral differences profoundly shape collective action. For instance, ADG's operations within Taiwan's specific healthcare regulations and digital infrastructure context differs from PAH's Australian public hospital system. A public hospital's stricter regulatory compliance might mandate top-down digital adoption, while ADG's clinics, operating within a different national setting, may prioritize voluntary adoption driven by local competitive advantage and client service.

Acknowledging these broader contextual nuances provides a richer understanding of collective action in varied healthcare settings. The broader cross-national network of Abc Dental Group, including its Australian operations, presents a compelling avenue for future research. Future research could address this limitation by comparing meta-organizations and traditional organizations within more similar contexts.

Second, our reliance on secondary data for the PAH case may be influenced by original researchers' perspectives and lacks the depth of primary data, particularly regarding organizational culture and informal interactions. We mitigated these limitations through triangulation methods and focusing on aspects reliably extractable from secondary data.

Finally, the study's focus on two cases limits the generalizability of our findings. The patterns observed may not apply to all meta-organizations or traditional organizations, particularly those in different sectors or with different characteristics. Additional comparative studies across a wider range of organizations would strengthen the robustness of our conclusions. Moreover, while our analysis suggests potential advantages for long-term sustainability in meta-organizational approaches, direct longitudinal evidence is currently absent. This limitation creates a significant avenue for future research to empirically examine the sustained impact of these different collective action mechanisms.

CONCLUSION

This study has investigated how meta-organizations and traditional organizations differ in facilitating collective action in healthcare digital transformation. Through comparing Abc Dental Group (a meta-organization of 12 dental clinics in Taiwan) and Princess Alexandra Hospital, we found that meta-organizations rely on collaborative decision-making, voluntary implementation, peer learning, and identity-based alignment, while traditional organizations employ centralized decision-making, structured implementation, formal training, and authority-based alignment.

The distributed approaches of meta-organizations particularly suit respecting clinical autonomy and adapting to diverse healthcare environments, while centralized approaches promote consistency in critical healthcare systems.

These findings extend our understanding of meta-organization dynamics and collective action mechanisms in digital transformation. Future research should examine longitudinal outcomes, investigate hybrid organizational models, analyze regulatory influences on collective action capacity, and explore cross-national contexts. As healthcare continues its digital transformation, understanding how different organizational forms facilitate collective action remains critical for research and practice.

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EMPOWERMENT OF SUSTAINABLE COMMUNITY HEALTH THROUGH THE APPLICATION OF THE THEORY OF MAQASID AL-SHARIAH

Ahasanul Haque*¹, Tarekol Islam Maruf², Md Nazim Uddin³, Md Zohurul Anis⁴

1. Department of Business Administration, International Islamic University Malaysia
2. Department of Business, Management & Technology, ALFA University College, Malaysia
3. Department of Business Administration, Ankara University, Turkey
4. Department of Management Studies, University of Rajshahi, Bangladesh.

Correspondence: ahasanul@iiu.edu.my

ABSTRACT

The Maqasid al-Shariah concept is a critical component in implementing Shariah compliant healthcare, promoting medical tourism and sustainable development goals. The concept of Maqasid Shariah provides a clear guidance and framework to the process of ijtihad in solving the issues conforming to the human interest while complying with the will of Spirit. This study examines the incorporation of Maqasid al-Shariah principles into sustainable community health practices, emphasizing the influence of Shariah-compliant hospitals (SCH) and community health (CH) on the realization of Maqasid al-Shariah in Malaysia. The study seeks to synchronize healthcare delivery systems with the United Nations' Sustainable Development Goals (SDGs), highlighting the significance of health and well-being via Shariah-compliant healthcare frameworks. This study identifies gaps in the literature on the systematic implementation of Maqasid al-Shariah in healthcare systems, aiming to address the challenges of reconciling Islamic principles with medical treatments to promote social well-being.

The research used a quantitative methodology, utilizing a survey of 257 participants from diverse healthcare institutions in Kuala Lumpur. The results validate a substantial, favourable correlation between community health practices and Shariah-compliant hospitals with Maqasid al-Shariah. The use of Maqasid al-Shariah principles in healthcare can enhance life, intellect, faith, lineage, and wealth, which are fundamental aims of Islamic law. This research further aids in the actual incorporation of these ideas inside healthcare systems, providing politicians and healthcare executives with solutions to connect medical procedures with Islamic values.

The study indicates that promoting healthcare systems guided by Maqasid al-Shariah, such as Shariah-compliant hospitals and community health programs, can enhance sustainable healthcare practices while furthering the SDGs in Malaysia. It also advocates for additional research on the long-term effects of these integrated practices and their potential applicability across various geographical and institutional contexts. This research provides valuable insights into strengthening healthcare quality, fostering social solidarity, and improving community well-being by integrating Islamic legal frameworks into healthcare systems.

KEYWORDS

Maqasid al-Shariah, Community Health, Shariah Complaint Hospital, SDG

INTRODUCTION

The Maqasid al-Shariah, which safeguards life, intellect, faith, lineage, and wealth in accordance with Islamic principles and teachings, is the blueprint for a sustainable society's healthcare system [1]. The fundamental goal of Shariah compliant sustainable healthcare, such as hospitals, is to provide high-quality medical care, halal cuisine, religious and spiritual activities, and ethical and cultural components of medicine. This idea can be developed since it is in high demand among Muslim and non-Muslim populations [2]. Moreover, it can serve as an exceptional instrument for elucidating the ethical, legal, and cultural frameworks inherent in faith-based practices [3]. Therefore, more effort should be placed into learning the fundamental rules for developing Shariah -compliant sustainable health. For example, Maqasid al-Shariah concept is a critical component that must be implemented in hospital operations [4]. Furthermore, the approach used in administering treatments to patients must adhere to the Maqasid al-Shariah [5]. Therefore, while Muslims are undergoing treatment, this practice will provide a better service.

Community health plays a vital role in healthcare delivery, particularly within the framework of Shariah-compliant practices. This alignment is guided by Maqasid al-Shariah, a principle that ensures healthcare practices are consistent with Islamic teachings, promoting the well-being and protection of individuals and communities by religious values—primarily a fundamental need and an invaluable aspect of human existence [6]. The integration of Shariah principles to promote a sustainable and ethical healthcare system is the primary focus of health empowerment in the context of community health and Maqasid al-Shariah. Community health empowerment has a substantial causal influence on long-term social and economic development [7]. On the other hand, disturbances in health can cause significant suffering and deterioration in human life. Furthermore, it creates disruptions in regular operations. COVID-19, heart disease, hypertension, stroke, cancer, chronic respiratory illnesses, diabetes, arthritis, and asthma are among the chronic conditions that impair empowering community health [8]. Several variables influence the incidence of illnesses. Unhealthy diets, excessive calorie consumption, physical inactivity, and cigarette smoking are all concrete factors contributing to these diseases [9].

Humans need particular treatments to be healthy. A community health centre is a facility where individuals may help diagnose, monitor, and treat illnesses [10]. The hospital offers specialists, diagnostic equipment, and medications [11]. If people bring their health concerns to the hospital sooner, the illnesses will be treated. The effectiveness and quality of hospital management are dependent on the organization's empowerment [12]. According to Gharipour et al. [13], administrative management, such as the appointment system, administration process, visiting hours, quality of services, doctor harassment, and a healthy atmosphere, are variables impacting patients' choices in a community health environment. It implies that people must be empowered to provide healthcare services, and services must be delivered. The balance and integration of Islamic and medical techniques is a critical component in building Maqasid al-Shariah based health care facilities that will empower sustainability [14]. The concept is used in hospital settings to promote medical tourism and Sustainable Development Goal 3 (SDG 3) "Good Health and Well-being" in Malaysia [4, 60]. Additionally, it can benefit visitors from outside the area seeking medical care and services. In this study, various issues have been identified. The first is a lack of study on the essential prerequisite for strengthening sustainable community health by implementing Shariah -compliant practices. Furthermore, there is a problem with the lack of explanation concerning the order of the components in Maqasid al-Shariah in the medical sector. Finally, there is a lack of a systematic technique for examining concerns related to Maqasid al-Shariah in the context of empowering sustainable community health and Shariah compliant hospital.

Multiple studies have outlined the characteristics and elements of sustainable community health systems grounded in Shariah compliance [15–18]. By integrating medical operations with the principles of Maqasid al-Shariah, Shariah -compliant hospitals and sustainable community health services can be effectively managed and organized [19]. The Maqasid al-Shariah principle's uses must be understood in the context of nature. The aspects of the Maqasid al-Shariah need a clear description and explanation of the nature of empowering sustainable health that offers healthcare evaluation. Today's advancements in science and technology have had a significant impact on medication and

healthcare services. In examining the relevant laws (*hukm*) and fatwas, Islam must be contextualized within the framework of evolving human existence and advancements in science, technology, and socio-economic development. [20]. As a result of their standing under Islamic law, Muslims begin to question the use of some treatments and services.

There should be a standardized system in place for identifying treatments and services tailored specifically for Muslim consumption. Besides, the *Maqasid al-Shariah* concept is an appropriate assessment since it is more relevant and flexible in medical areas [21]. It will serve as an example for other regional nations to offer high-quality quality services to Muslim demands. This study aims to answer what is the impact of community health (CH) on *Maqasid al-Shariah*? And what is the impact of Shariah Compliant Hospital (SCH) on *Maqasid al-Shariah* (MAS)? Based on the above research questions, this study's general objective is to investigate the impact of community health (CH), and Shariah -compliant hospitals (SCH) on *Maqasid al-Shariah* (MAS) in Malaysia.

This assessment clearly demonstrates what healthcare practitioners must undertake to create a *Maqasid al-Shariah* empowering health care system based on community health and a Shariah compliant hospital. It explores how aspects in the *Maqasid al-Shariah* are prioritized in medical practice. Since it presents a thorough approach to hospital treatments, this research enables healthcare practitioners to determine Islamic legislation aims. As a result, the healthcare practitioners will get the basic skills in operating a Shariah -compliant organization by learning the essential requirements in building a Shariah -compliant hospital. Furthermore, it assists patients in making the best possible decision to acquire Shariah -compliant treatment.

Furthermore, the explanation of the precedence factor in *Maqasid al-Shariah* gives full knowledge of Islamic law in terms of medical procedures, allowing individuals to apply the teachings of Islam appropriately. Moreover, this research helps medical practitioners and patients prioritize the relevant aspects in the *Maqasid al-Shariah* while seeking treatment. Practical strategies, such as techniques for identifying the *Maqasid al-Shariah*, are presented in this work. This specific technique assists medical practitioners in determining the status of treatment based on the amount of *maslaha* and make judgments that are compliant with Islamic law. In the future, the approach might serve as a guide and reference for other researchers who want to develop the framework of the approach, which is still in its early stages.

LITERATURE REVIEW

This study investigates the contemporary comprehension of community health empowerment, highlighting *Maqasid al-Shariah* as the dependent variable. The research examines two primary independent variables—community health (CH) refers to both the overall well-being of a population and the provision of healthcare services aimed at promoting health, preventing illness, and ensuring equitable access to care, and Shari'ah-compliant hospitals—by evaluating their fundamental principles, current status, and the vocabulary used to describe Shari'ah-aligned healthcare practices. The discourse will outline the essential criteria and components for assessing Shari'ah-compliant community health, based on previous studies. The section will conclude with a comprehensive clarification of the relevance of *Maqasid al-Shariah* in the health care system.

SDGS AND MAQASID SHARIAH

The concept of a sustainable development model based on religious principles contrasts with the existing paradigm, emphasizing the separation of religious dogma and public policymaking. However, the sustainable development discourse has recognized that the three pillars of sustainable development need an ethical component to realize widespread values [22, 23]. As a result, *Maqasid al-Shariah* -driven health care would contribute to the achievement of the SDGs. Islamic financial institutions are increasingly recognizing the need to align their aims with the SDGs to defend and promote *Maqasid al-Shariah*. SDG 17's role in climate response, global health, and broader development contexts converges on the view that partnerships are the mechanism by which the remaining SDGs are operationalized, financed,

and scaled (including governance, accountability, and knowledge exchange across sectors) [41, 60, 62]. The following part will look for similarities between the SDGs and Imam al-Maqasid Ghazali's Shariah framework [63].

People, planet, prosperity, peace, and partnership are the five Ps that must be understood to comprehend the SDGs. These five Ps are considered components of the SDGs, and three of them—people, planet, and prosperity—are the pillars of SD [24]. Because the 2030 Agenda is indivisible, nations should avoid cherry-picking objectives and carefully weigh the trade-offs between them. SDGs are very broad, intended to accomplish global objectives that have been agreed upon by the international community as a whole, and have no direct contradictions with Islamic principles. Maqasid-al Shariah is also highly methodical, attempting to address human welfare and well-being in an orderly and complete manner [24]. The following paragraph attempts to translate the Sustainable Development Goals into Maqasid al-Shariah.

Protection of faith is one of the first pillars of Imam Al-Maqasid Ghazali's Shariah framework, and SDG targets 1, 2, 3, 6, and 10 concentrates on decreasing vulnerability, which is seen in people's faith. The second pillar is life protection (Nafs), which includes objectives 2, 3, 6, 8, and 11 to ensure healthy lifestyles and foster well-being to achieve long-term growth. The third pillar is progeny protection (Nasl) and Zakat (one of Islam's five pillars of religion), which assists people in poverty alleviation, fostering peace, and preserving the environment, as well as objectives 3, 5, 7, 11, 12, 13, 14, 15, and 16, which are all related to human progeny. The fourth pillar is intellectual protection (Aql), which aligns with SDGs 1, 2, and 9 by facilitating access to nutritious food and excellent education and making children more productive in the future. The last pillar is wealth protection (Mal), and Zakat has built-in wealth transfer (SDG 10) that may assist create economic activity (SDG 8) and provide a social safety net (SDGs 1 and 3).

SHARIAH COMPLIANT HOSPITAL

A hospital that complies with Shari'ah legislation ensures that all of its policies, processes, and medical practices adhere to the principles of Shari'ah [20]. This includes providing food that has been certified halal, ensuring that medical treatment is gender-sensitive, treating patients according to Islamic principles, and attending to their religious needs, such as providing prayer rooms and spiritual counselling [5]. These hospitals offer more than just medical care. Additionally, they base their administrative choices, financial management, and general patient care on Islamic principles. This ensures that the provision of healthcare aligns with the broader objectives of the Maqasid al-Shariah. In addition to receiving high-quality medical care, patients who select these institutions seek a medical environment that honours their moral principles and religious beliefs.

COMMUNITY HEALTH

The coordinated efforts of healthcare professionals, organizations, and legislators to improve the health and well-being of entire populations, particularly in local areas, is known as community health [4]. Medical services, health education, preventive care, and wellness programs that adhere to Islamic morals and teachings are all included in community health in a Shari'ah-compliant setting. These initiatives address public health issues while ensuring that decisions are made in accordance with religious principles, cultural values, and the Shari'ah's moral guidelines [5]. In accordance with Maqasid al-Shariah, hospitals primarily concentrate on treating individual patients, but community health initiatives adopt a broader stance by attempting to prevent illness, promote health, and create policies that would enhance the overall well-being of the community.

MAQASID AL-SHARI'AH (THE HIGHER OBJECTIVE OF ISLAMIC LAW)

Shariah is an Arabic term that is meaning "law" or "code of law." Maqasid al-Shariah is based on individual and communal advantages, and its rules are intended to preserve these benefits while also facilitating the development and perfection of human existence on Earth [19, 60]. Maqasid al-Shariah, according to Bendebka [28], is the Lawgiver's goals and intelligent purpose enshrined in each Shariah judgment. Its focus is on the essentials of individual existence in general [20].

The components of Maqasid al-Shariah have been described by previous academics. The elements of Maqasid al-Shariah are as follows: if al-Din (protection of belief and religion), if al-Nafs (protection of soul and body), if al-Aql (protection of intellect), if al-Nasl (protection of progeny and offspring), and if al-Mal (protection of resources), as introduced by previous scholars such as Imam Al-Ghazali. Moreover, many other scholars, such as Imam al-Shibi [28] agree with these points. The

five fundamental principles are founded on a reading of the Quran and Sunnah, which are the primary sources of Islamic law. The aim and goals of this concept are to facilitate (malaah) and protect humanity's advantages [30].

Medical treatments have positive and bad outcomes, with positive and negative side effects [21]. This method should strike a balance between the advantages and disadvantages. Patients need medical intervention in order to reclaim their quality of life. Unfortunately, there is no medical intervention that provides complete advantages to people [21]. In the lack of advantages, medical treatments will be useless. When artificial life support merely provides the quantity of life (a more extended lifetime) but not the quality or utility of human life, it is unnecessary. As a result, medical intervention will be deemed useless and a waste of money.

The merger of Shariah and medicine may occur in the preventive and preservation mode [21]. The Shariah rule includes food hygiene, personal cleanliness, and environmental hygiene, which leads to illness prevention and dissemination [21]. Furthermore, metabolic syndromes such as hypertension, coronary artery disease, and diabetes may be avoided by sharing information and educating about hunger management.

Intellect is a person's distinguishing feature, and it should be developed through time to increase both the individual's and society's knowledge [29]. According to Islam, Muslims must safeguard their intellect [30]. Thus, mental illness will be treated medically, and human intelligence will be restored. Furthermore, people will not live the lives of animals since humans, and a healthy mind and intelligence distinguish other creatures. A person's mental function should be managed since it may quickly lead to problems. Stress, neuroses, and psychoses are mental health issues that need therapy to restore intellectual function [21]. The same may be said about drug and alcohol addiction. Alcohol is addressed explicitly in the Quran as being prohibited because it interferes with human brain processes and intelligence.

Preserving the lineage entails selecting the children in terms of purity and cleanliness, as God has done. As a result, in Muslim culture, Islam encourages marriage and forbids infidelity [31, 2]. In addition, medical experts offer maternal health care, infertility therapy, and obstetric care, among other therapies, to maintain the community's reproduction [21].

One of the essential aspects of human existence is resources or property. As a result, Islam includes wealth in Islamic law to correctly manage their resources and avoid misusing them [32]. Human and material resource conservation are two elements of resource conservation in the medical profession [21]. The hospital's personnel will offer their entire dedication to the industry and create a healthy and productive environment by taking effective medications and living healthy lives. It adds to the economic resources of the community. Medical treatment facilities should not be squandered, and medical practitioners should look after them. Furthermore, it follows Islamic doctrine, which encourages resource conservation and avoidance of wasteful behavior.

COMMUNITY HEALTH AND MAQASID AL-SHARIAH

The sources of reference in creating a Maqasid al-Shariah based community health system are the complete Shariah compliance covered sources, which are either primary or secondary sources of Islamic law, Islamic legal maxims, norms, model, and basic necessity [19]. The sources are divided into two categories: primary and secondary. The Quran, Sunnah, Ijma", and qiys are among the primary sources that Muslims use to achieve Islamic law goals. Furthermore, when the problems addressed are either unclearly expressed or not covered in the primary texts, Muslims turn to various sources to develop and build judgments. In defining empowering community health procedures and processes in the SDGs, secondary sources may also supplement primary ones [6]. They are juristic preference (Istisn), public interest considerations (Malik mursalah), custom (Uruf), continuity assumption (Istib), and undermining the means (Sad al-dhari).

A portion of the Quranic verses is the primary source for establishing a Maqasid al-Shariah framework based on community health system. It implies that eating halal food, paying attention to cleanliness, and being frugal while consuming sources are among Muslims' rules. The basic principles serve as a guide for developers and researchers in establishing the Quran as a basis for organizational growth. Because it is the second source of Islamic law, the Sunnah plays an essential part in the Islamic governing process. Since its careful and comprehensive procedure, Sunnah is a reliable source. Sunnah is

concerned about healthcare. Medical practitioners may use this tradition as a basic guideline for creating treatments in the health sector. Sunnah is also the primary source for introducing Shariah -compliant hospitals.

The third source of Islamic law is the Ijma [20]. Ijma Shariah may also be done when a scholar expresses his or her viewpoint on a topic and has it endorsed and agreed upon by other academics. Muslims do not need to reject Ijma Shariah since it is included in Islamic law [12]. Non-halal medical use as long as halal alternative medications are not accessible is an example of ijma" linked to medical activities. It may be seen in gelatin in medications and the injection of highly pure insulin [25]. In Islamic law, qiyas is also one of the essential sources. In its literal sense, qiyas refers to an analogy that compares one item to another [20, 30]. Therefore, the Quran, Sunnah, and ijma" all support accepting the qiyas as a source [4].

Secondary sources such as al-istisna, malih mursalah, uruf, istib, and sad al-dhari are used in addition to primary sources to determine the principles in shari'ah-compliant community health. In Islamic law, istisna (equity) means to deem anything desirable [20]. The Quran and Sunnah are used to create Istisna. The permission of seeing at people's private parts while getting treatment is an example of Istisna in sustainable health procedure and practice [19]. The basic rule is that looking at private areas is illegal, although it is permitted to avoid damage. Because it offers the essential tools to promote flexibility and development of Islamic law, it is significant in structuring processes in the healthcare sector [12].

In Maqasid al-Shariah, malih mursalah (public interest) considers obtaining profit and avoiding or averting damage, and it supports the preservation of five fundamental components [27]. Indeed, it adheres to the concept of Maqasid al-Shariah, which is to gain benefit (malaah) while avoiding damage (mafsadah). The development of an empowered, sustainable community health centre and services for the community falls under the maalh mursalah, which means "life protection." Therefore, this study proposes the following hypotheses:

H1: There is a positive impact of community health on Maqasid al-Shariah.

SHARI'AH-COMPLIANT HOSPITAL AND MAQASID AL-SHARIAH

Despite its arrival and growth, there are no comprehensive criteria for this idea or acknowledged Shariah -compliant standards for community health empowerment. However, several industry participants have expressed their views on the requirements for creating Shariah-compliant hospital. Therefore, this section attempts to bring together various sources to examine the features and structure of creating Shariah-compliant hospital to facilitate Maqasid al-Shariah. According to Al Haq et al. [5], the Shariah supervisory committee (SSC) in the hospital's organizational structure is an essential criterion in establishing Shariah compliance in community health. It will provide continuous monitoring, clarification, and evaluation to ensure that the community health system operates by Islamic law.

On the other hand, the following elements are the best criterion for demonstrating that this specific community health is compliant with Shariah principles. Architectural design, financial stability, advanced technology, and high-quality equipment are among the requirements. The services provided are accessible to everyone, regardless of faith or creed, and include the provision of healthy, up-to-date scientific medical treatment and holistic patient care, including physical, mental, emotional, and spiritual well-being. Among the requirements that the community health needs to recognize Shariah-compliant hospital are social demands and services and processes that do not violate Shariah principles [33].

Furthermore, the requirements for establishing Shariah-compliant sustainable community health are centered on specific components such as food and medicines, facilities, finances, human resources, services and treatment, and management. There are several indicators that a specific healthcare service is Shariah-compliant [1]. On the other hand, [19] have their criteria to define Shariah-compliant, long-term community health. Understanding the basic principles of Shariah, understanding the principles of halal and haram, understanding the principles of mumalah, implementing the concept of quality in Islam, and establishing Islamic core values within the organization that runs the sustainable community health are the essential characteristics and components that reflect Maqasid al-Shariah.

These factors and criteria of Shariah are necessary for determining if a particular empowering community health program is Shariah-compliant. It encompasses both excellent infrastructure and facility management as well as spiritual requirements [26]. In addition, the enabling organization must include Shariah principles into its standard operating procedure (SOP) to maintain a high-quality, long-term community health management approach. Finally, a variety of variables influences people's preferences for these two kinds of hospitals. For example, administration, such as appointment systems, administrative procedures, visiting hours, quality of services, doctor harassment, and a healthy atmosphere, affect patient choice in private and government hospitals [34].

In Malaysia, the provincial government is in charge of the rules and regulations at government hospitals [6]. The Minister of Health in Malaysia employs and dispatches physicians, nurses, pharmacists, dentists, and other associated healthcare professionals to various medical facilities [31]. Besides, government hospitals are faced with an excessive number of patients to treat daily. It is based on a study that states that in 2016, six million more outpatients were admitted to government hospitals [57]. As a result, government hospitals could barely afford to offer patients the same level of care as private hospitals. Furthermore, the research found that patients were dissatisfied with the level of assurance provided by government institutions, interpersonal skills continue to be a significant issue in government hospitals.

Additionally, most private hospitals have reduced waiting times for medical care, are well-maintained, have a clean atmosphere, pleasant and elegant amenities, room service, and various food and medication options, to name a few benefits [35]. Furthermore, since there are more private wards, guests may enjoy longer visiting hours and excellent solitude. Private hospitals are expensive in-service fees since they provide higher quality services and provide superior patient and customer care [36]. With the promise of more excellent pay and lighter workloads in the private sector, retaining government sector experts has become a problem [37].

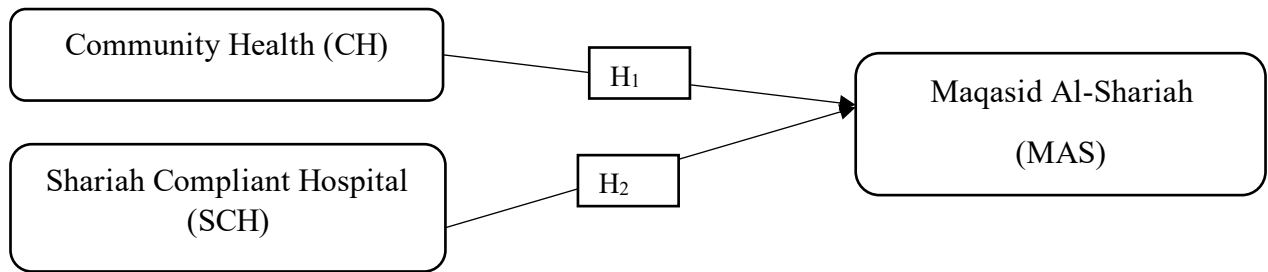
The Malaysian government has announced plans to cooperate with the commercial healthcare industry in sharing experts and facilities in government hospitals via the Minister of Health [38]. When experts are shared, this cooperation will overcome numerous logistical difficulties, allowing for more significant work in the hospital. In addition, the cooperation mechanism ensures greater productivity and efficiency, as hospitals may combine their efforts to provide high-quality, safe, and cost-effective social insurance for patients [39].

Private hospitals are actively implementing Shariah-compliant hospitals. It is notable that, An-Nur Specialist Hospital is a private hospital in Malaysia that has received a Shariah compliance certificate [19, 40]. Malaysia wants more healthcare professionals from both the commercial and public sectors to offer Shariah-compliant services. In the comprehensive literature study, definitions of Muslim medical tourism, ibadah friendly hospital, Islamic hospital, Shariah-compliant hospital, and the words *qawa id al-fiqhiyyah*, and *Maqasid al-Shariah* are given. As this study offers important information in addressing the research goals, the literature on the sequence of *Maqasid al-Shariah* and its development based on requirements is examined. Primary sources for building a Shariah-compliant hospital and other relevant criteria are also addressed in depth.

In terms of standard operating procedures (SOP) and customer service delivery, *Maqasid al-Shariah* may be implemented at the management level. The appropriate methods and procedures should be followed in order to create Shariah-compliant hospitals. The principles of *Maqasid al-Shariah* will guarantee that individuals behave by the revelation, guiding them to Allah S.W.T.'s compassion and favor. This hypothesis is also established by Ibn Khaldun's concept of *Asabiyyah* [41, 42], which emphasizes social cohesion and collective well-being. In the context of this study, *Asabiyyah* aligns with the Community Health construct, reflecting the social solidarity necessary to preserve life and lineage as part of the *Maqasid al-Shariah*. This research proposes the pursuing hypotheses:

H2. There is a positive impact of Shariah compliant hospital and *Maqasid al-Shariah*.

FIGURE: 1 CONCEPTUAL FRAMEWORK



RESEARCH METHODOLOGY

The quantitative research methodology used in the study was based on a survey approach [48, 61], utilizing convenience sampling to gather data. The researchers distributed 300 sets of questionnaires, collecting 257 valid responses from Malaysian community health beneficiaries. The data were analyzed using IBM's SPSS-28 for statistical analysis and IBM's AMOS-SEM for structural equation modeling (SEM) to validate the measurement model and test hypotheses [64]. The present study analysed several elements that are essential for Maqasid al-Shariah (MAS). Consequently, the study's target audience consists of patients in Kuala Lumpur who are using the health care services of the country. Kuala Lumpur has been selected as the primary area for data collection because, as the nation's capital, it has the highest concentration of the population. According to Klar & Leeper [43], convenience sampling was chosen as the sampling method because it enables researchers to acquire essential data from a large population efficiently and rapidly. In addition, they stated that convenient sampling allows researchers to select respondents who are knowledgeable and conversant with the research topic. Yue et al. [44] indicate that a sample size between 200 and 400 is ideal for SEM data processing in terms of sample size selection. This study distributed 300 sets of questionnaires in several health care centre in Kuala Lumpur. All 273 responses were gathered. Respondents were Malaysian community health beneficiaries. After eliminating the eleven incomplete questions, 257 were usable.

The research model comprises three constructs: community health, Shariah compliant hospital, and Maqasid al-Shariah. The self-developed questionnaire consists of 14 items that were adopted and modified to some extent to meet the requirements of the present study. Following Hair et al. [45, 46], a 5-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree" was utilized. The items of the questionnaire were composed exclusively in English. To validate the items, 20 sets of questionnaires were distributed to university students as part of a pilot study to collect their views. The questionnaires were then refined based on the respondents' suggestions. Based on the comments and suggestions provided by 273 respondents, the questionnaire was modified to increase clarity and comprehension.

For statistical analysis of the data, IBM's SPSS-28 was utilized in this study. However, IBM's AMOS-SEM was also utilized to validate the measurement model and to prove the research hypothesis.

DEMOGRAPHIC PROFILE

The demographic profile can provide valuable insights regarding healthcare accessibility and community health. The disparity between employed and unemployed individuals may indicate difficulties in delivering sufficient healthcare services to the unemployed, who are likely more dependent on public health resources. The disparity in wealth levels suggests varying healthcare requirements, with affluent people likely accessing private or Shariah-compliant healthcare facilities, whilst lower-income persons may have obstacles in obtaining similar treatments.

The demographic data underscore the necessity for more inclusive healthcare systems that accommodate various populations, tackle socio-economic inequities, and correspond with the objectives of Maqasid al-Shariah, particularly regarding healthcare equity and quality. An exhaustive examination of these groups' preferences and requirements can assist policymakers in formulating more focused and efficacious healthcare services that address the entire community, without exclusion.

Table 1 provides a succinct overview of demographic information, while a comprehensive analysis of these features fosters a better comprehension of the community's varied requirements and underscores the necessity of incorporating inclusive, egalitarian, and Shariah-compliant healthcare frameworks. The demographic profile of the questionnaire respondents is displayed in Table 1.

TABLE 1: DEMOGRAPHIC PROFILE OF RESPONDENTS

Attributes	Category	Frequency	Percentage
Gender	Male	131	50.97%
	Female	126	49.03%
Age (Year)	18-23	23	8.95%
	24-29	60	23.35%
	30-35	39	15.18%
	36-41	52	20.23%
	42-47	25	9.73%
	48-53	19	7.393%
	54 and above	39	15.18%
Occupation	Service	43	16.73%
	Housewife	38	14.786%
	Student	49	19.07%
	Self-employed	53	20.62%
	Unemployed	74	28.79%
Income (RM)	Less than 2 k	38	14.78%
	2k-3k	31	12.06%
	4k-5k	49	19.07%
	6k-7k	53	20.62%
	8k-9k	80	31.13%
	10 k and above	6	2.33%

EXPLORATORY FACTOR ANALYSIS

An Exploratory Factor Analysis (EFA) was conducted to study and determine the correlation between a group of interconnected variables [47] and [48]. Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity were conducted to initiate the EFA for this study. The KMO test yielded a value of 0.630, as shown in Table 2, showing that the result was statistically significant because it exceeded the 0.50 criterion [49]. Bartlett's Test of Sphericity was also statistically significant P value (0.000), confirming that the variables under consideration had a suitable correlation. The outcomes of the KMO test and Bartlett's test of sphericity indicate that the data were appropriate for exploratory factor analysis.

TABLE 2: KMO AND BARTLETT'S TEST

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.630
Bartlett's Test of Sphericity	Approx. Chi-Square	1103.415
	df	66
	Sig.	0.000

According to Badar et al. [50], the exploratory factor analysis of this study utilized principal component analysis and the varimax rotation method. In addition, elements with eigenvalues more than 1.0 and factor loadings greater than 0.50 were chosen to represent a construct.

It is noteworthy that three components were found using EFA. However, specific parameters had to be eliminated from the study since they overwhelmed other variables. Due to the removal of SCH3, CH4 and MAS4 from the principal component analysis for a second time, the factors in Table 3 are capable of independently loading without causing any issues.

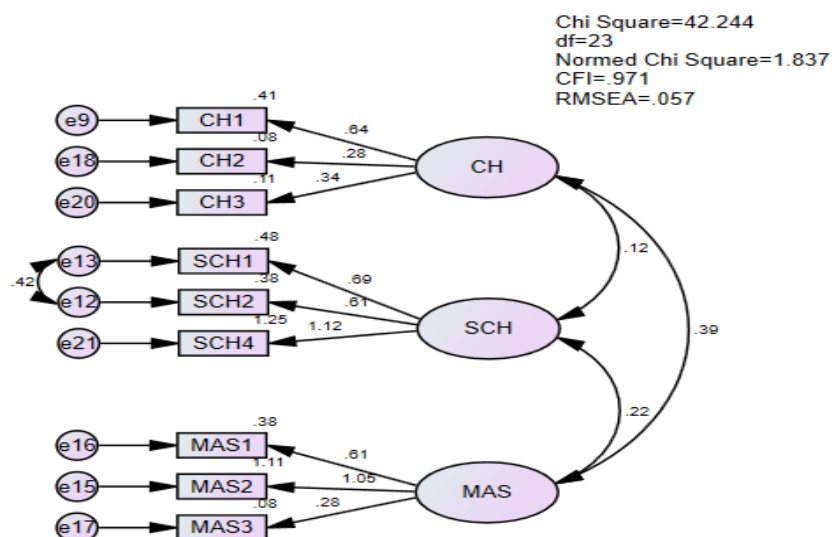
TABLE 3: TOTAL VARIANCES EXPLAINED

Rotated Component Matrix ^a			
	Component		
	1	2	3
SCH4	0.910		
SCH1	0.894		
SCH2	0.875		
CH1		0.876	
CH2		0.864	
CH3		0.831	
MAS2			0.853
MAS1			0.844
MAS3			0.565
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

MEASUREMENT MODEL

A measuring model was developed to evaluate the validity of all exogenous and endogenous variables in the fitness-tested model. The independent variable of this study is community health (CH) and Shariah compliant hospital (SCH). On the other hand, Maqasid al-Shariah (MAS) is the dependent variable. Based on EFA, some items have been eliminated.

FIGURE 2 MEASUREMENT MODEL



After the change depicted in Figure 2, the variables were fitted to a CFI with a value of 0.971 and an RMSEA of 0.057, both of which are acceptable. The chi-square value is 42.244, and the degree of freedom is 23. The normed chi-square value of 1.837 is below the cutoff value of 5.0. Table 4 illustrates a summary of the measuring model.

TABLE 4: SUMMARY OF MEASUREMENT MODEL RESULTS

Name of Category	Recommended Value	Obtained Value	Comments
Absolute fit	RMSEA $\leq$ 0.08	0.057	The recommended level is achieved
Incremental fit	CFI $\geq$ 0.90	0.971	The recommended level is achieved
Parsimonious fit	ChiSq/df $\leq$ 5	1.837	The recommended level is achieved

All exogenous and endogenous latent variables exhibit correlation values less than the 0.85 thresholds, demonstrating the discriminant validity between variables.

TESTING RELIABILITY AND VALIDITY

This study conducted a reliability test, including Cronbach's alpha, using SPSS-28 software for all constructs and AMOS software to evaluate Construct Reliability (CR). According to Bujang, Omar, & Baharum [51], Cronbach's alpha should exceed 0.70. Table 5 displays Cronbach's alpha value for each variable. Cronbach's alpha for CH, SCH, & MAS are 0.82, 0.88, & 0.71, respectively, which are above the minimal threshold provided. Furthermore, standardized loading for the construct of all three factors is greater than the 0.50 threshold, indicating that none of the constructs has a reliability concern.

TABLE 5: FACTOR LOADING, AVE AND CR COMPUTATION FOR THE CONSTRUCTS

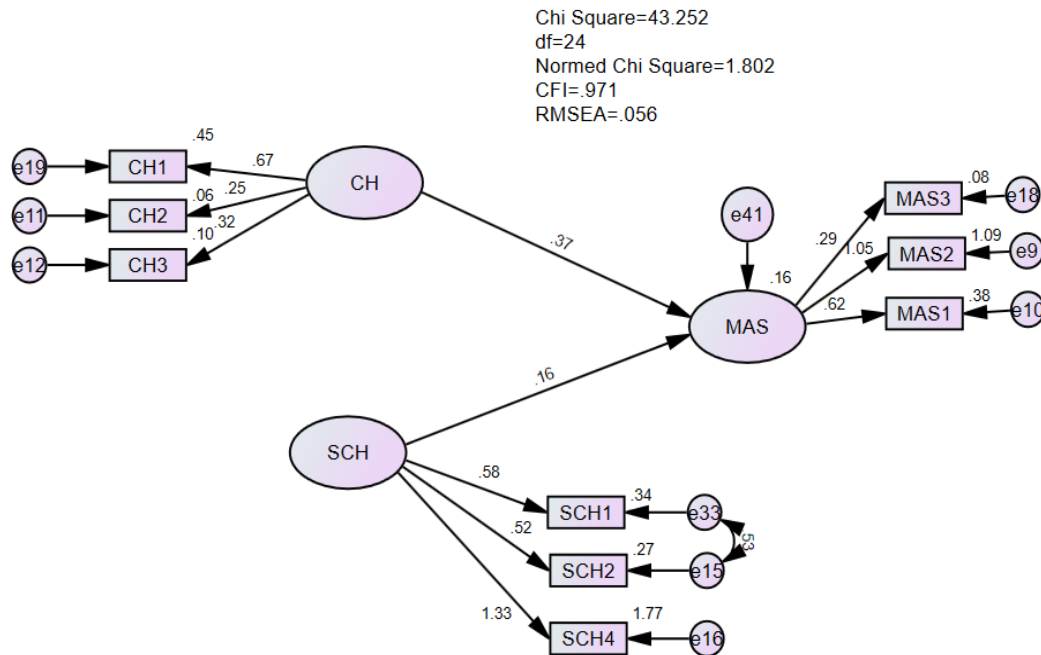
Constructs	Items	Factor loading	Cronbach a	AVE	CR
CH	CH 1	0.782	0.82	0.79	0.90
	CH 2	0.772			
	CH 3	0.693			
SCH	SCH 1	0.836	0.88	0.81	0.91
	SCH 2	0.774			
	SCH 4	0.844			
MAS	MAS1	0.713	0.71	0.73	0.89
	MAS2	0.766			
	MAS3	0.521			
Overall Cronbach's alpha			0.80		

In addition, the Composite Reliability (CR) and Average Variance Extracted (AVE) estimations were used to evaluate the validity of the three constructs in this study. Table 5 reveals that AVE for construct CH (0.79), SCH (0.81) and MAS (0.73) which are above the minimal threshold provided. Indeed, convergent validity was demonstrated for all components since the value of CR was greater than 0.60 (CR fluctuating from 0.89 to 0.91). According to Ab Hamid, M. R., Sami, & Sidek [52], if AVE is less than 0.50, although composite reliability is greater than 0.60, the construct's convergent validity is still adequate. However, in this study, the value of AVE and CR exceed the threshold level. Consequently, it might be argued that the legitimacy of further investigation has been established.

STRUCTURAL EQUATIONS MODELING

Figure 3 illustrates the modified structural model, which fits with a CFI of 0.971, exceeds the cut-off value of 0.90, and has an RMSEA of 0.056, which satisfies the criteria. The normed chi-square value of 1.802 is less than five, which contributed to the structural model's fit; it has 24 degrees of freedom, and the chi-square value is 43.252. Therefore, the structure model remains fitted.

FIGURE 3: STRUCTURAL MODEL



Based on the SEM model (Figure 3), Table 6 displays the estimated paths between the constructions.

TABLE 6: PATH ESTIMATION

			Estimate	S.E.	C.R.	P	Decision
MAS	<---	CH	0.464	0.221	2.098	0.036	Supported
MAS	<---	SCH	0.098	0.038	2.589	0.010	Supported

HYPOTHESIS TESTING

The results of analysing the structural path in the model revealed that community health (CH) has a substantial impact on Maqasid al-Shariah (MAS). Table 6 above shows that the hypothesis testing yielded a standardized regression weight of 0.464, a standard error of 0.221, and a critical ratio of 2.098. This critical ratio is higher than the threshold value of 1.96. The p-value is 0.036, which is less than the threshold 0.05. Prior studies have also found a favourable correlation between community health and its substantial impact on Maqasid al-Shariah [54, 55, 28]. Thus, the null hypothesis was refuted, indicating that there is a substantial impact of community health on Maqasid al-Shariah.

The hypothesis testing (Table 6) revealed that there is a strong relationship between Shariah-compliant hospitals (SCH) and Maqasid al-Shariah (MAS). The structure route has a standard regression weight of 0.098, a standard error of 0.038, a critical ratio of 2.589, and a P value of 0.010, which is less than the threshold level of 0.05. Hypothesis testing demonstrates that the services of a Shariah-compliant hospital have an impact on Maqasid al-Shariah. Given the rejection of the null hypothesis, there is strong empirical support, as demonstrated by previous studies, that a Shariah-compliant hospital has an impact on Maqasid al-Shariah [56, 57, 58, 59].

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

This study demonstrates a significant correlation between Maqasid al-Shariah (MAS), shariah-compliant hospitals (SCH), and community health (CH). This is consistent with prior research that advocates for the integration of Maqasid al-Shariah principles into healthcare systems. According to the findings, the objectives of Maqasid al-Shariah are positively influenced by shariah-compliant healthcare practices, particularly in the preservation of life, intellect, faith, lineage, and fortune. Through the application of AMOS-SEM statistical analysis, the empirical data collected in this study demonstrate that shariah-compliant hospitals and community health systems are essential for improving the general health of individuals by Maqasid al-Shariah. These results are consistent with existing theoretical frameworks and emphasize the significance of integrating Islamic law principles into healthcare systems. The results emphasize the broader alignment with the Sustainable Development Goals (SDGs), suggesting that the integration of Maqasid al-Shariah can enhance societal well-being by promoting ethical healthcare practices.

Despite the work's merits, it has a few deficiencies that warrant further investigation. The results of the study were conducted in Kuala Lumpur, Malaysia, using a convenience sample technique. Unfortunately, this may limit their generalizability to other regions or healthcare environments with varying cultural or economic conditions. The capacity to infer causality regarding the long-term effects of Maqasid al-Shariah integration within healthcare systems is limited using a cross-sectional design. To assess the effects over time and provide more considerable evidence of causal relationships, it is imperative to employ a longitudinal approach. The convenience sample approach may have resulted in sampling bias, as it fails to adequately represent the larger population, potentially undermining the external validity of the results. To rectify these deficiencies, future research should employ a more randomized sampling methodology and examine the long-term effects of Maqasid al-Shariah in a variety of healthcare contexts. The findings could be improved, and a more comprehensive understanding of the integration of Maqasid al-Shariah into global healthcare systems could be achieved by expanding the geographic parameters of the study and incorporating a more representative sample.

The study's findings suggest that there are numerous critical recommendations for future healthcare policy and research. To strengthen the spiritual and medicinal integrity of the healthcare system, policymakers should prioritize the integration of Maqasid al-Shariah into national healthcare frameworks. By incorporating Islamic legal principles into healthcare programs, the system could be more responsive to community demands while still adhering to fundamental ethical principles. Secondly, healthcare administrators and religious leaders should collaborate to develop policies and programs that align with Maqasid al-Shariah to ensure that healthcare professionals are trained in the application of these principles. The third and subsequent research should focus on the long-term effects of Maqasid al-Shariah on healthcare outcomes through longitudinal studies. The generalizability of the findings will be enhanced, thereby enabling a more comprehensive understanding of the relationship between Maqasid al-Shariah and global healthcare systems, by increasing the sample size to incorporate a more diverse demographic and geographic spectrum. Additionally, there is a need to prioritize the identification and resolution of the practical challenges that impede the implementation of Maqasid al-Shariah in healthcare settings, particularly in regions with diverse cultural and healthcare needs. Ultimately, research on shariah-compliant hospitals and their impact on community health and empowerment may offer valuable insights into the most effective methods for integrating Islamic principles into modern healthcare systems.

Research Ethics Approval

Ethics approval for this study was received from the Research Ethics Committee of ALFA University College (RECAUC) on 20/06/2024 (Ref. No.: RECAUC-2024-0620).

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A DECISION MODEL BASED ON ARTIFICIAL INTELLIGENCE FOR DISEASE PREDICTION AND PATIENT TREATMENT PROCESS PLANNING

Serkan Derici*¹, Nuri Özgür Doğan²

1. Faculty of Economics and Administrative Sciences, Department of Business Administration, Department of Quantitative Methods, Nevşehir Hacı Bektaş Veli University, Turkey

2. Faculty of Health Sciences, Department of Health Management, İstanbul Medeniyet University, Turkey

Correspondence: serkanderici@nevsehir.edu.tr

ABSTRACT

PURPOSE:

The aim of this study is to determine which patients are at risk of lung cancer with a sample of 1,000 people living in China and a data set consisting of 20 variables. In this direction, it is aimed to take preventive measures for individuals at risk of developing lung cancer, to protect human health, and to contribute to the effective and efficient use of resources. In this way, the model developed in the planning of preventive and therapeutic activities of professionals working in the health sector will be exemplary as a decision model.

METHODOLOGY:

A linear regression model was developed and applied to a public domain data set to predict individuals at high risk of developing lung cancer using machine learning on the Microsoft Azure Machine Learning Studio platform.

FINDINGS:

Lung cancer risk of the patients in the sample was predicted with the machine learning application. It was determined that these predictions made with machine learning gave an effective result and provided efficient policies. The developed model and application example is proposed as a modern, valid and artificial intelligence-based decision-making model for professionals.

ORIGINALITY:

There are few statistical analysis and machine learning applications for lung cancer prediction in the literature. In this paper, in addition to the prediction model, statistical analyses will be performed, preventive measures will be proposed, and the scope of the analyses will be made holistic by linking it to efficiency in resource utilization. As a result, this will enable professionals to make optimal decisions.

KEYWORDS

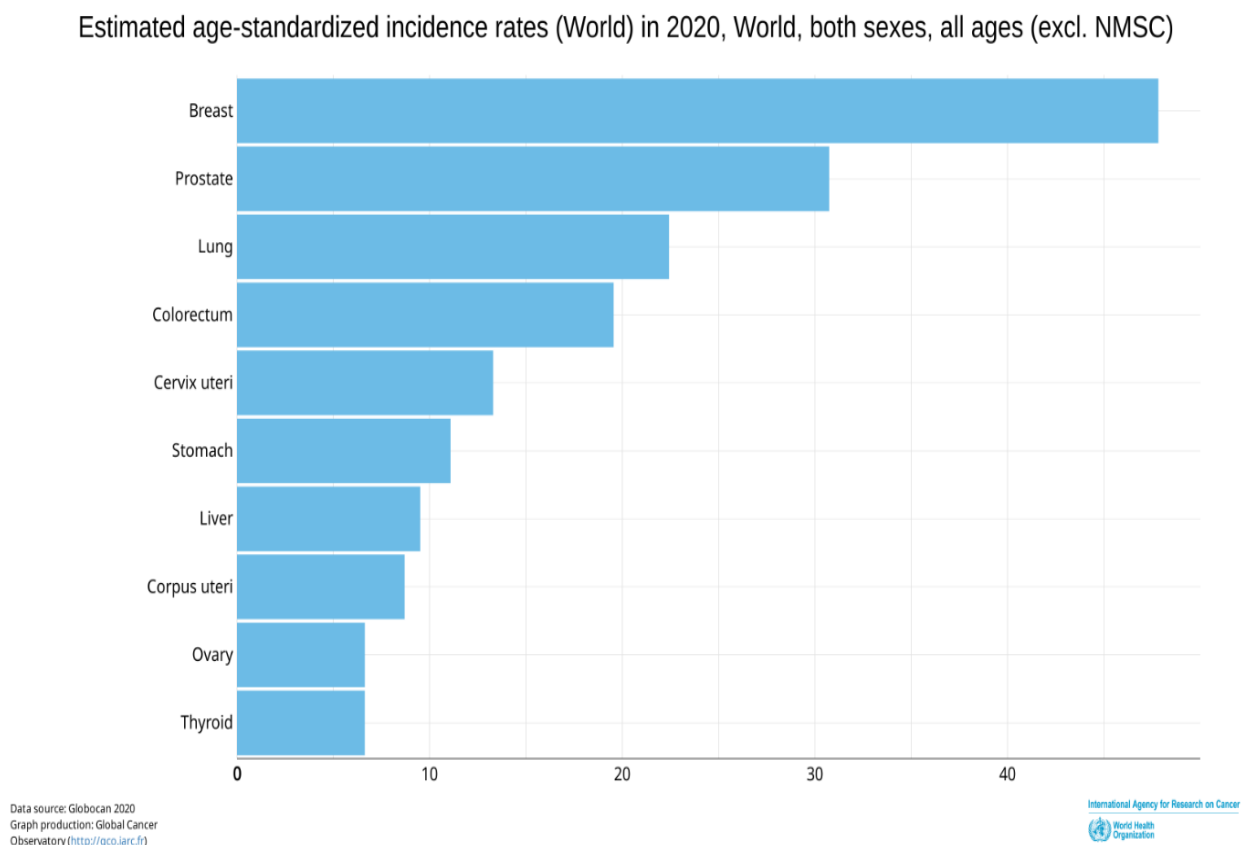
lung cancer, prediction, big data, artificial intelligence, machine learning.

INTRODUCTION

The technological innovations that entered our lives with the last industrial revolution have led to the acquisition of big data in every sector. The large amount of data obtained in processes has created the problem of drawing useful conclusions from this data. The problem of analyzing big data has become one of the departments to which companies allocate the most resources. Transforming the raw data obtained in big data analysis into useful information and determining policies in line with this information directly affects the success and efficiency of the sectors. However, classical methods are insufficient in big data analysis [31]. At this point, machine learning emerges as an innovative approach based on artificial intelligence and is increasingly used in big data analysis. The use of machine learning algorithms in big data analysis is important for the efficient use of resources and the development of effective policies [32].

Machine learning algorithms are used for classification, clustering and prediction problems [33]. When the literature is examined, it is seen that machine learning has started to be widely used not only in marketing or production but also in all sectors. Artificial intelligence-based applications such as machine learning have started to be used in very important studies in the health sector [34]. Prediction models, especially robotic applications and visual processing, give successful results in the health sector. For this reason, in this study, a prediction model has been developed for patients to get lung cancer under certain variables. As shown in Figure 1, lung cancer is the third most common cancer in the world with 22.4% [Cancer Today (iarc.fr)]. Due to the prevalence of lung cancer, a machine learning application on lung cancer was realized in this study.

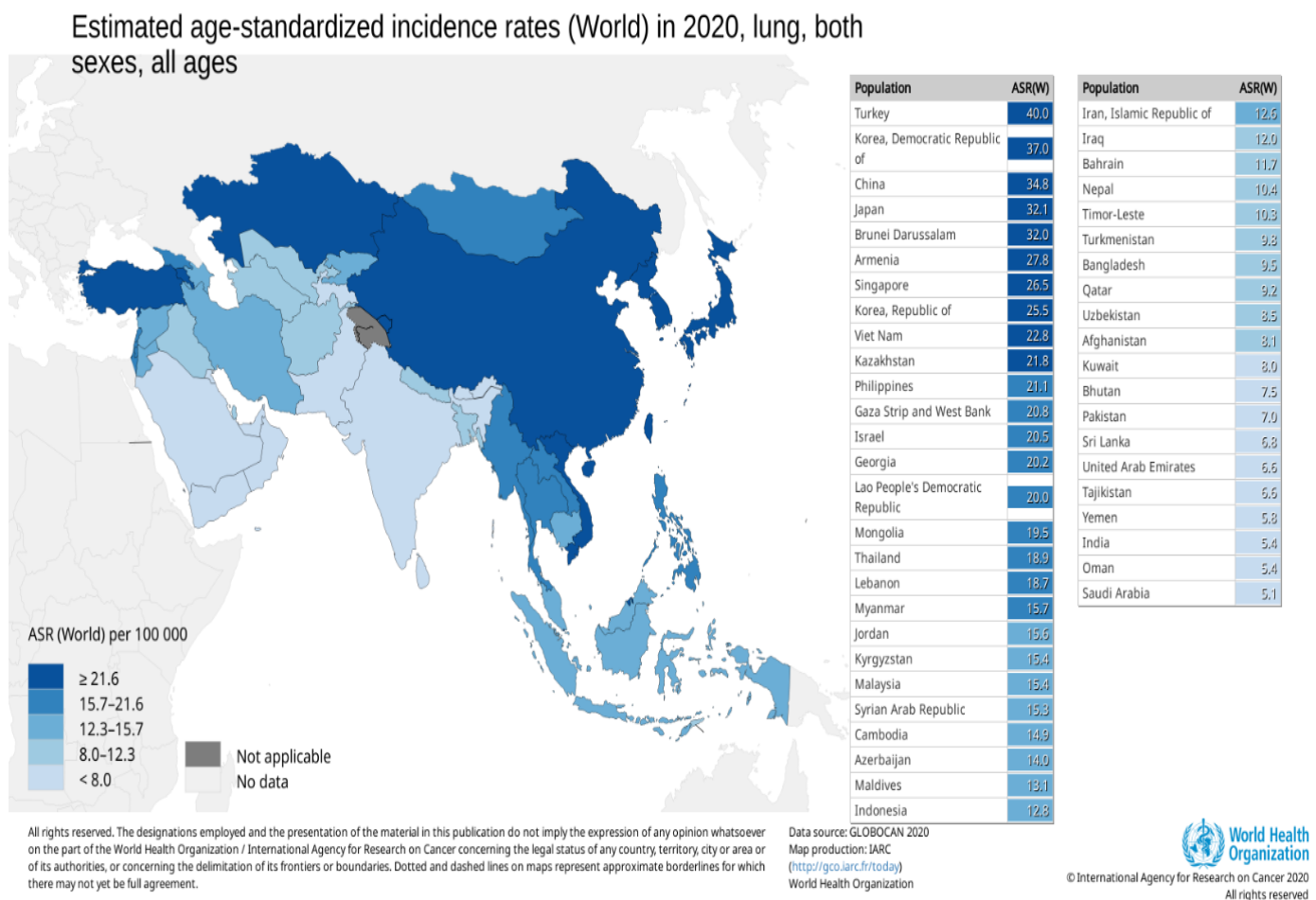
FIGURE 1: TYPES OF CANCER SEEN IN THE WORLD (2020) [CANCER TODAY (IARC.FR)]



Prediction models for lung cancer have been developed and applied with classical methods in the literature; however, few studies have been conducted with machine learning. Information on these studies is presented in the literature review section.

Early detection of lung cancer is very important for the success of treatment. AI-based prediction models are very successful in predicting the condition of a new patient by learning from previous observations. Therefore, the problem of predicting lung cancer in patients in a practical and fast way instead of lengthy examinations is very important. In this study, we investigate whether an AI-based model can actually provide effective results. According to World Health Organization data, 34.8% of lung cancer cases in Asia are in China, which is the reason for the analysis on China in this study. This information is shown in Figure 2 [Cancer Today (iarc.fr)].

FIGURE 2: DISTRIBUTION OF LUNG CASES IN ASIA BY COUNTRY [CANCER TODAY (IARC.FR)]



This paper is designed in four sections: introduction, literature review, application methodology and dataset, application and conclusion. These sections will be explained in the following sections, respectively.

This study consists of an introductory section followed by a literature review where the research model is presented, a methodology section where information about machine learning is presented, an application section where the results of the analysis are presented, and a conclusion and discussion section where the findings are presented.

LITERATURE REVIEW

Smart Objects, which entered our lives in the 21st century [5], began to develop at a very high speed with the last industrial revolution. In all sectors that affect our lives, large amounts of data are instantly obtained, stored, analyzed with artificial

intelligence components and transformed into useful information. Machine learning algorithms have been developed to analyze this data. Machine learning is a field of science developed in close relationship with data mining, which includes methods for computers to learn by analogy with the thoughts of individuals [13].

Machine learning minimizes statistical errors in big data analysis [35]. Since the aim of this study was to predict individuals who are likely to develop lung cancer, the literature was examined in this direction.

TABLE 1: LITERATURE REVIEW ON MACHINE LEARNING APPLICATIONS ON LUNG CANCER

Author(s)	Year	Method(s)	Application
Cai et al.	2015	Receiving Operating Curve Random Forests Maximum Relevancy	Classification of lung cancer types.
Danjuma	2015	Multilayer Perceptron Decision Tree Naive Bayes	Machine learning was applied to determine the probability of survival after surgery.
Burki	2016	Image evaluation	Machine learning application was made on the possibility of surviving lung cancer.
Podolsky et al.	2016	Support Vector Machine Naive Bayes Decision Tree	Determining the type of lung cancer
Kadir and Gleeson	2018	Prediction	Lung cancer prediction approaches evaluated.
Radhika, Nair & Veena	2019	Naive Bayes Support Vector Machine Decision tree Logistic Regression	Classification algorithms, early diagnosis of lung cancer.
Banerjee and Das	2020	Support Vector Machine Artificial Neural Network Random Forests	The issue of detecting early lung cancer has been studied.
Pradhan and Chawla	2020	Literature review	Lung cancer detection with IoT-based machine learning is discussed.
Raoof, Jabbar & Fathima	2020	Naive Bayes Support Vector Machine Logistic regression Artificial Neural Network	The factors causing lung cancer.
Abdullah and Ahmed	2021	Literature review	The detection of lung cancer.
Xie et al.	2021	Naive Bayes	Early lung cancer.
Dritsas and Trigka	2022	Rotation Forest	Lung cancer risk prediction
Sharma and Mittal	2024	Convolutional Neural Network	Prediction of lung cancer disease

It is clear from the literature review that machine learning algorithms have different applications in the health sector by providing many advantages. Machine learning algorithms; It has been the subject of studies such as diagnosis of lung cancer, prediction of deaths and recovery from diseases. The data set was determined in line with the literature review. Utilizing this literature review, the application model of the study is built with twenty different variables as shown in Table 3 in the following sections. Thus, a unique lung cancer prediction model was developed.

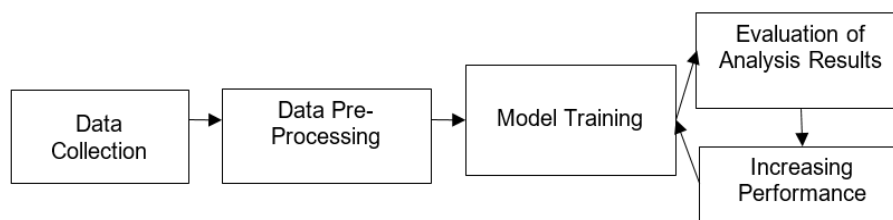
METHODOLOGY

The dataset is obtained from Kaggle¹ and consists of 1,000 observations and 20 variables from approximately 450,000 individuals with lung disease in China. The dataset was introduced to the Microsoft Azure Machine Learning Studio (AMLS²) platform and an attempt was made to predict patients at risk of developing lung cancer. The regression analysis and artificial neural networks used in the prediction are described in this section.

MACHINE LEARNING

The analysis of big data obtained through artificial intelligence components can only be done with artificial intelligence-based systems. Machine learning is a sub-branch of artificial intelligence, first defined by Arthur Lee Samuel in 1959 [24]. Theoretically, machine learning is a method that enables a system developed for a process to make predictions about future periods using information from previous processes [30]. In other words, machine learning is a method that enables computers to learn in a way similar to human thinking [13]. Machine learning applications generally follow the five steps shown in Figure 3:

FIGURE 3: STAGES OF MACHINE LEARNING [29]



Machine learning methods have been developed in the literature for machine learning applications depending on whether the data is labeled or not. The classification of these methods is shown in Table 2:

TABLE 2: CLASSIFICATION OF MACHINE LEARNING ALGORITHMS [15]

Machine Learning Type	Problems Type	Methods
Supervised Learning	Regression Classification	Decision Tree Random Forest Naive Bayes Artificial Neural Network Deep Learning Support Vector Machine K-Nearest Neighbor
Unsupervised Learning	Clustering	K-Means Clustering Hierarchical Clustering Soft Clustering
Semi Supervised Learning	Dimensional Reduction	Single Value Parsing Policy Component Analysis Independent Component Analysis
Reinforced Learning	Q-Learning	Q-Learning

An artificial intelligence-supported linear regression analysis was applied on the Microsoft Azure Machine Learning Studio platform to predict the risk of lung cancer in individuals in the data set within the scope of this study. Therefore, linear regression analysis is explained in the next section.

¹ <https://www.kaggle.com/>

² <https://azure.microsoft.com/en-us/products/machine-learning>

REGRESSION ANALYSIS

Regression analysis, first articulated by Francis Galton, is a supervised machine learning method. In regression analysis, a dependent variable (Y) is estimated by one or more independent variables (Xi) associated with it [3]. The mathematical notation of the regression analysis to express the i index independent variables and ε regale error is simply expressed as:

$$y = f(x) + \varepsilon \dots\dots\dots(l)$$

Regression analysis as a machine learning algorithm; It starts with the division of the data set into training and test data, and has a working principle of feature selection, determination of the regression model and obtaining the results by running the model [8- 15].

The literature review indicates that regression models are widely used in machine learning applications on lung cancer. Lung cancer, which is considered as the dependent variable in the context of regression analysis, is associated with different independent variables. Therefore, the data set used in the study has multiple regression analysis assumptions.

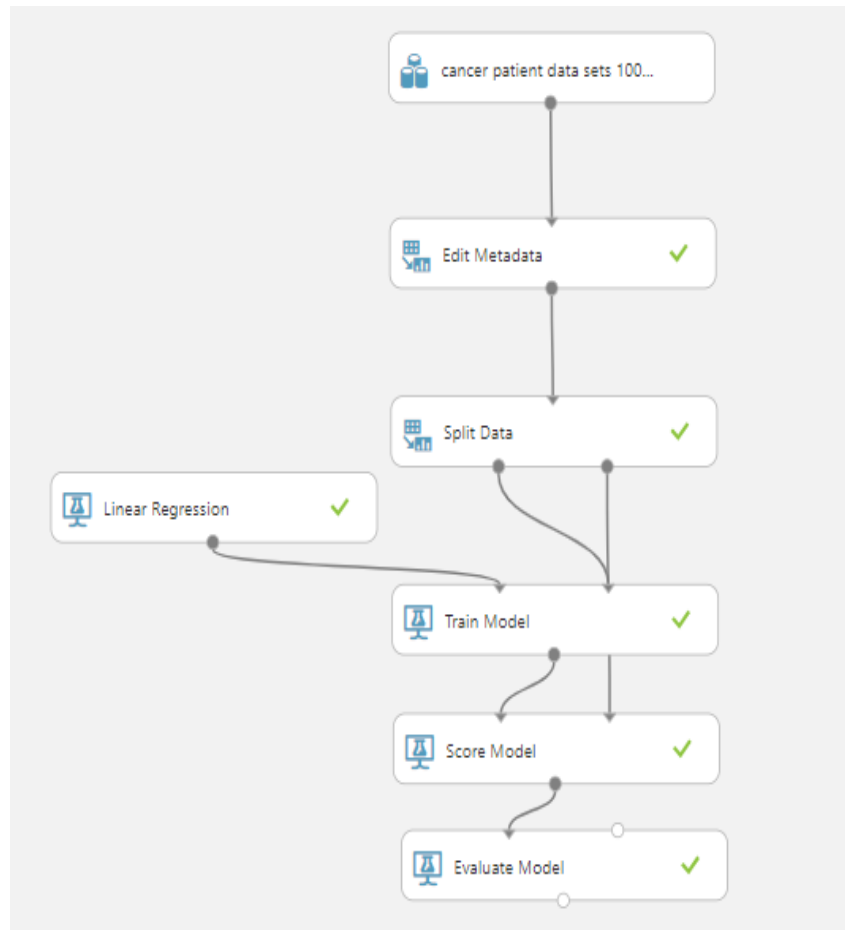
APPLICATION

The dataset used in this study is obtained from Kaggle. This dataset contains 23 factors that cause lung cancer for 1000 individuals living in China. A unique lung cancer prediction model was designed using 20 of these variables. The data was uploaded to the AMLS System and firstly, the data was preprocessed and missing data was completed by averaging on the same platform. In the analyses, the risk level variable was introduced to the system as a categorical dependent variable. The data belonging to 1000 individuals were divided into two parts as 70% training data and 30% test data to enable the system to learn the problem. In this step, it was ensured that the machines learned past disease experiences.

It is important for the protection of human health to identify individuals who pose a risk with this algorithm and to carry out the necessary medical tests and procedures. On the other hand, by following this path, an important planning will be made in the effective and efficient use of personnel, material expenses and medicines in health institutions. Misdiagnoses will be minimized and unnecessary procedures will be prevented in this way and time efficiency will be ensured. This will contribute to the efficient use of staff working hours and resources. On the other hand, following an effective diagnostic pathway and preventing misuse of drugs will increase efficiency in drug use.

The developed model was analyzed on the AMLS platform. The flow of the analysis on the AMLS platform is shown in Figure 4.

FIGURE 4: AMLS APPLICATION STEPS



The descriptive statistics of the variables used in the analyses were determined by the steps shown in Figure 4 and presented in Table 3 together with the results of the regression analysis.

TABLE 3: DESCRIPTIVE STATISTICS AND REGRESSION ANALYSIS RESULTS RELATED TO VARIABLES

Variables No	Independent Variables	Number	Mean	Standard Deviation	Min-Max
V1	Age	1000	37.17	12.01	14-73
V2	Gender	1000	1.40	0.49	1-2
V3	Air Pollution	1000	3.84	2.03	1-8
V4	Alcohol Use	1000	4.56	2.62	1-8
V5	Dust Allergy	1000	5.17	1.98	1-8
V6	OccuPational Hazards	1000	4.84	2.11	1-8
V7	Genetic Risk	1000	4.58	2.13	1-7
V8	Chronic Lung Disease	1000	4.38	1.85	1-7
V9	Balanced Diet	1000	4.49	2.14	1-7
V10	Obesity	1000	4.47	2.13	1-7
V11	Smoking	1000	3.95	2.50	1-8
V12	Passive Smoker	1000	4.20	2.31	1-8
V13	Chest Pain	1000	4.44	2.28	1-9
V14	Coughing of Blood	1000	4.86	2.43	1-9
V15	Fatigue	1000	3.86	2.25	1-9
V16	Weight Loss	1000	3.86	2.21	1-8
V17	Shortness of Breath	1000	4.24	2.29	1-9

V18	Wheezing	1000	3.78	2.04	1-8
V19	Frequent Cold	1000	3.54	1.83	1-7
V20	Dry Cough	1000	3.85	2.03	1-7
Dependet Variable: Risk Level		300	0.96	0.75	0-2
	Mean Absolute Error: 0.30 Root Mean Squared Error: 0.41 Relative Absolute Error: 0.46 Relative Squared Error: 0.25 Coefficient of Determination (R ²): 0.79				

The data set consisting of 20 independent variables and one dependent variable used for lung cancer risk of individuals was analyzed. Descriptive statistics of the variables used are presented in Table 3. While creating the data set, the relevant risk factors were graded from 1 to increasing severity and accordingly, exposure levels and averages were determined. In the model developed for the lung cancer risk of individuals aged 14-73 years according to 20 risk factors, it is seen that the independent variables explain 79% of the dependent variable. This is an acceptable rate. Subsequently, the risk of developing lung cancer was estimated. After the risk level variable was expressed as a categorical variable (0: Low, 1: Medium, 2: High), predictions were made by applying machine learning on the AMLS platform. A cross-section of 20 individuals for these predictions is presented in Table 4.

The prediction results of these individuals showed that 10 patients were high risk, 5 patients were medium risk and 5 patients were low risk. Using the system developed as a result of this application, the risk level of patients can be easily found by entering values in this way. Because according to the data of 1000 patients entered into the system with the machine learning application, the computer has now recognized the symptoms of lung cancer. In this way, making a preliminary assessment and applying appropriate treatments plays an important role in terms of treatment and resource utilization efficiency.

TABLE 4: PREDICTING THE RISK LEVELS OF DEVELOPING LUNG CANCER

No	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	Risk Level
0	33	1	2	4	5	4	3	2	2	4	3	2	2	4	4	2	3	1	2	3	0.21*
1	17	1	3	1	5	3	4	2	2	2	2	4	2	3	3	7	6	2	1	7	1.13**
2	35	1	4	5	6	5	5	4	6	7	2	3	4	8	7	9	1	4	6	7	1.90***
3	37	1	7	7	7	7	6	7	7	7	7	7	7	8	2	3	4	5	6	7	1.86***
4	46	1	6	8	7	7	7	6	7	7	8	7	7	9	2	4	4	2	4	2	1.92***
5	24	1	6	8	7	7	6	7	7	3	8	7	9	6	2	5	3	2	1	7	1.98***
6	39	2	4	5	6	6	5	4	6	6	6	6	6	6	3	2	3	1	7	5	1.05**
7	27	2	3	1	4	2	3	2	3	3	2	2	4	2	2	3	1	5	2	6	0.17*
8	52	2	2	4	5	4	3	2	2	4	3	2	2	4	4	2	3	1	2	3	0.24*
9	14	1	2	4	5	6	5	5	4	6	5	4	6	5	3	2	4	7	2	1	0.99**
10	62	1	6	8	7	7	7	6	7	7	8	7	7	9	3	4	4	2	4	2	1.78***
11	61	2	2	3	4	2	1	1	2	4	3	2	1	5	1	3	1	3	2	1	0.09*
12	44	1	2	1	5	3	2	3	2	4	1	4	4	6	7	5	8	1	3	2	1.26**
13	32	2	1	6	7	5	3	2	6	2	3	3	2	3	3	7	4	8	7	7	1.99***
14	29	2	6	7	7	7	7	6	7	7	7	7	7	2	7	6	7	2	3	1	1.95***
15	53	1	6	8	7	7	6	7	3	8	7	9	5	6	2	3	2	1	7	6	1.96***
16	26	1	6	7	7	6	7	7	7	7	7	7	2	7	6	5	7	3	2	3	1.81***
17	47	1	6	7	7	7	7	5	6	7	5	8	2	5	5	4	6	1	2	4	1.91***
18	24	1	3	1	3	2	2	4	3	1	3	2	3	2	4	2	2	3	1	2	0.20 *
19	36	1	3	4	6	5	4	6	5	4	2	5	2	3	6	1	2	4	2	1	1.03**
20	18	1	3	1	4	2	3	1	2	2	3	1	2	1	3	8	6	2	1	2	1.14**

It was determined as "0<Low Risk<0.75<Medium Risk<1.50<High Risk".

*Patients at low risk

**Patients with intermediate risk

***Patients at high risk

RESULT AND CONCLUSION

Machine learning includes artificial intelligence-based algorithms that save time and automatically minimize errors by providing direct targeted results. Worldwide, lung cancer is the third most common type of cancer. Many preventive projects and campaigns such as reducing air pollution, quitting smoking and creating a clean air space are organized worldwide. An examination of the data on China used in this context reveals that lung cancer cases occur at a very high rate. In this respect, the Chinese sample is a very effective study area.

Predicting big data with machine learning algorithms and developing and implementing policies based on these predictions play an important role in achieving accurate and effective results. This is because errors are minimized and holistic analyses are performed using data from all variables of the process.

We used a sample of 1,000 people with lung disease in China to estimate the risk level of patients with lung cancer based on 20 different variables. Based on the analysis using the AMLS Platform, patients with high probability of lung cancer were identified by the artificial intelligence algorithm.

Thanks to such analyses to be made with machine learning applications, early detection of diseases and efficient treatment planning will be possible. Using the analyzes made in this direction, similar risk levels can be determined. This is an efficient way to prevent misdiagnosis and treatment and to protect human health. The use of machine learning algorithms in diagnosis provides speed, time and cost advantages in health institutions. On the other hand, it is an important guide for optimum use of resources and correct planning.

The decision-making processes with the last industrial revolution are succeeding as a result of the correct use of big data. Big data on patients in healthcare organizations is obtained in many ways, from recording a patient's patient cards on computers to the data of sensors. However, when the amount of data in question increases and reaches gigantic dimensions, analyzing it with classical methods and taking decision-making actions as a result of these analyzes are not the right practices. Because it has been clearly demonstrated in the literature that when big data is analyzed with artificial intelligence-based algorithms, more accurate results are obtained and especially the success of prediction models. Analysis of patient information with machine learning and making predictions will increase the success in the decision-making processes of professionals in the health sector. In addition to the machine learning algorithms used in this study, other purpose-built models can be used. Similar studies can be done for different disease groups as well as for different countries and sectors.

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POST COVID ERA AND THE INFLUENCE OF ONLINE HEALTHCARE PLATFORMS ON THE HEALTH-SEEKING BEHAVIOUR OF ADULTS

Keerthana Venkatesan, Prabakar S*

Department of Social Sciences, School of Social Sciences and Languages, Vellore Institute of Technology, Vellore, Tamilnadu, India

Correspondence: prabakar.s@vit.ac.in

ABSTRACT

NEED & OBJECTIVES OF THE STUDY:

Good living conditions include basic shelter, food, and clothing but the aspect of access to quality healthcare has become one of the essentials of livelihood, especially in this post-COVID era. The post-COVID era has also marked the digital evolution where the role of social media is inevitable to a wide range such that it has acquired the position among the social institutions influencing diverse populations on all aspects due to its multiple users. This multiplicity of users has demanded the interference of social media in all spheres of life even in the field of health and medicine. It has opened up new ways of access for sharing information and social support, due to increased connectivity and direct participation bringing changes in the illness behavior.

METHODOLOGY:

The study tries to understand the influence of online healthcare platforms on health health-seeking behavior of young adults in contemporary society by adopting a quantitative methodology with self-structured questionnaire for data collection.

RESULTS:

The study results state that online healthcare services have developed a new platform of interaction between the doctor and the patient resulting in the evolution of traditional health-seeking behaviour. It also infers that health-seeking behavior is dynamically aligned with modernity.

KEYWORDS

digital evolution, health seeking behavior, health seeking information, social media, post-COVID era

INTRODUCTION

HEALTHCARE AND ONLINE PLATFORMS

Social media as one of the core components of online platforms means "the activities, practices, and behavior among communities of people who gather online to share information, knowledge, and opinions using conversational media" [1–3]. It is widely used for disseminating information from one individual to another assisted by popularity and utilization for the cycle of dissemination making social media a universal platform. This collective platform has assimilated into all spheres

of life and various disciplines such as public administration, governance, and healthcare. By entering the field of healthcare, it has altered the previous mode of healthcare interaction between the patient and the professionals virtually facilitated by social media, particularly focusing on its awareness, promotion, public relations, and crises communication [4–6].

Earlier, Internet services in healthcare assisted service providers currently the reference information function of the Internet makes it a medium for interaction with a wide range of users. This increase in population with access to the internet makes social media a strong force with potential impact. Previously, patients paid little attention to the quality, safety, and experiences of other patients to make choices that largely depended on factors like reputation, recommendation, and proximity of the informant [6–13]. Media has become an effective means for healthcare professionals and patients to share opinions, feedback, photos, audio, and videos collecting necessary information to expand their professional knowledge and care for patients [11,12,14,15]. Further, the utilization of social media and other online platforms empowers patients to widen their knowledge on various diseases, their symptoms, cures, and cost-effective care. Enabling people to track their personal health progress and access other infra-structural facilities such as fixing appointments, availing consultation, checking and reserving hospital beds and professionals [6,12–15]. Consequently, it provides ability for patients to express themselves, share their experiences, absorb others, and spread health knowledge beyond the boundaries of hospitals or local clinics [5,12,16–18].

HEALTH-SEEKING BEHAVIOR AND ONLINE HEALTHCARE

Health-seeking behavior (HSB) can be described as 'any action or inaction undertaken by individuals who perceive themselves to have a health problem or to be ill for the purpose of finding an appropriate remedy.' As a concept, HSB consists of actions to sustain good health, prevent ill-health, and any state marking the exodus of good health [16,19]. From the patient's perspective, HSB can be understood as the response towards discomfort rather than to a specific diagnosed disease that was unidentified by them before medical consultation [13,20,21]. HSB is regarded as the way in which people seek medical attention for their ailments. While online HSB is emerging as one of the potential sources of health-seeking behavior refers to the organization-sponsored websites and other social media sites offering telemedical services or other healthcare services [1,6,22]. Bennett, a social psychologist, has delineated five indispensable uses of social media in hospitals such as for customer service, community outreach, patient education, public relations, and crisis communication. Furthermore, professional reviews including blogs, tweets, and advertisements providing content with therapeutic evidence and recognized procedures consequently educated patients and doctors about various medical conditions [3,10–13,23,24].

Much of the literature on healthcare organizations and social media focuses on networking and information sharing. Many studies found that patients find it easier to describe their experience without modification of emotional context which provides necessary coping skills, support, and resources for other patients [5,12,25–27]. Some studies outlay the challenges of social media in healthcare by questioning the issues of privacy, usability, manipulation of identity, misinformation, and other security issues [6,11,13,15].

Further, various sociological underpinnings such as the functionalist perspective including the person's sick role theory that conceptualises sickness or illness as a social right and deviance affecting the societal functioning, while the symbolic interactionism tends to stigmatise illness and the health seeking behaviour of individuals. The conflict perspectivist proclaims illness as the struggle between power and equality where the poor suffer and the rich benefits the healthcare services. Apart from these perspectives there are various sociological theories that tends to escalate the effectiveness of online healthcare services [28]. One such theory that this study favours is the technology acceptance model (TAM) designed by Fred Davis to predict the willingness of individuals to accept the instruction of new technologies in their daily lives. This model posits the key feature of motivation and the possibilities of influence with perceived ease of usage and its usefulness [11,14,28].

From these sources and insights, the study tries to understand the influence of social media on the health-seeking behavior of young adults in contemporary society explicitly addressing the replacement of the real world with the virtual world of

reality satisfying the individual's drive for companionship. Therefore, the study is an attempt to understand the influence of online healthcare services on the health-seeking behavior of young adults by challenging the traditional means of HSB and witnessing its replacement with social media or technology.

METHODS AND MEASURES

The study population included young adults 18-25 years old in Vellore district, Tamil Nadu, India. The study is a cross-sectional, quantitative [29] descriptive research design with health-seeking behavior as the dependent variable and online healthcare as the independent variable. The study employed a quantitative methodology and was conducted by using a self-constructed questionnaire as the tool of data collection. The study population was selected based on the individual volunteering using simple random sampling to ensure the representativeness of the sample, accuracy of analysis, and wide availability of users. The study adopted simple random sampling by using power analysis to devise the minimum sample size [30] of 80 for a larger effect. Therefore, the total sample size of the study is 120 wherein 13 samples were eliminated due to missing and incomplete data thus 107 samples were considered for analysis.

Prior to the data collection the study was subjected to XIV Institutional Ethical Committee for Studies on Human Subjects and clearance obtained. Further, the study was conducted on a voluntary basis by seeking individual consent through informed consent and their willingness to participate in the study after a detailed explanation of the study.

MEASURES

The study has adopted a self-constructed questionnaire with a detailed description of the study containing information about the study purpose, the right to withdraw from the study, and data privacy and confidentiality statement. Individuals who decided to participate in the survey were asked to sign the informed consent and later the researcher started the survey by distributing the survey link to the participants. The questionnaire contained questions related to demographic factors, usage of social media, health-seeking behavior such as mode of treatment, preference of hospital, and its related factors. While online HSB was assessed using the scale titled 'e-health impact' constructed by Laura Kelly [31]. The scale consists of 26 items measuring four dimensions such as attitude towards online health information, attitude towards sharing health experience, understanding and motivation for seeking online consultation, and confidence and motivation towards online health-seeking behavior. The questionnaire was arranged according to the objectives of the study and converted to Google Forms. The constructed Google forms were then circulated among the participating individuals who gave their consent so as to ease the process of data collection. Later, the collected data was analyzed using SPSS 20 (Statistical Package for Social Sciences) and MS Excel.

The collected data was analyzed using descriptive statistics by calculating the mean and standard deviation. Correlation coefficients and multiple linear regression were employed to understand the relationship between attitude, confidence, identification, understanding, motivation, self-assurance and inspiration towards online health-seeking behavior. While the basic statistical comparison was made for attitude towards health-seeking information and health-sharing experience to gender, nature of family, and preference of consultation using cross-tabulation and chi-square to test their association in the following hypothesis:

- **H₀₁**- The attitude towards sharing health experience is not associated with the respondents' preference of treatment and type of hospital referred for consultation.
- **H₀₂**- The attitude towards sharing health experience is not associated with the respondents' preference of treatment and type of family.
- **H₀₃**- There is no significant relationship between the study variables such as the attitude towards consultation, confidence & identification, understanding & motivation, and self-assurance & inspiration.
- **H₀₄**- Confidence & Identification and Understanding & Motivation do not significantly predict the respondent's attitude towards online consultation.

RESULTS AND DISCUSSION

The study population consisted of young adults in the age group 18-25 years with 21 years as the mean age group among the study population. Two-thirds of the respondents (76.6%) are male while the remaining one-third (23.4%) were females. A predominant proportion of the respondents (92.5%) were Hindus and the remaining (8.5%) were from other religions. Six out of ten respondents belong to the nuclear family followed by joint family (33.6%) and single-parent family with less than 5%. Almost all the respondents possessed a smartphone, laptop, and internet connection of their own which implies that the study population rightly represents in the study with an understanding that technology has intruded into the lives of individuals holding an indispensable place without any replacement or alteration for it.

PREFERENCE OF TREATMENT

80% of the respondents preferred the online mode of consultation for their treatment during post-COVID due to the fear of infection spreading, social isolation, availability of specialists, and access to higher quality treatment. Thereby, displacing space by replacing hospital infrastructure [12,14] with home ambiance, especially for minor illness while hospitals were considered as a specialised infrastructure for treating major illness. It ensures more comfortability by easing the transportation cost, at the same time it involves the risk of wrong self-diagnosis and treatment due to miscommunication [6,11,12]. Previous studies have found that the decision for preference of treatment was often influenced by factors such as age, gender, socio-economic status of the women, the severity of illness, the interactive nature of social media, access and quality of service, etc. It can be inferred that these services are influenced by both individual and environmental factors [3,12,30,32].

ATTITUDE TOWARDS HEALTH-SEEKING BEHAVIOR

The relationship between online health-seeking information and online health-sharing experience was tested using correlation (two-tailed) analysis and it was found that the tested relationship was significant at the level $r=0.372$ $p<0.01$. About 59.8% and 56.1% of the respondents had a better attitude for seeking health information and sharing health experiences online respectively. These results shows that almost half of the respondents have a positive attitude towards online healthcare services mostly the young adults report that usage of social media for health-seeking information also depends on the virality or popularity of the person at the same time the presence of pseudo professionals, celebrities and other commoners who carry out paid promotions opens the possibility of misguiding the audience on the health seeking services [6,11,14,21,26,33].

The study further analyzed the attitude for health information seeking and sharing health experience of the respondents with that of their demographics such as gender, nature of family, and the mode of consultation to understand the influence of factors for social construction on health-seeking behavior of the respondents. The term health sharing experience in the study includes sharing of health-related experience or trauma undergone, treatment process, feedback about the treatment & staff behavior, suggestions to others with similar illnesses, etc., The attitude towards health sharing experience and online health-seeking information of the respondents was categorized into poor, fair, good, and excellent based on the descriptive statistics with mean value (21 and 15) and standard deviation (4 and 3) respectively.

From Table 1 it can be inferred that both genders (male 58.5% and female 48%) have a heightened good attitude for health sharing experience. Also, 52.8% of the respondents were from a joint family, 57.8%, and 57.1% from a nuclear and single-parent family have good attitude towards health sharing experience. Similarly, respondents with both modes of consultation (offline 57.8% and online 40%) are equally comfortable sharing their health-related experience with professionals and others. As the fear of illness that the patient develops increases their curiosity to know about the symptoms, treatment, cure, and prevention usually gathered from various sources mostly reflects the previous experience of the affected patients. Also, this is used for determining the preferences for treatment such as the place (e.g., hospital) its infrastructural facilities, doctor/specialist for consultation, and other reasons such as financial and environmental conditions.

TABLE 1 ATTITUDE TOWARDS HEALTH INFORMATION SHARING AND SEEKING OF THE RESPONDENTS

	Attitude towards health-sharing experience			
	Poor	Fair	Good	Excellent
Gender				
Male	7.3%	26.8%	58.5%	7.3%
Female	8%	40%	48%	4%
Family				
Joint	13.9%	30.6%	52.8%	2.8%
Nuclear	4.7%	28.1%	57.8%	9.4%
Single parent	0	42.9%	57.1%	0
Consultation				
Offline	7.8%	29.4%	57.8%	4.9%
Online	0	40%	20%	40%
Attitude towards online health seeking information				
Gender				
Male	6.1%	22%	57.3%	14.6%
Female	4%	8%	68%	20%
Family				
Joint	2.8%	16.7%	66.7%	13.9%
Nuclear	7.8%	20.3%	56.2%	15.6%
Single parent	0	14.3%	57.1%	28.6%
Consultation				
Offline	5.9%	18.6%	59.8%	15.7%
Online	0	20%	60%	20%

Table 1 also sets out the attitude for health-seeking information through online platforms which include gathering health-related information through online services. The post-pandemic era, coupled with declining social support, has led to the penetration of online access into the field of medicine. At the same time changing dimensions of the severity coupled with the specialist for treatment of the disease has led to the incorporation of online medical services in the daily life of the individuals where the respondents claim the utilization of online information services for healthcare includes reviewing the best hospital for treatment, searching availability of doctor, booking an appointment, small health alignments like skin problem, hair fall related issues, telemedicine, counseling, and secondary consultation/opinion. The online services of fitness and diet consultation, its related yoga, Zumba classes, the increasing awareness for pregnancy and childcare, pre and post-natal care, parenting classes, etc., are some of the noticeable examples of increased online health awareness replacing reality. Similar results were seen between genders and nature of family with the attitude for online health-seeking information. As increasing online influencers and their followers, commercial advertisements, paid online promotions, and wide publicity for online telemedicine shopping in websites like Amazon, MedPlus, PharmEasy, Netmeds and 1mg have been a catalyst for the increasing attitude for online health-seeking information. Respondents claim that factors such as transportation charges due to drifting (constant movement for consultation), long waiting hours, and overcrowding can be avoided by adopting online healthcare services.

The association of health sharing information was tested with the respondents' preference of treatment, the type of hospital for consultation and the type of family by using chi-square test of association. The relation between the respondents' attitude for health sharing experience was found to be significantly associated with the preference of treatment and respondents from joint family ($\chi^2 (3, 36) = 17.94, p < 0.001, \Phi = 0.706$). Also, there is a significant association between the attitude for health sharing experience with preference of treatment and private hospital consulting respondents ($\chi^2 (3, 87) = 8.68, p < 0.05, \Phi = 0.316$). Thereby, the hypotheses H_{01} and H_{02} are rejected proving the significant association between the tested variables.

ONLINE HEALTH-SEEKING BEHAVIOR

The rapid technological development coupled with globalization has increased internet usage among people to seek information specifically in the post COVID era is due to its variety and vast information available online, affordability, accessibility, convenience, interactivity, and anonymity [6,10–12,14,15]. In the study, 77% of the respondents were online health information seekers who seek information mostly for their family members (81%). The information sought includes information regarding symptoms, diagnosis, treatment, remedial tips, and measures thereby enabling them to deal with health issues, make decisions, and gain knowledge about their sickness. Previous studies claim that health-seeking behavior online has a positive impact on the patient because prior knowledge of health conditions assists them in making better decisions and due to the development of self-assurance.

TABLE 2 CORRELATION BETWEEN VARIABLES OF ONLINE HEALTH-SEEKING BEHAVIOUR

Attributes	1	2	3	4
1 Attitude towards consultation	1			
2 Confidence & Identification	0.728**	1		
3 Understanding & Motivation	0.691**	0.731**	1	
4 Self-assurance & inspiration	0.765**	0.938**	0.905**	1

**Significant at 0.01 level (two-tail)

The results in Table 2 shows that there is a significant relationship between attitude towards consultation, confidence & identification, understanding & motivation, and Self-assurance & inspiration at the level of 0.01. The relationship of attitude towards consultation with confidence & identification ($r=0.728$ $p<0.01$), understanding & motivation ($r=0.691$ $p<0.01$), and self-assurance & inspiration ($r=0.765$ $p<0.01$) are statistically significant with each other. Similarly, the relationships of confidence and identification with understanding & motivation ($r=0.731$ $p<0.01$) and self-assurance & inspiration ($r=0.938$ $p<0.01$) is also significant. The relationship of understanding & motivation with self-assurance & inspiration is ($r=0.905$ $p<0.01$). These results infer that online health-seeking behavior is influenced by the factors such as attitude confidence and identification, understanding and motivation, self-assurance and inspiration by rejecting H_03 as these factors are accountable for the development of trust [11,28] in the online platform used for health information seeking leaving an impact over the behavior of the individual.

Table 3 presents the results of multiple linear regression analysis conducted for the study variables dealing with the respondent's attitude towards online health seeking behavior. It was found that the respondent's attitude towards telemedicine or the online healthcare consultation services was predicted by the attributes of confidence and identification ($\beta=0.369$, $p<0.000$) and understanding and motivation ($\beta=0.476$, $p<0.000$) at a prediction value/explained variance of $R^2= 63.6\%$ ($F(2,104) = 90.79$, $p<0.000$) thereby, rejecting H_04 . In other words, the developed attitude towards online health seeking behavior in this post-COVID era is significantly predicted or influenced by the process of identification, understanding, confidence, and motivation involved within the online healthcare platforms. But the attribute of self-assurance and inspiration did not show any significant prediction towards online health seeking behavior of the respondents.

TABLE 3 RESULTS OF MULTIPLE LINEAR REGRESSION FOR THE STUDY VARIABLES

Variables	B	SE	t	p	95% CI
Constant	8.38	2.15	3.88	0.000	[4.106, 12.66]
Confidence & Identification	0.428	0.109	3.91	0.000	[0.211, 0.645]
Understanding & Motivation	0.704	0.140	5.04	0.000	[0.427, 0.980]

This finding supports the theoretical foundation of the study proving the impact of motivation and confidence combined with the identification and comprehending skills of the respondents to significantly play a crucial role in the construction

and development of individual's perception towards online healthcare services. Additionally, the concepts of social trust, support [10,28], and networking triggers the online healthcare communities to replace the traditional settings [6,14,28].

Further, the detailing on the respondent's medical awareness adds significance to the findings where most of the respondents (76.6%) who know their medical history prefer online consultation which regard to the family member's preference for online consultation 77.7% of the respondents choose online health appointments based on their awareness of medical knowledge. The above observation proves that health factors of confidence, understanding, motivation, and self-assurance are vital for the preference of online health-seeking behavior. Most (80 %) of the respondents who prefer private hospitals claim to utilize online treatment for accessibility, educational concerns, socio-economic factors, awareness of treatment and further measures. Furthermore, the fear of pandemic, social distancing, social isolation of the infected, frequent curfews, governmental and other administrative restrictions, and increased usage of social media during the pandemic have led to the high penetration of online platforms into healthcare services. The Information-seeking behavior theory states that 'information seeking is the purposive acquisition of information from selective information carriers which is considered as the coping strategy for patients as they navigate and synthesize the information to make informed decisions about their health' [9,11,12,19,30,34]. Presently, the respondents utilize online health services for basic information undergo selective self-evaluation of the available information to ensure its credibility. Further, the lack of rigid policy interventions on the rising medicolegal issues further challenging the accreditation, ethical consideration of practice & patients, credibility, and acceptance of telemedicine [15].

SOCIAL MEDIA INFLUENCE ON HEALTH-SEEKING BEHAVIOR

The widespread globalization with its intrusion in various disciplines especially in healthcare services has led to new avenues for knowledge sharing multiple changes in the patterns of health behavior of the individuals. This study also concentrates on comprehending the influence of social media on the conduct of those who seek health care. Technology and mobile phones have become one of the essential tools in the contemporary era and were possessed by all the individuals in the study and witnessed by their utilization of various social media platforms like WhatsApp, Instagram, YouTube, Snapchat, Facebook, etc., and search engines related to HSB including Mayo Clinic, Symptomate, Everyday Health, MedlinePlus, Healthdirect, Medindia, Babycentre, Pharmeasy, Netmeds, Tata's 1mg, etc., for checking symptoms and find easy and cost-effective home remedies including emergency care. The category of people who mostly utilized online platforms for medical consultations were young adults either for minor issues or to care their elderly. Some claimed it was for their pregnant siblings regarding maternal exercises, motivation, and post-natal care claiming the perceived usage and usefulness of technology in the evolving social behavior of the individuals marking the acceptance of technology. From these results, it can be observed that social media is occupying the healthcare sector has distanced time and space as mentioned by famous sociologist Antony Giddens in his book '*Time and Space in Social Theory*'. He claims '*emptying time as a precondition for the emptying of space*' especially observed in the modern era focuses on time and space distinction as the consequence of modernity including different aspects of integration and coordination of society working separately ignoring its properties of association such as proximity and nearness [10,12,15,35]. Modernity has separated the physical presence of the individual which has been made possible even in the field of healthcare. Thus, the higher the technological advancement the higher is the separation from the real world.

CHANGING SOCIAL CONSTRUCTION OF THE SICK ROLE

Most of the anthropological studies categorized HSB as preventive, illness, and sick role behavior. Talcott Parsons in his book '*the social system, 1951*' introduced the concept of *sick role* referring to the primary role performed by a person when he/she is ill or sick. By adopting the sick role, the person is relieved from other responsibilities making sick role as deviance from social life affecting the normal functioning of society. It is the legitimate role sanctioned by the formal healthcare system mediated by the healthcare services and facilities [36–39]. The longevity of the sick role is influenced by various social, economic, environmental, and cultural determinants. India's cultural differences potentially influence patients' attitude towards understanding the illness, apprehending its symptoms, diagnosis, treatment, and consequences. Further, socializing influencers such as the family, religion, and media adds to the construction on perceptions of health & illness by anticipation towards health care system contributing to the Goffman's understanding of illness. For example, a child suffering from fever and body tiredness is taken to the place of worship with the belief that

the child would be a victim of an evil eye. Similarly, people related all their illnesses and conditions from birth to death to various customs and practises [19,30,38,40–42]. These, practices result in noticeable behavioral change towards illness, health, its prevention and cure which are unlearned once the benefit of health is reached. Thereby, individuals' response to illness and its healthcare system is diverse and dynamic. Especially the intrusion of online healthcare services coupled with its popularity has led to the evolution of new forms of diagnosis, treatment, and care thereby, bringing complexity and changes in the existing healthcare infrastructure and preferences. These changing norms and perception of illness has changed the notion of illness from a taboo or deviance to performance of the social system mediated by internet and technology [28]. The evolving medical facilities, improving socio-economic conditions of people, increasing expectations for better healthcare, and changing human behavior makes the social construction of sick role as a socially dynamic concept of investigation.

FUTURE DIRECTIONS AND LIMITATIONS OF THE STUDY

Aligning with the theoretical consideration of the illness and the sick role, the study has tried to portray the evolving nature of illness with the developing healthcare infrastructure facilities aimed at equal accessibility by all the citizens. Further, the study would recommend for the inclusion of social security support systems for the online health consultants to effectively ensure their needs to provide quality health support to all. Thereby, boosting the achievement of Sustainable Developmental Goal 3 (Quality health for all). The study involves the risk of generalizing the information with caution due to the randomness in collecting the sample and the cross-sectional nature of the study limited to young adults whose behavioral changes are dynamic. The rapid development of the medical field has brought in various medical improvements such as telemedicine, AI and machines, and other technological improvements opens crucial aspects of future interrogation. Especially, dealing with its potential acceptance, social good approach, experience, and its implications to real-world. The study did not focus on the risks and benefits of adopting online health information and its behavior, the changing ways of patient-centered care, and the evolving patterns of healthcare behavior.

AUTHOR CONTRIBUTIONS

Both authors contributed equally to the conceptualization, methodology, writing, reviewing, editing, and approval of the submitted version of the manuscript.

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The authors report there are no competing interests to declare.

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IMPLICATIONS OF NURSES' COVID-19 PHOBIAS ON PATIENT SAFETY CULTURE: A CROSS-SECTIONAL STUDY

Bahar Kuleyin*, Ayşe Çiçek Korkmaz

Faculty of Health Sciences, Nursing Administration Department, Bandirma Onyedi Eylul University, Balıkesir, Turkey

Correspondence: bkuleyin@bandirma.edu.tr

ABSTRACT

BACKGROUND:

COVID-19 phobia in nurses may increase the incidence of negative events that threaten the culture of patient safety. Especially due to the devastating effects of the coronavirus pandemic, there is concern that nurses may engage in practices that may threaten patient safety against a possible pandemic. Therefore, this study aims to examine the relationship and impact of nurses' COVID-19 phobia levels with patient safety culture.

METHODS:

The study was conducted using a descriptive and cross-sectional design. Data was collected from 165 nurses in Turkey using the descriptive characteristics form, COVID-19 phobia (C19P-S) and patient safety culture scale (PSC-S) between August and November 2022 via online responses.

RESULTS:

The mean score of C19P-S of the nurses was $47,85 \pm 19,29$, and the mean score of PSC-S was determined as $2,75 \pm 0,57$. There was a significant correlation between psychological and the employee behavior subscales ($r=0,174$; $p<0,05$). The impact value of nurses' COVID-19 phobia on patient safety culture was found to be $\beta=,153$, $p=,050$.

CONCLUSIONS:

Nurses have low COVID-19 phobias and moderate patient safety culture perceptions. A positive and low-level significant relationship was found between psychological and employee behavior subscales. There was no significant impact of nurses' COVID-19 phobias on patient safety culture.

KEYWORDS

COVID-19 phobia, healthcare, nursing, patient safety culture

INTRODUCTION

The global coronavirus pandemic has brought unprecedented challenges to healthcare systems worldwide. The rapid spread and evolving variants of the virus have caused widespread fear and anxiety among the general population [1]. Constant exposure to the coronavirus and its potential threats has given rise to a new phenomenon called "coronaphobia", meaning constant and excessive fear. This phenomenon is particularly prevalent among nurses, who are in direct contact with infected patients and are at higher risk of contracting the virus [2]. Coronaphobia, or COVID-

19 phobia, can manifest in a variety of ways, including anxiety, sleep disturbances and burnout, and has a negative impact on nurses' mental health and well-being. Nurses experience fear due to close contact with patients, the risk of infecting themselves or their loved ones, and witnessing the severity of the disease [3].

The fact that COVID-19 phobia was found to be above average in nurses in various studies [4, 5] may increase the incidence of adverse events that threaten patient safety [6]. As the level of COVID-19 phobia increases, job satisfaction decreases and healthcare workers, including nurses, are more likely to consider leaving their jobs. This decreased job satisfaction and increased intention to quit can lead to understaffing and inadequate care for patients [7, 8] ultimately jeopardizing patient safety. In addition, nurses with increased COVID-19 phobia may unintentionally focus more on the potential dangers associated with coronavirus and negatively affect patient care plans [5]. Focusing on the threat of a pandemic with increased fear can reduce focus on other important aspects of patient care, leading to inadequate management of non-coronavirus-related health problems, delays in necessary treatments, and increased risk of medical errors [4]. In addition, nurses who experience fear and anxiety may experience burnout and poor job performance, which can jeopardize patient safety [7, 9].

COVID-19 phobia among nursing professionals could have long-term consequences not only on mental health but also on the quality of care delivered to patients [10]. Moreover, the chronic stress and anxiety associated with COVID-19 phobia may lead to absenteeism and high turnover rates, exacerbating the already existing nursing shortage [11]. The impact of COVID-19 phobia on nurses is based on the fact that it can affect the adoption of safe practices in healthcare delivery and in turn reduce patient safety.

The changing processes of healthcare institutions in response to the coronavirus have also caused further fears and concerns [8]. This exacerbated pre-existing patient safety hazards, leading to patient safety hazards that did not exist before the pandemic. It has directly and indirectly created difficulties in the treatment and proper isolation of patients and led to underreporting of patient safety incidents [12]. An inappropriate work environment is a barrier to a positive safety culture and high quality care. This is because when nurses perceive that their work environment is conducive to professional practice, they are more engaged in their work and thus provide safe patient care [6].

All these experiences make the relationship between nurses' COVID-19 phobia and patient safety culture more complex and multifaceted. As COVID-19 phobia in nurses may hinder their ability to comply with patient safety protocols and best practices, it may negatively affect the development of a patient safety culture in healthcare settings [10]. This failure to promote a patient safety-centered culture can ultimately lead to decreased patient safety, as nurses may struggle to provide the high-quality care needed to protect patients from potential harm. The coronavirus or any other pandemic that may emerge may affect nursing practice. Examining the consequences of nurses' COVID-19 phobias on patient safety culture, which is limited in the literature, may provide preliminary preparation for nurse managers to carry out possible regulatory remedial activities. Therefore, in this study, nurses' perceptions of COVID-19 phobia and patient safety culture were investigated. In addition, the effect of nurses' COVID-19 phobia on patient safety culture was examined.

METHODS

DESIGN

Descriptive and cross-sectional design

SETTINGS AND PARTICIPANTS

The population of the study consisted of nurses in Turkey (N: 232,442) [13]. The sample was determined by a snowball sampling method, one of the non-random sampling methods. Nurses who had been working for at least 6 months were included in the study. Since there is no sample study using the scales included in the study, the minimum number of people was determined as 90 people to reach 80% power with an effect size of 0.30 (medium), 95% confidence interval and 5% margin of error in GPower. A total of 172 registered nurses were reached to participate. After excluding those who did not meet the inclusion criteria, data from n=165 nurses were included in the analysis.

MEASUREMENT

The data of the study were collected using the descriptive characteristics form, COVID-19 Phobia Scale and Patient Safety Culture Scale.

Descriptive characteristics form: A total of 16 questions were created by researchers through the literature [5, 14] on the descriptive characteristics of nurses. These include questions such as age, gender, education status, working status in COVID-19 units, etc.

COVID-19 Phobia Scale (C19P-S): It was a 20-item scale developed to measure the phobia levels of people against coronavirus. It consisted of four sub-scales: psychological, psychosomatic, economic and social. Items in the 5-point Likert-type scale were evaluated between "strongly disagree (1)" and "strongly agree (5)". The total scale score ranged between 20 and 100 points, and the higher the score, the higher the phobia in the relevant sub-scales and the general scale. The Cronbach's alpha internal consistency coefficient of the entire scale was .93; for the psychological sub-scale, it was .87; for the psychosomatic sub-scale, .89; for the social sub-scale, .85; and for the economic sub-scale, .88 [15].

Patient Safety Culture Scale (PSC-S): Consisting of 51 items in total, the scale was designed in 5 sub-scales: "management and leadership", "employee behavior", "unexpected event and error reporting", "employee training" and "care environment". The total Cronbach's alpha coefficient of the scale was .97; for the sub-scales, 'management and leadership' was .92 (highest), and 'unexpected event and error reporting' was .83 (lowest). The scale was a four-point Likert scale; it was scored between (1) completely disagree and (4) completely agree. When calculating the scale score, the item scores in the sub-scales were summed, and the total number obtained was divided by the number of items to obtain the average score of each sub-scale between one and four. In the interpretation of the scale score, an increase in the average score towards four indicated the presence of a positive patient safety culture, while a decrease towards one indicated the presence of a negative patient safety culture [16].

DATA COLLECTION

Data were collected through Google Forms with the online survey method between August and November 2022. The link to the data collection tools created through Google Forms was shared with nurses who could be reached via social media (Instagram, Facebook, Twitter, Telegram, Whatsapp). Accordingly, nurses were invited to participate in the study. Logging in from the settings section of the form was mandatory and limited to a single response to prevent repeated entries.

DATA ANALYSIS

The data were analyzed using the SPSS-22 statistical package program. The descriptive characteristics of the nurses were evaluated by descriptive statistical methods (percentage, mean, standard deviation etc.). The normality of the data was assessed based on skewness and kurtosis values. Parametric and nonparametric tests were used (Student t Test, Mann Whitney U, Kruskal Wallis). Post hoc tests were used to determine the difference between groups (Dunnett's T3). The relationship between the scales was evaluated by Pearson correlation test. Simple linear regression analysis was used to evaluate the relationships between variables.

ETHICAL CONSIDERATIONS

In order to conduct the study, permission was obtained from the Health Sciences Non-Interventional Research Ethics Committee of a state university (28.04.2022/2022-64) and from the responsible authors via e-mail for the use of the scales. Voluntary informed consent form was obtained from the participants for data collection.

RESULTS

The mean age of the nurses participating in the study was 30.3 ± 7.08 years, 87.3% were female and 66.7% had bachelor's degree. The mean professional experience of the nurses was 7.84 ± 7.41 and 75.8% of them chose the profession willingly. The nurses participating in the study, 81.8% were staff nurses and 75.2% had been working in this position for 5 years or less. It was determined that 71.5% of the nurses worked in COVID-19 units and 53.9% worked in these units for 1 year or less. While 83.6% did not have a chronic disease, 74.5% had a chronic disease in their family. It was determined that 68.5% of

the nurses participating in the study were infected with COVID-19, 80% of their relatives were infected and 38.5% of their relatives died from COVID-19. In addition, it was determined that 92.1% did not have psychiatric problems and 4.8% received psychiatric treatment due to COVID-19 (**Table 1**).

TABLE 1. NURSES' DESCRIPTIVE CHARACTERISTICS AND C19P-S AND PSC-S MEAN SCORES (N=165)

Variables	C19P-S Mean±SD	PSC-S Mean±SD
Age	Mean±SD=30.3±7.08	
Gender		
Female (n=144, %87.3)	46.77±18.13	2.72±0.56
Male (n=21, %12.7)	55.28±25.21	2.93±0.63
Test value	Z=-1.52	Z=-1.77
p value	p=0.128	p=0.077
Educational status		
High school degree (n=19, %10.9) ^a	59.31±18.37	2.94±0.50
Bachelor's degree (n=110, %66.7) ^b	48.13±19.93	2.75±0.52
Graduate degree (n=36, %22.4) ^c	40.94±14.55	2.64±0.73
Test value	$\chi^2=10.68$	$\chi^2=1.72$
p value	p=0.000* a, b > c**	p=0.421
Choose the profession willingly		
Willingly (n=125, %75.8)	47.63±19.33	2.81±0.58
Unwillingly (n=40, %24.2)	48.55±19.40	2.56±0.51
Test value	t=-0.26	t=2.46
p value	p=0.796	p=0.010*
Position		
Staff nurse (n=135, %81.8)	49.17±19.15	2.77±0.57
Nurse manager (n=30, %18.2)	41.90±19.09	2.66±0.59
Test value	t=1.88	t=0.97
p value	p=0.064	p=0.332
Working year in this position		
5 years and ↓ (n=124, %75.2)	46.56±20.03	2.73±0.61
5 years ↑ (n=41, %24.8)	51.75±16.47	2.80±0.45
Test value	t=-1.49	t=-0.60
p value	p=0.130	p=0.540
Work in COVID-19 units		
Worked (n=118, %71.5)	48.10±20.07	2.73±0.61
Did not work (n=47, %28.5)	47.23±17.37	2.81±0.44
Test value	t=-0.26	t=0.95
p value	p=0.794	p=0.341
Working year in COVID-19 units		
1 years and ↓ (n=89, %53.9)	46.16±17.6	2.75±0.52
1 years ↑ (n=76, %46.1)	49.82±21.04	2.75±0.63
Test value	t=-1.20	t=0.05
p value	p=0.232	p=0.955
Having chronic disease		
Yes (n=27, %16.4)	52.77±21.92	2.74±0.42
No (n=138, %83.6)	46.89±18.67	2.75±0.60
Test value	Z=-1.24	Z=-0.73

p value	p=0.218	p=0.461
Having chronic disease in family		
Yes (n=123, %74.5)	48.21±18.82	2.72±0.58
No (n=42, %25.5)	46.80±20.82	2.84±0.55
Test value	t=0.40	t=-1.13
p value	p=0.688	p=0.265
Infected with COVID-19		
Yes (n=113, %68.5)	45.78±19.22	2.78±0.58
No (n=52, %31.5)	52.34±18.85	2.69±0.56
Test value	t=-2.04	t=0.89
p value	p=0.044*	p=0.376
Relatives being infected with COVID-19		
Yes (n=132, %80)	46.39±18.99	2.75±0.58
No (n=33, %20)	53.69±19.67	2.73±0.54
Test value	t=-1.96	t=0.16
p value	p=0.057	p=0.862
Relatives died due to COVID-19		
Yes (n=47, %38.5)	52.65±19.00	2.73±0.60
No (n=118, %71.5)	45.94±19.15	2.76±0.56
Test value	t=2.03	t=-0.20
p value	p=0.043*	p=0.833
Having a psychiatric problem		
Yes (n=13, %7.9)	35.53±12.96	2.64±0.46
No (n=152, %92.1)	48.90±19.41	2.76±0.58
Test value	Z=-2.26	Z=-0.50
p value	p=0.021*	p=0.619
Willing to get psychiatric treatment due to COVID-19		
Yes (n=8, %4.8)	49.25±13.85	2.70±0.34
No (n=157, %95.2)	47.78±19.56	2.75±0.58
Test value	Z=-0.32	Z=-0.63
p value	p=0.742	p=0.521

*: p<0.05, Z= Mann Whitney U, t= Student t Testi, X²= Kruskal Wallis, **Dunnett's T3, C19P-S: COVID-19 phobia scale, PSC-S: patient safety culture scale

When the mean scores of the COVID-19 Phobia Scale were compared based on the nurses' educational status, it was found that the scores of nurses with a high school or bachelor's degree were statistically significantly higher than those of nurses with a graduate degree (p<0.05). There was no statistically significant difference between high school and bachelor's degree groups (Table 1).

TABLE 2. MEAN SCORES OF NURSES IN C19P-S AND PSC-S (N=165)

Variables	Min-max points of the original scale	Mean±SD (Min-Max)
C19P-S	20-100	47.854±19.29 (20-96)
Psychological*	6-30	15.775±6.17 (6-30)
Psychosomatic*	5-25	10.945±5.09 (5-25)
Economic*	4-20	9.030±4.06 (4-20)
Social*	5-25	12.103±5.01 (5-25)
PSC-S	1-4	2.754±0.57 (1-4)
Management and Leadership**	1-4	2.749±0.60 (1-4)

Employee Training**	1-4	2.742±0.69 (1-4)
Unexpected Event and Error Reporting**	1-4	2.758±0.72 (1-4)
Care Environment**	1-4	2.777±0.68 (1-4)
Employee Behavior**	1-4	2.754±0.62 (1-4)

*: C19P-S's sub-scales, **PSC-S's sub-scales, C19P-S: COVID-19 phobia scale, PSC-S: patient safety culture scale

While the mean score of nurses' COVID-19 phobia was 47.85±19.29, the highest mean score in the sub-scales belonged to the psychological sub-scale with 15.77±6.17. This was followed by mean scores of 12.10±5.01, 10.94±5.09 and 9.03±4.06 in the social, psychosomatic and economic sub-scales, respectively. While the mean score of the nurses on the patient safety culture scale was determined as 2.75±0.57, the highest mean score in the sub-scales belonged to the care environment sub-scale with 2.77±0.68. This was followed by mean scores of 2.758±0.72, 2.754±0.62, 2.749±0.60 and 2.742±0.69 in the unexpected event and error reporting, employee behavior, management and leadership and employee training sub-scales, respectively (Table 2).

TABLE 3. CORRELATION VALUES OF C19P-S, PSC-S AND SUB-SCALES' (N=165)

Scales and Sub-scales		Management and Leadership	Employee Training	Unexpected Event and Error Reporting	Care Environment	Employee Behavior	PSC-S
Psychological	r	0.116	0.138	0.125	0.087	0.174	0.149
	p	0.131	0.072	0.100	0.266	0.020*	0.052
Psychosomatic	r	0.114	0.077	0.072	0.020	0.135	0.110
	p	0.141	0.324	0.368	0.799	0.087	0.165
Economic	r	0.092	0.072	0.062	0.047	0.109	0.095
	p	0.243	0.355	0.421	0.548	0.163	0.223
Social	r	0.124	0.119	0.114	0.064	0.148	0.136
	p	0.117	0.128	0.148	0.416	0.057	0.088
C19P-S	r	0.119	0.111	0.102	0.060	0.153	0.132
	p	0.122	0.155	0.193	0.441	0.053	0.092

*: p<0.05, r: pearson correlation coefficient, C19P-S: COVID-19 phobia scale, PSC-S: patient safety culture scale

In the study, a positive, low-level significant relationship was found between the psychological sub-scale of the COVID-19 phobia scale and the employee behavior sub-scale of the patient safety culture scale (p<0.05) (Table 3).

TABLE 4. SIMPLE LINEAR REGRESSION ANALYSIS OF C19P-S AND PSC-S (N=165)

Dependent variable	Independent variable	β	t	p	F	Model (p)	R ²	Durbin-Watson
Patient safety culture scale	COVID-19 phobia scale	0.153	1.927	0.050	3.907	0.050	0.022	1.824

p<0.05, β: Standardized regression coefficient; t: significance of regression coefficients, F: Regression ANOVA test statistic, R²: coefficient of determination; p: p probability of significance of regression coefficients

The effect of nurses' COVID-19 phobias on patient safety culture is shown in Table 4. According to the results of the regression model, it was determined that COVID-19 phobia did not have a significant effect on patient safety culture (Table 4).

DISCUSSION

As frontline workers, nurses have faced numerous stressors throughout the pandemic, including increased workloads [3], risk of infection [8] and the emotional cost of caring for critically ill patients [1]. In addition, it has been shown in the literature that factors such as the lack of a definitive treatment, insufficient protective equipment, feelings of insecurity, loneliness due to isolation, and anxiety about the future contribute to COVID-19 phobia during this period [17]. In most of the studies in the literature, it is seen that the COVID-19 phobia of nurses is between medium and high [5, 14, 18]. However, in our study, it was determined that nurses had a low level of COVID-19 phobia. This discrepancy may be attributed to factors such as the production of the coronavirus vaccine, the identification of risk factors and transmission routes of the disease, and the decrease in cases compared to the early periods of the pandemic [19]. In addition, national policies implemented by the Ministry of Health in Turkey to protect healthcare workers such as prioritizing nurses and other frontline staff for early vaccination and providing separate accommodation facilities to reduce transmission risk [20] may also have contributed to the reduction in COVID-19 phobia among nurses.

In line with the literature [5, 21] the highest mean score was found in the psychological sub-scale and the lowest mean score was found in the economic sub-scale in our study. This finding emphasizes the importance of psychological factors in the experience of COVID-19 phobia among nurses, even if the general phobia level in our study was low. As mentioned earlier, it can be associated with various stressors and challenges faced by nurses during the pandemic. Specifically, the necessity of isolation practices, uncertainty about the course of the pandemic, and anxiety about caring for infected patients [19], may have contributed to the increased psychological impact on nurses. On the other hand, the low scores observed in the economic sub-dimension may be explained by the fact that nurses maintained employment security and continued to receive regular income during the pandemic. Both globally and nationally, many governments implemented financial support policies to mitigate the economic impact of the pandemic. These included incentive payments, job security measures, and flexible working arrangements [22, 23]. Such supports may have contributed to the lower level of economic phobia observed among nurses in this study. Our findings highlight the importance of supporting nurses' psychological well-being during and beyond the coronavirus pandemic. Healthcare organizations and policymakers should consider implementing evidence-based interventions aimed at alleviating the psychological stressors experienced by nurses. Previous studies recommend a range of supportive strategies including access to mental health services, structured peer support programs, and leadership approaches that foster psychological safety and well-being [24, 25]. Additional measures may include regular debriefings, resilience training, flexible scheduling, and transparent communication about evolving situations. Integrating such strategies into future preparedness plans can help safeguard the mental health of nurses and enhance the sustainability of the healthcare workforce.

A relationship was found between educational level and COVID-19 phobia scale scores. This finding could potentially be associated with lower COVID-19 phobia scores due to increased professional self-confidence and professionalism as the level of education increases [26]. However, this result may also be influenced by age-related factors. Since COVID-19 is known to have a more severe impact on older populations [27], the higher phobia scores observed in nurses with lower education levels particularly high school graduates might also be partially explained by their older age. In Türkiye, many nurses with only a high school education tend to be older, which may contribute to a heightened perception of personal risk and thus increased COVID-19 phobia.

Interestingly, unlike the literature [28], we found that nurses not infected with coronavirus had higher phobia scores. According to global meta-analyses, the infection rate among healthcare workers ranged from approximately 10% to 20% during the peak periods of the pandemic, depending on country and region [29]. In Turkey, the Ministry of Health reported a relatively high infection rate among healthcare workers in the early stages of the pandemic [30], although specific nationwide statistics for nurses are limited. This contrast in infection status may reflect differing levels of risk perception. Nurses who had not yet been infected may have had heightened fear due to uncertainty and anticipation of infection, whereas those who had recovered may have experienced reduced anxiety. These findings highlight the importance of considering nurses' differing pandemic experiences when designing psychological support interventions. Tailored

approaches based on individual exposure history and perceived risk may be more effective in promoting psychological well-being.

Another result obtained in the study was the level of patient safety culture of nurses. In the study, it was determined that the level of patient safety culture of nurses was at a moderate level and the highest average was in the care environment sub-scale. This finding is different from the study that found that employee behavior and education were the sub-scales with the highest mean scores [31]. A possible explanation for this difference is that healthcare organizations are increasingly focusing on improving the care environment, including physical structure, equipment and technology such as electronic medical records and barcoding systems for supplies and medications [32]. Furthermore, this study revealed that the unexpected event and error reporting sub-scale ranked second, followed by employee behavior, management and leadership, and employee training. This distribution suggests that healthcare organizations have made progress in improving the environment of care, but improvements are needed in other aspects of patient safety culture, especially in employee training. In order to achieve a comprehensive patient safety culture, it is crucial that improvements are balanced across all sub-scales. By emphasizing regular training, effective communication and error incident reporting, healthcare organizations can further strengthen patient safety culture and ensure both safe and quality care for patients and employee safety [33]. Patient safety practices in Türkiye are standardized within the framework of the Health Quality Standards and relevant regulations. In this context, the quality criteria set by Türkiye Health Care Quality and Accreditation Institute and the scientific guidance provided by Health Institutes of Türkiye ensure that patient safety culture is approached based on similar principles across all healthcare institutions [34]. Although not specifying the names of the hospitals in this study constitutes a limitation, the fact that all healthcare institutions in Türkiye operate under common legal, structural, and quality-based standards allows the findings to be interpreted meaningfully at the national level.

In line with the previous literature, this study shows that nurses who willingly practice their profession have higher patient safety culture scores [35]. While voluntary commitment may contribute to professional satisfaction and retention [36], it is important to note that adherence to patient safety protocols and professional accountability are far more critical factors in shaping patient safety culture [37]. In this context, nurse managers play a vital role in establishing and sustaining a strong patient safety culture, especially during crisis periods like the COVID-19 pandemic. Their responsibilities include not only ensuring compliance with safety protocols but also supporting staff well-being and fostering a safety-oriented work environment [38]. Therefore, rather than focusing solely on personal willingness, structured leadership, organizational control, and systematic oversight may be emphasized as the main drivers of patient safety culture.

In the study, a positive, low-level significant relationship was found between the psychological sub-scale of the COVID-19 phobia scale and the employee behavior sub-scale of the patient safety culture scale. Although there are no studies in the literature directly investigating the relationship between coronavirus-19 phobia and patient safety culture, it is important to consider that higher than normal risks that threaten patient safety in pandemics lead to an increase in medical errors [39]. Increased fear and anxiety related to COVID-19 phobia may influence nurses' perceptions of patient safety culture, especially in the context of employee behavior. A study by Labrague and Santos (2020) highlights the potential impact of the coronavirus pandemic on nurses' psychological well-being, which may indirectly affect their perceptions of patient safety culture [8]. Similarly, Al Maqbali et al. (2021) emphasize the importance of addressing mental health concerns among healthcare workers to maintain a positive patient safety culture during challenging times such as pandemics [40]. As a result, in this study, no direct relationship was found between COVID-19 phobia and patient safety culture; however, it was found that there was a positive relationship with the sub-scales of the scales, albeit at a low level. This finding suggests that nurses' concerns and fears during the pandemic may have affected certain aspects of their perceptions of patient safety culture. It also suggests that with increased risks and medical errors for patients during pandemics, the need to address and support nurses' mental health is important to ensure a strong patient safety culture. In the study, no significant result was found when the effect of COVID-19 phobia on patient safety culture was examined. This suggests that even if nurses have phobias/fears of COVID-19 or any epidemic disease, it will not affect their perception of patient safety culture due to their professionalism and professional ethical values [41]. In the literature, although nurses were psychologically affected by COVID-19, their caregiver roles were not affected [42] which supports the findings of our study. In addition, it is a pleasing result that the findings of our study do not support this, although it is thought that

epidemics such as COVID-19 may cause complex health care delivery in working environments, thus jeopardizing patient safety [43].

LIMITATIONS OF THE STUDY

The results of this study are limited to the responses of the nurses who participated in the study. Due to the cross-sectional design of the study, the findings obtained reveal the situation in a certain period. The fact that this research was conducted during the period when the pandemic started to lose its importance may have had an impact on the results. Therefore, it would be useful to test this research with a longitudinal design for a possible future pandemic in order to support the research findings.

CONCLUSIONS

This study emphasized the relationship between nurses' COVID-19 phobia and patient safety culture and concluded that as the impact of the pandemic decreased, COVID-19 phobia decreased in nurses, but its psychological dimension continued. The study also reveals that nurses' individual and professional characteristics as well as their experiences of being infected with the disease affect COVID-19 phobia. A low level significant positive correlation was found between the sub-scales of COVID-19 phobia and patient safety culture sub-scales. In addition, it was determined that COVID-19 phobia and patient safety culture were not predictors. Future research should focus on longitudinal studies to monitor how pandemic-related fears and perceptions of patient safety culture evolve over time. Rather than assuming pandemics are inevitable, they should be treated as high-impact risks that require proactive strategies. In this regard, nurse managers and policy makers must take preventive and supportive actions to maintain a resilient safety culture during future crises. Nurse managers, in particular, should be aware of the psychological impact of such crises on nurses and actively support them by fostering collaboration, psychological empowerment, and professional resilience.

FUTURE CLINICAL EVIDENCE

This study suggests that supporting nurses with psychological training and interventions during extraordinary periods such as pandemics will contribute to improving the negative consequences of COVID-19 phobias on patient safety culture.

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ALLIED HEALTH PROFESSIONALS' INVOLVEMENT IN THE COVID-19 VACCINATION RESPONSE: A CROSS-SECTIONAL ONLINE SURVEY

Katrina Dunn^{*1,2}, Abby Foster^{3,4,5}

1. School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, Queensland, 4067, Australia.
2. Speech Pathology Department, West Moreton Health, Queensland Health, Ipswich, Queensland, 4305, Australia.
3. Allied Health Workforce, Innovation, Strategy, Education & Research (WISER) Unit, Monash Health, Melbourne, Victoria, 3192, Australia.
4. School of Allied Health, Human Sciences & Sport, La Trobe University, Melbourne, Victoria, 3086, Australia.
5. School of Allied Health, Monash University, Melbourne, Victoria, 3168, Australia.

Correspondence: katrina.dunn@uq.edu.au

ABSTRACT

BACKGROUND:

Allied health professionals offered an additional workforce strategy to support the COVID-19 vaccination response. The aim of this study was to understand the experiences of Australian AHPs who worked in the COVID-19 vaccination response.

METHODS:

An explanatory-sequential mixed-methods design was conducted, with the first phase involving a cross-sectional online survey. The survey consisted of 36 questions related to participant demographics, role/s undertaken in the COVID-19 vaccination response, and perceptions regarding benefits, concerns, and future roles for allied health professionals in vaccination responses.

RESULTS:

29 participants were eligible for study inclusion defined by completion of all survey questions representing three Australian states and five allied health professions (physiotherapy, speech pathology, occupational therapy, dietetics, and podiatry). The most reported benefit was 'enhanced knowledge base related to vaccines' (n=25, 86.25%), while concerns were expressed related to keeping current with guidelines and accidentally causing harm (each n=11, 37.9%). Theoretical domains enabling allied health professional participation were 'knowledge', 'reinforcement', 'beliefs about consequences', and 'environmental context and resources'. Three key categories were identified in open-ended responses: "An appropriate role" for allied health? The impact of allied health participation; and Processes shape the experience.

CONCLUSIONS:

Findings enhance our understanding of allied health professionals' experiences in the COVID-19 vaccination response, and the benefits and barriers to their involvement. There is an opportunity to better utilise the AHP workforce. Organisations are implored to review their use of AHPs both in the COVID-19 pandemic and broadly in health service delivery to support enhanced use of this workforce in future extended scope of practice or disaster management responses.

KEYWORDS

allied health, COVID-19 pandemic, vaccination, experiences, extended scope, health services, community, survey.

INTRODUCTION

The COVID-19 global pandemic was declared in March 2020. Public health measures were rapidly adopted, with vaccinations becoming available from the end of 2020. The international response to the pandemic included the implementation of strategies to enable wide-scale vaccination uptake. Specific strategies included vaccine mandates, public education campaigns, partnerships between government and community groups, peak medical, healthcare, insurance and business sectors, along with methods to enable public access such as mass vaccination centres and mobile clinics [1].

In response to workforce demands during the vaccination rollout, various jurisdictions within Australia and internationally issued temporary authorisation for allied health professionals (AHPs) to participate in the COVID-19 vaccination response. Roles sanctioned to be performed by AHPs included the receiving, handling, preparation, and/or administration of COVID-19 vaccinations. In Australia, emergency public health orders were issued to authorise allied health involvement in its three most populous states; Victoria [2], New South Wales [3], and Queensland [4]. Workforce profiles differed in each state; however, all Australian AHPs involved in COVID-19 vaccination workforces were required to complete an online series of training modules. Additional bridging training and competency assessment requirements were determined at a local level.

Due to the emergent and urgent nature of the COVID-19 vaccination response, the use of AHPs as vaccinators offered a workforce strategy to support in the vaccination response. While there has been some examination of the general experiences of Australian health workers during the pandemic [5], little is known about the nature and perspectives of AHPs who undertook novel vaccination workforce roles within the COVID-19 vaccination response. The current research study therefore aimed to:

- 1) Understand the nature of AHP involvement in Australian COVID-19 vaccination workforces.
- 2) Explore AHPs' perspectives on the benefits and concerns related to involvement in the COVID-19 vaccination response.
- 3) Examine the factors (barriers and facilitators) influencing the involvement of the AHP workforce in the COVID-19 vaccination response.
- 4) Determine participants' perspectives on future involvement of AHPs in vaccination responses.

METHODS

STUDY DESIGN

This study involved a cross-sectional, online survey. This methodology was chosen to allow participants to describe the nature of their role in the COVID-19 vaccination workforce and share their experiences, with the option to build and extend on their responses.

The online survey utilised survey design principles [6] and consisted of 36 questions covering: (1) demographic information, (2) nature of employment in the COVID-19 vaccination response, and (3) participant perceptions on their involvement within the COVID-19 vaccination response. A combination of response options was included. Questions for the first and second sections of the survey were modelled off studies within community pharmacy literature [7,8].

The Determinants of Implementation Behaviour Questionnaire [9] (DIBQ) was used to inform the development of questions related to barriers and facilitators. The DIBQ was developed to enable researchers to independently assess all 14 domains

of the Theoretical Domains Framework [10] (TDF). The TDF provides an appropriate framework for examining the barriers and facilitators to the implementation of an AHP workforce in the COVID-19 vaccination response, with the view to understanding methods or strategies which may support future involvement of this workforce. A total of 21 survey statements relating to the 14 TDF domains were included. Response options used a five-point Likert scale [6] (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The order of the barrier and facilitator questions was randomised for each participant to minimise order bias.

Four healthcare clinicians piloted the survey with resultant minor changes to the wording of questions and response requirements. The full survey can be accessed in Appendix 1.

PARTICIPANTS AND SETTING

Eligible participants were required to meet the following criteria: (1) qualified AHP whose discipline was authorised to administer COVID-19 vaccinations under an emergency public health order, (2) current or previous experience working in a COVID-19 vaccination workforce role, and (3) employed in Victoria, Queensland, or New South Wales. Pharmacists were excluded from participation due to their previously well-established role in preparing, handling, and administering vaccinations.

PROCEDURE

Ethics exemption was granted by the relevant Human Research Ethics Committees. Confidentiality and anonymity of participant responses was maintained throughout the data collection and analysis process. All information was de-identified and stored electronically on a secure, password-protected university research data management system. The Consensus-Based Checklist for Reporting of Survey Studies [11] (CROSS) was used to guide reporting of this study.

The online survey was hosted on Qualtrics XM (2001). Security functions incorporated included prevention of multiple submissions, bot detection using an embedded data field, prevention of indexing to block search engines including the survey in results, and anonymized responses that did not record IP address, location data or contact information. Survey recruitment was for a two-month period (September to November 2022). Convenience and snowball sampling methods were employed to maximise survey reach. Convenience sampling occurred predominantly through targeted emails to state-based allied health professional leads and the authors' social media accounts. The survey was also distributed through a professional association national e-newsletter. Due to the use of convenience and snowball sampling, as well as limited publicly available workforce data to determine the size of the population, to the distribution and the response rate could not be determined.

DATA ANALYSIS

Quantitative data from the Qualtrics survey was exported on to a Microsoft Excel spreadsheet. Demographic data was analysed and reported using descriptive statistics (frequencies, percentages, means, standard deviations, and ranges). Participants were able to select more than one option in relevant questions, and thus, reporting of frequencies and percentages adds up to more than the total number of participants. Open-ended responses from the survey were analysed using inductive content analysis [12]. Themes were determined based on participants' perspectives about the phenomenon, rather than derived from previous or existing survey instruments. The first author (K.D.) coded the qualitative content, while the second author (A.F.) conducted peer checking to enhance credibility. To enable consistency of scoring for TDF statements, negative phrases had reverse scoring applied, consistent with the process outlined by Wallace et al. [13]. Calculation of an overall domain score was performed by averaging the mean scores of each statement within each of the 14 TDF domains. "Agreement" and "less than agreement" categories were created by combining Likert ratings of 1, 2, and 3 (strongly disagree, disagree, and neutral; less than agreement) and ratings of 4 and 5 (agree and strongly agree; agreement) respectively, as per the approach by Chang et al. [14].

RESULTS

The survey was accessed by 103 participants. The survey was deemed insufficiently complete by 74 participants, due to (a) the Qualtrics platform indicating participant responses were 'spam' (n=5), (b) participants not consenting to participate (n=8), (c) participants consenting to participate but not progressing to the demographic questions (n=36) or (d) completing limited demographic information only (n=25). The remaining 29 participants completed all survey questions and were included in final analysis. The survey completion rate was 28%.

PARTICIPANT DEMOGRAPHICS

Participants were predominantly from metropolitan areas (n=27, 93.1%) representing all three Australian states eligible for inclusion, with the majority based in Victoria (n=20, 69%). AHP disciplines most represented included physiotherapists (n=10, 34.5%), speech pathologists (n=7, 24.1%) and occupational therapists (n=6, 20.7%). Participants had a wide range of professional experience, with most practising clinicians (n=23, 79.3%). Nearly half (n=23, 44.8%) were re-deployed from routine duties, while nearly two-thirds (n=18, 62.0%) voluntarily chose to participate in the COVID-19 vaccination response. Most participants worked within community vaccination hubs (n=26, 89.7%) and nearly two-thirds (n=19, 65.5%) were involved in vaccination administration. Participants performed nearly 26 shifts on average (range=1-200, SD=40), and administered approximately 190 vaccinations each (n=8, range=50-360, SD=116.1).

BENEFITS OF COVID-19 VACCINATION RESPONSE INVOLVEMENT

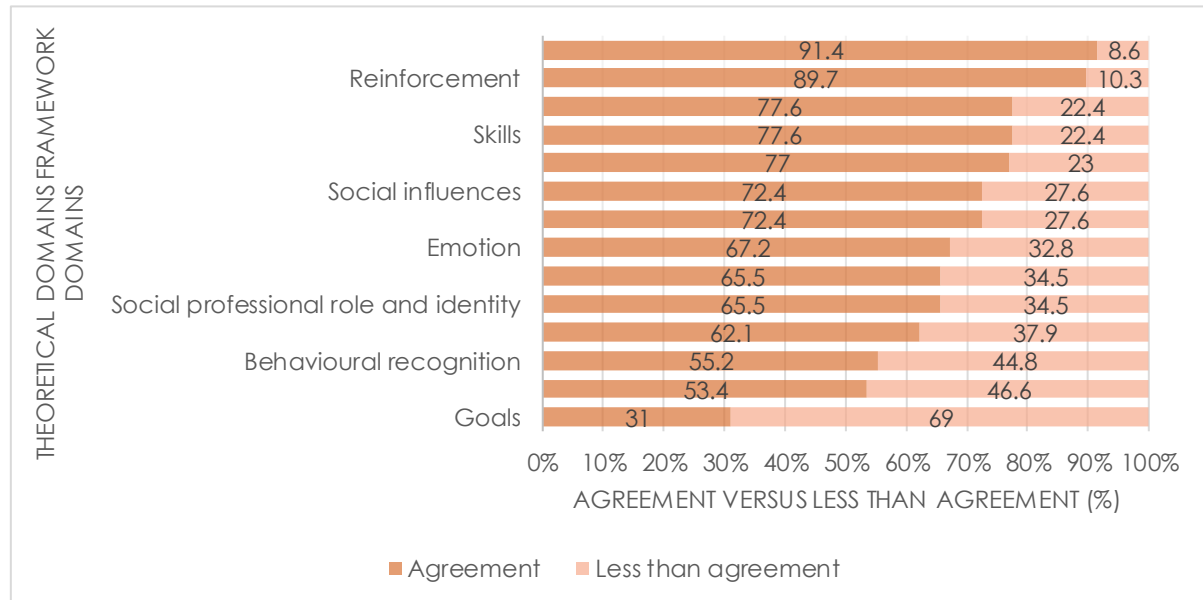
Participants identified many professional and personal benefits to being involved in the COVID-19 vaccination response. The most common reported benefit was 'enhanced knowledge base related to vaccines' (n=25, 86.3%). Many participants reported that their 'own personal satisfaction contributing to the COVID-19 vaccination response' (n=23, 79.3%) and 'expanded scope of practice' (n=19, 65.5%) were benefits to involvement. Other benefits reported by participants included 'enabling increased vaccination delivery by expanding workforce to allied health professionals' (n=15, 51.7%), 'working as part of a multi-disciplinary team' (n=11, 37.9%), and 'raising the profile of allied health professionals as care providers in the community' (n=9, 31.0%).

CONCERNS RELATED TO COVID-19 VACCINATION RESPONSE INVOLVEMENT

Participants were asked to identify concerns they had prior to their involvement in the COVID-19 vaccination response and indicate whether these concerns remained at the end of their involvement in the COVID-19 vaccination response. The most common concern prior to commencing in the vaccination response reported by participants were 'difficulty keeping current with immunisation guidelines and/or training' and 'accidentally causing harm to a citizen' (each n=11, 37.9%). While most participants concerned about accidentally causing harm to a citizen had this concern resolved at the end of their involvement, the concern regarding keeping up with immunisation guidelines and/or training remained present for most of these participants at the end of their involvement (each n=9/11, 81.8%). Participants also commonly reported concerns related to 'professional liability and responsibility' (n=8, 27.6%), 'accidentally causing harm to myself' (n=7, 24.1%), and 'insufficient knowledge about vaccination information, including side effects' (n=6, 20.7%) prior to their involvement. Of these pre-involvement concerns, 'accidentally causing harm to myself' remained the most reported concern at the end of their involvement (n=5/7, 71.4%).

FACTORS INFLUENCING ALLIED HEALTH PROFESSIONALS' INVOLVEMENT

Participants responded to all 22 statements linked to the TDF exploring barriers and facilitators related to their involvement in the COVID-19 vaccination response. Figure 1 outlines participants' overall scores for each domain represented by "agreement" and "less than agreement" categories. A summary of participants' ratings against each of the domains is reported in the following section.

FIGURE 1. PERCENTAGE OF AGREEMENT AND LESS THAN AGREEMENT FOR THEORETICAL DOMAINS FRAMEWORK DOMAINS.

Note. Scores ranked in order from most 'agreement' to least 'agreement'.

The TDF domain of "knowledge" had the highest level of agreement (91.4% agreement) in facilitating participants' involvement in the COVID-19 vaccination response. Participants indicated high levels of understanding of the scope and extent of the role, as well as their understanding of the objectives for using AHPs in the COVID-19 vaccination response. Participants ranked four additional TDF domains with high levels of agreement, "reinforcement" (89.7% agreement), "beliefs about consequences" (77.6% agreement), "skills" (77.6% agreement), and "environmental context and resources" (77% agreement), indicating these domains as potential facilitators to their experiences in the COVID-19 vaccination response. In the "reinforcement" domain, participants indicated that they were encouraged to be involved as AHPs in the COVID-19 vaccination response. In support of the "beliefs about consequences" domain, participants perceived the use of AHPs in the COVID-19 vaccination workforce was a strength in their organisation's response and that this involvement reflected well on them professionally. Participants felt that they had the appropriate skills to participate in the COVID-19 vaccination response and that the training they had supported their involvement (related to "skills" domain). Related to the "environmental context and resources" domain, participants indicated that working in the COVID-19 vaccination response was a good fit for their skillset, that the organisation provided sufficient resources for AHP involvement, and that citizens perceived AHP involvement in the COVID-19 vaccination response positively.

Eight of the TDF domains had levels of agreement between 50% to 75%, and were therefore also considered additional potential facilitators to AHPs' involvement in the COVID-19 vaccination response: "social influences" (72.4% agreement), "optimism" (72.4% agreement), "emotion" (67.2% agreement), "intentions" (65.5% agreement), "social professional role and identity" (65.5% agreement), "memory, attention, and decision processes" (62.1% agreement), "behavioural recognition" (55.2% agreement), and "beliefs about capabilities" (53.4% agreement). Participants indicated that their AHP colleagues supported their involvement in the COVID-19 vaccination response (in reference to "social influences" domain). Participants were optimistic that any issues related to the use of AHPs in the COVID-19 vaccination workforce could be resolved (referring to "optimism" domain). Participants stated that working within the COVID-19 vaccination response was rewarding and without high levels of stress for them (referring to "emotion" domain). In relation to the domains of "intentions" and "social professional role and identity" respectively, participants indicated their intention to support future vaccination responses should the need arise and that they believed it was their responsibility as an AHP to support their vaccination response. Participants indicated that they knew how to perform their role effectively following completion of training in the vaccination response (referring to "memory, attention, and decision processes" domain) and that there were appropriate policies/procedures and processes in place to ensure AHPs were used successfully (referring to "behavioural recognition" domain). Participants were confident in their ability to participate in the COVID-19

vaccination response and the control they had on the roles they performed (referring to “beliefs about capabilities” domain).

The remaining TDF domain of “goals” had the lowest level of agreement (31% agreement) and was therefore considered a potential barrier to AHPs involvement in the COVID-19 vaccination response. Specifically, participants did not strongly indicate a future goal to improve their skills within vaccination responses.

Appendix 2 outlines participants ratings for each survey statement along with associated data analysis represented by levels of agreement, means, median, and average domain scores.

FUTURE ROLES FOR AHPs AND FURTHER COMMENTS REGARDING EXPERIENCES

At the conclusion of the survey, participants were asked to (a) state their perspectives on whether AHPs could have similar and/or additional roles in future immunisation responses, and (b) provide any further comments on their experiences. Most (n= 27, 93.1%) participants perceived future opportunities for AHPs to be involved in similar and/or additional roles. Of the 29 survey participants, 22 (75.9%) provided an open-ended response when asked for any further comments regarding their experiences as an AHP in the COVID-19 vaccination response. Two participants responded with “no” regarding further comments and were therefore removed from content analysis, while the remaining 20 participants provided responses. Open-ended responses to both questions were coded into categories and themes. These are further outlined in the section below.

Three overarching themes were identified in the data. They were: (1) “An appropriate role” for allied health?; (2) The impact of allied health participation; and (3) Processes shape the experience.

“An appropriate role” for allied health?

Participants' responses explored the appropriateness of AHPs undertaking roles in the vaccination response. The allied health professional skillset was easily applied in vaccination response roles, and participants felt that AHPs were receptive to learning new skills. Allied health professionals were described as having “scientific, evidence-based training” [P22] and “good knowledge of anatomy/physiology” [P6], combined with “good generalised skills” [P12], including “experience with providing information, informed consent and working in a healthcare setting” [P25]. Participants identified that these skills made allied health professionals “suitable to perform the roles designated” [P12]. In addition to having a strong existing skillset, participants identified that allied health clinicians were “easy to train in other areas of health” [P9]. They perceived that AHPs to be “already trained and trainable” [P14] and were “able to be skilled up in this area with sufficient training” [P22].

Some participants felt that there were opportunities for extensions of the AHP role in the vaccination response. Additional roles included educational roles and creating supportive environments for people with a disability. One participant felt that role extension was limited by nursing staff being “protective over their territory” [P3]. This participant felt that “there could have been many things allied health could have done to ease the load on nursing staff” [P3]. Beyond skillset appropriateness, some participants identified the appropriateness of AHPs working in vaccination response roles as there were limitations in their capacity to perform their usual role due to COVID-19 restrictions. Participant 12 stated that “most of us were limited in what we could do in our regular clinical roles so it made sense to send us where we could be of greater use”. This perspective was not shared by all, with some participants reporting they “should have been left to continue the work they do best” [P11]. Some felt redeployment to roles that were “more fitting to [their] profession” [P13] would have been preferable, while others felt that students or less experienced clinicians should have been used in the vaccination response rather than senior clinicians.

The impact of allied health participation

Participants discussed the impact of allied health participation on the broader health workforce, allied health patients, and on AHPs themselves. Respondents saw their participation to be “help[ing] the greater workforce” [P24]. By taking on

these roles, AHPs were able to “assist with workforce shortages” [P28] and “take off the pressure on nursing staff who are better placed on the ward and front line of taking care of patients in need” [P29].

Conversely, participants felt the impact on allied health patients and clients were impacted “in ways we are still trying to recover from” [P17]. One participant described that the closure of services that “take years to build up and we are all very passionate about” [P19] had significant impacts on their clientele that was not adequately acknowledged. Furthermore, participants related the impacts of service closures to an “exacerbation of [clients’] symptoms and co-morbidities” [P11].

The impact on AHPs was multifaceted. Some respondents felt participating in the vaccination response held altruistic value, in that they were “getting something important done” [P6] and “contributing to something greater” [P27]. Others derived benefit from being in an environment characterised by less stress, connection with new colleagues, and insights into nursing culture [P6]. Others experienced AHP involvement negatively, emphasising “the toll it took on staff...[and] how much [they]...were hurting from the closure of their services” [P19]. Negative experiences were exacerbated when “there was no choice to participate” [P13].

Processes shape the experience

Respondents highlighted that organisational and administrative processes shaped the experience of AHPs engaged in the COVID-19 vaccination response. Training and onboarding were “very extensive and took a couple of months to get trained and set up as a hospital employee” [P18], without guarantees of shifts upon completion. Once in the system, AHPs reported “very little clarity when first starting on how shifts would be organised and impact on pay” [P7]. In some circumstances, shift management issues resulted in redeployed AHPs “sitting around with nothing to do for a significant portion of time” [P11]. One participant described the inability to “overcome the red tape” in health service processes, resulting in a perception of disorganisation that “increased the level of stress” [P12].

Participants’ perceptions of control, recognition and support also shaped the experience. Many participants did not hold the locus of control related to participation in the vaccination response. One participant reported that “there was no choice to participate” [P13], with another describing the decision to redeploy AHPs from their service as “a knee jerk reaction, not well planned and not based on evidence” [P11]. While some participants felt “welcomed and valued” [P15] in their role, others felt their role “wasn’t well acknowledged” [P19]. One participant felt AHPs should have been supported to undertake “more optional study to perhaps gain an extra qualification” [P3] in recognition of their value in the vaccination response. The experience of a supportive environment was variable, with some describing “a great vibe” [P27], and others experienced a lack of managerial support.

DISCUSSION

This study provides insights into AHPs’ involvement in Australian COVID-19 vaccination workforces. The rapid, large-scale implementation of the COVID-19 vaccination response provided AHPs opportunity to expand their scope of practice as part of vaccination workforces. Participants identified many benefits to their involvement in COVID-19 vaccination workforces, including enhancing their knowledge related to vaccines, personal reward in contributing to the pandemic response, expanding scope of practice, and increasing vaccination delivery to the community. However, AHPs also reported concerns regarding their participation, including keeping up with training and guidelines, accidentally causing harm to a citizen or themselves, and their professional liability and responsibility.

Most participants in our study worked in a community hub and administered vaccinations. However, AHPs took on a diverse range of workforce roles including managing clinic operations and in Public Health Units. Participants reported sufficient knowledge and skills required to enact these roles. Community pharmacist vaccinators reported enhanced professional satisfaction associated with the increased knowledge and additional services able to be offered to patients when administering influenza vaccinations in Canada [15]. While in response to COVID-19, Canadian pharmacists

reported low levels of discomfort in temporarily extending their scope of practice [16]. AHPs have skills in obtaining and applying knowledge, working cooperatively within a multidisciplinary team, communication, devising and implementing innovative practice, and self-reflecting [17]. This study supports acceptability and suitability of extended scope of practice roles in vaccination workforces for AHP disciplines.

Importantly, AHP participants identified further training needs related to their roles, including knowledge of vaccines (e.g., side effects), response to an adverse event, and immunisation guidelines. These concerns were similarly reported by community pharmacists involved in delivering COVID-19 vaccinations who cited access to and ongoing provision of training as barriers to their involvement⁸. The nature of the COVID-19 vaccination response saw rapid changes to community vaccine eligibility, type and availability, making these findings unsurprising. Alternative delivery modes (i.e., face-to-face) may have been preferred.

Participants described the importance of feeling valued and recognised for their contribution as AHPs in a supportive environment as a strength of their organisations' response to managing vaccination roll-out. Enhancing the scope of roles traditionally not associated with vaccination helped positively influence the professional identity of AHPs. This finding is consistent with Pill et al. [18] who noted positive shaping of nursing professional identity following their involvement in an expanded scope of practice role [18]. Despite this, participants felt that their organisation could have provided more support through sufficient resources, workforce planning and organisation, and supportive management. These experiences are congruent with the experiences of health workers throughout the COVID-19 pandemic. A lack of established protocols impacted frontline health workers' views about support during COVID-19 and other pandemic responses [19]. Paykel et al. [20] described how Australian AHP staffing surges during COVID-19 in the Intensive Care Unit setting were often planned locally and ad-hoc, while medical and nursing workplace planning was often more coordinated. Solutions included greater workforce consultation, streamlined processes with centralised information, and increased staffing [21].

Understanding healthcare professionals' experiences in undertaking new extended scope roles assists healthcare organisations to understand the benefits and challenges of their involvement. Participants reported minimal resistance from colleagues regarding AHP roles in the COVID-19 vaccination workforce. However, it is likely that the temporary nature of this shift in AHP scope of practice during the pandemic enabled an enhanced 'acceptance' amongst non-AHPs to cross traditionally held professional scope boundaries. Expanding the health professional disciplines authorised to administer vaccinations has been previously successfully demonstrated within the pharmacy workforce. In the case of influenza immunisations, improved public vaccination rates have been demonstrated following implementation of community pharmacy vaccination [22]. Importantly, this model of care is also positively perceived by patients and provides professional satisfaction [23]. Challenges reported by community pharmacists included potential challenge to relationships with physicians, increased workload demands, and difficulties vaccinating paediatric patients [15].

AHPs described their limited, defined scope in COVID-19 vaccination workforces and indicated potential to undertake additional roles. There remain legislative and regulatory challenges across many AHP-led initiatives to transform traditional role boundaries. In the case of non-medical prescribing by podiatrists, Fitzpatrick and Borthwick [24] outlined legislative rigidity as a threat to supporting comprehensive clinical care delivery. Removing legislative barriers whereby health workers are readily enabled to perform such tasks once the required training has been completed, has immeasurable health system benefits. The benefits of an agile and responsive workforce with extended scope of practice skillsets has numerous benefits for healthcare organisations, patients, and the AHP workforce. Organisations and professional associations are encouraged to consider opportunities to regulate tasks/skillsets rather than professions enabled to perform certain tasks to identify a greater range of potential skill sharing and scope extension opportunities [24]. In turn, the workforce is more readily enabled to respond flexibly to population needs to ensure the efficient delivery of services to patients [25].

LIMITATIONS

There are several limitations associated with this study, primarily related to the recruitment of participants, survey distribution methods and timing. The size of the AHP COVID-19 vaccination workforce could not be ascertained. Participants from Victoria may have been over-represented in this study; however, this is likely representative of the Australian AHP workforce involved in COVID-19 vaccinations. The research team are both speech pathologists and it is possible that speech pathologists were more highly represented as a result of dissemination methods within professional networks. The timing of the study was approximately 12 months post participants' involvement in vaccination workforces and therefore responses may be subject to recall bias.

CONCLUSION

AHPs provided important contributions to Australia's COVID-19 vaccination response. This is the first study that has explored the roles and involvement of non-pharmacist AHPs in the COVID-19 vaccination response. This study supports the alignment between AHP skillsets and extended roles in public health responses. Importantly, barriers to AHP participation such as education and training, legislative barriers, and limitations to the roles enabled to be performed by AHPs should be considered to enable flexible and agile use of this workforce in future. Further investigation of AHP involvement via semi-structured interviews would enable more in-depth understanding of their experiences working in COVID-19 vaccination workforces.

ETHICS APPROVAL

Ethics exemption was granted by the relevant Human Research Ethics Committees (HREC/88958/MonH-2022-328757 and 2022/HE001672). All participants provided informed consent for their involvement in this study.

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APPENDIX 1: SUPPLEMENTAL MATERIAL. SURVEY QUESTIONS

Demographic Information

1a) What allied health professional qualification do you have?

- ☐ Dietitian
- ☐ Exercise physiologist
- ☐ Medical radiation practitioner
- ☐ Occupational therapist
- ☐ Optometrist
- ☐ Physiotherapist
- ☐ Podiatrist
- ☐ Radiographer
- ☐ Sonographer
- ☐ Speech pathologist
- ☐ Other: _____

1b) Nature of allied health employment prior to role in vaccination clinic

- ☐ Practising clinician
- ☐ Qualified, non-practising
- ☐ Researcher
- ☐ Management
- ☐ Allied health student
- ☐ Retired
- ☐ Unemployed

What state in Australia are you primarily employed in?

- ☐ New South Wales
- ☐ Queensland
- ☐ Victoria

Specify the geographical area of the service where you were employed in the COVID-19 vaccination response.

- ☐ Metropolitan
- ☐ Regional
- ☐ Rural / remote

Years of experience as an allied health professional

- ☐ 0-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ 21 +

What was the nature of your employment in the COVID-19 vaccination response?

- ☐ Re-deployed from routine duties
- ☐ Casual employee – full-time
- ☐ Casual employee – part-time
- ☐ Agency staff
- ☐ Other: _____

Was it your choice / decision to become part of the COVID-19 vaccination response?

- ☐ Yes
- ☐ No

How long were you employed in the COVID-19 vaccination response?

Number of shifts: _____

What were your roles and responsibilities as part of the COVID-19 vaccination program? *You may select more than one option.*

- ☐ Administer vaccines (i.e., administration of a COVID-19 vaccine to an individual). If selected this option, provide estimated total number of COVID-19 vaccinations administered: _____
- ☐ Prepare vaccines (i.e., preparation of a COVID-19 vaccine in line with local protocols for use within a vaccination service)
- ☐ Receive and handle vaccines (i.e., transport vaccines from one location to another; confirm vaccines have been transported in compliance with manufacturer's conditions)
- ☐ Managing operations of COVID-19 vaccination clinic
- ☐ Other: _____

Where did you provide services in the COVID-19 vaccination response? *You may select more than one option.*

- ☐ Community hub
- ☐ Mobile clinic
- ☐ Hospital

What were the benefits to being involved as an allied health professional in the COVID-19 vaccination response? *You may select more than one option.*

- ☐ Enhanced knowledge base related to vaccines
- ☐ Expanded scope of practice
- ☐ Own personal satisfaction contributing to the COVID-19 pandemic response
- ☐ Working as part of a multi-disciplinary team

- ☐ Enabling increased vaccinations to be delivered by expanding workforce to include allied health professionals
- ☐ Raising the profile of allied health professionals as care providers in the community
- ☐ There were no benefits to being involved
- ☐ Other: _____

Prior to commencing your role, what were your concerns about being involved as an allied health professional in the COVID-19 vaccination response? *You may select more than one option.*

- ☐ Insufficient knowledge about vaccination information, including side effects
- ☐ Difficulty keeping current with immunisation guidelines and/or training requirements
- ☐ Professional liability and responsibility
- ☐ Accidentally causing harm to a citizen
- ☐ Accidentally causing harm to myself (e.g., needle stick injury)
- ☐ Responding to an adverse event following vaccination administration
- ☐ Incorrectly preparing the COVID-19 vaccine
- ☐ Inadequate access to professional supervision or training related to your role in the vaccination response
- ☐ Remaining current with profession-specific knowledge and skills (e.g., speech pathology)
- ☐ I didn't have any concerns
- ☐ If you had other concerns, please specify:

Which of these concerns did you still have at the end of your involvement in the COVID-19 vaccination response? *[Used 'carry forward choices' option so that responses from question 11 copied across. Participants were able to de-select those responses which no longer applied].*

The next section of this survey will ask you to indicate to what extent you agree with the statements provided
(Presentation of the TDF questions were randomised for each participant and did not have associated TDF headings)

Knowledge:

I was familiar with the objectives of using allied health professionals in the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

I understood the scope and extent of my role in the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Skills:

I feel I had the necessary skills to participate in the COVID-19 vaccination response workforce.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

I feel I would have benefited from more training to support the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Social professional role and identity

As an allied health professional, I believe it was my responsibility to participate in the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Health professionals (non-AHP) perceived allied health professional involvement in COVID-19 vaccination response positively.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Beliefs about capabilities

I was confident in my ability to participate in the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

I had little control over the roles I could perform as an allied health professional in the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Optimism

I was optimistic that any issues related to the use of allied health professionals in the COVID-19 vaccination workforce could be addressed.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Beliefs about consequences

The use of allied health professionals in the COVID-19 vaccination workforce strengthens my organisation's COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Having been an allied health professional in the COVID-19 vaccination workforce reflects well on me professionally.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Reinforcement

There was no encouragement given to me as an allied health professional to support the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Intentions

I intend to support future vaccination responses should the need/opportunity arise.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Goals

I have a goal to improve my skills within vaccination responses.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Memory, attention, and decision processes

Since completing my initial COVID-19 vaccination training, I always remembered how to perform my role in the COVID-19 vaccination response effectively.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Environmental context and resources

Working in the COVID-19 vaccination response has a good fit with my skills as an allied health professional.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

My organisation did not provide allied health professionals with sufficient resources to be involved in the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Citizens perceived allied health professional involvement in COVID-19 vaccination response positively.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Social influences

My allied health professional colleagues were willing to support my involvement in the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Emotion

Working in the COVID-19 vaccination response was rewarding for me.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Working in the COVID-19 vaccination response was stressful for me.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

Behavioural regulation

In my workplace, there were policies/procedures and processes that enabled the successful use of allied health professionals in the COVID-19 vaccination response.

Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐ Strongly disagree ☐

ADDITIONAL COMMENTS:

Do you believe allied health professionals could have similar and/or additional roles in future immunisation responses? Please explain the reason for your response.

☐ Yes

☐ No

Do you have any further comments on your experiences as an allied health professional involved in the COVID-19 vaccination response?

Invitation: The second arm of this study will involve online semi-structured interviews or focus groups with allied health professionals involved in the COVID-19 vaccination response. Please indicate if you would like to participate in an online semi-structured interview or focus group to discuss your experiences further, by leaving your contact details below. If you select 'yes', a member of the research team will be in touch with you to schedule.

☐ No

☐ Yes

Name:

Email:

Contact number:

If you would like a summary of the outcomes of this project, please click 'yes' in the field below and you will be re-directed to a new page. Your details will remain confidential and separate from your responses.

Name:

Email:

APPENDIX 2: PARTICIPANTS' RATINGS AGAINST SURVEY STATEMENTS RELATED TO THE THEORETICAL DOMAINS FRAMEWORK AND ASSOCIATED DATA ANALYSIS

Domain	Survey statements	Likert scale responses, n (%)							M	Mdn
		5	4	3	2	1	A	<A		
Knowledge	I was familiar with the objectives of using allied health professionals in the COVID-19 vaccination response.	12 (41.4)	14 (48.3)	1 (3.4)	1 (3.4)	1 (3.4)	26 (89.7)	3 (10.3)	4.2	4.5
	I understood the scope and extent of my role in the COVID-19 vaccination response.	14 (48.3)	13 (44.9)	2 (6.9)	0 (0.0)	0 (0.0)	27 (93.1)	2 (6.9)	4.4	5
	Average domain score, %						91.4	8.6	4.3	-
Skills	I feel I had the necessary skills to participate in the COVID-19 vaccination response workforce.	11 (38.0)	15 (51.7)	2 (6.9)	0 (0.0)	1 (3.4)	26 (89.7)	3 (10.3)	4.2	5
	I feel I would have benefited from more training to support the COVID-19 vaccination response. (R)	4 (13.8)	6 (20.7)	8 (27.6)	8 (27.6)	3 (10.3)	10 (34.5) 19 (65.5)^	19 (65.5) 10 (34.5)^	3^	4.5^
	Average domain score, % (R statement scores reversed for overall agreement)						77.6	22.4	3.6	-
Social professional role and identity	As an allied health professional, I believe it was my responsibility to participate in the COVID-19 vaccination response.	7 (24.1)	11 (38.0)	8 (27.6)	1 (3.4)	2 (6.9)	18 (62.1)	11 (38.0)	3.7	4.5
	Health professionals (non-AHP) perceived allied health professional involvement in COVID-19 vaccination response positively.	7 (24.1)	13 (44.9)	7 (24.1)	1 (3.4)	1 (3.4)	20 (69.0)	9 (31.0)	3.8	5
	Average domain score, %						65.5	34.5	3.8	-
Beliefs about capabilities	I was confident in my ability to participate in the COVID-19 vaccination response.	9 (31.0)	13 (44.9)	5 (17.2)	1 (3.4)	1 (3.4)	22 (75.9)	7 (24.1)	4	5
	I had little control over the roles I could perform as an allied health professional in the COVID-19 vaccination response. (R)	6 (20.7)	14 (48.3)	5 (17.2)	3 (10.3)	1 (3.4)	20 (69.0) 9 (31.0)^	9 (31.0) 20 (69.0)^	3.7^	4^
	Average domain score (R statement scores reversed for overall agreement)						53.4	46.6	3.9	-

Optimism	I was optimistic that any issues related to the use of allied health professionals in the COVID-19 vaccination workforce could be addressed.	7 (24.1)	14 (48.3)	7 (24.1)	0 (0.0)	1 (3.4)	21 (72.4)	8 (27.6)	3.9	4.5
	Average domain score						72.4	27.6	3.9	-
Beliefs about consequences	The use of allied health professionals in the COVID-19 vaccination workforce strengthens my organisation's COVID-19 vaccination response.	10 (34.5)	12 (41.4)	5 (17.2)	1 (3.4)	1 (3.4)	22 (75.9)	7 (24.1)	4	5
	Having been an allied health professional in the COVID-19 vaccination workforce reflects well on me professionally.	10 (34.5)	13 (44.9)	5 (17.2)	0 (0.0)	1 (3.4)	23 (79.3)	6 (20.7)	4.1	4.5
	Average domain score						77.6	22.4	4.1	-
Reinforcement	There was no encouragement given to me as an allied health professional to support the COVID-19 vaccination response. (R)	2 (6.9)	1 (3.4)	5 (17.2)	17 (58.6)	4 (13.8)	3 (10.3) 26 (89.7)^	26 (89.7) 3 (10.3)^	2.3^	3.5^
	Average domain score (R statement scores reversed for overall agreement)						89.7	10.3	2.3	-
Intentions	I intend to support future vaccination responses should the need/opportunity arise.	8 (27.6)	11 (38.0)	7 (24.1)	2 (6.9)	1 (3.4)	19 (65.5)	10 (34.5)	3.8	4.5
	Average domain score						65.5	34.5	3.8	-
Goals	I have a goal to improve my skills within vaccination responses.	1 (3.4)	8 (27.6)	12 (41.4)	7 (24.1)	1 (3.4)	9 (31.0)	20 (69.0)	3	4.5
	Average domain score						31.0	69.0	3	-
Memory, attention, and decision processes	Since completing my initial COVID-19 vaccination training, I always remembered how to perform my role in the COVID-19 vaccination response effectively.	5 (17.2)	13 (44.9)	5 (17.2)	4 (13.8)	2 (6.9)	18 (62.1)	11 (37.9)	3.5	4.5
	Average domain score						62.1	37.9	3.5	-
	Working in the COVID-19 vaccination response has a good fit with my skills as an allied health professional.	7 (24.1)	14 (48.3)	4 (13.8)	2 (6.9)	2 (6.9)	21 (72.4)	8 (27.6)	3.8	4.5

Environmental context and resources	My organisation did not provide allied health professionals with sufficient resources to be involved in the COVID-19 vaccination response. (R)	1 (3.4)	3 (10.3)	5 (17.2)	13 (44.9)	7 (24.1)	4 (13.8) 25 (86.2)^	25 (86.2) 4 (13.8)^	2.2^	2.5^
	Citizens perceived allied health professional involvement in COVID-19 vaccination response positively.	2 (6.9)	19 (65.5)	5 (17.2)	2 (6.9)	1 (3.4)	21 (72.4)	8 (27.6)	3.7	4.5
	Average domain score (R statement scores reversed for overall agreement)						77.0	23.0	3.2	-
Social influences	My allied health professional colleagues were willing to support my involvement in the COVID-19 vaccination response.	5 (17.2)	16 (55.2)	7 (24.1)	1 (3.4)	0 (0.0)	21 (72.4)	8 (27.6)	3.9	4.5
	Average domain score						72.4	27.6	3.9	-
Emotion	Working in the COVID-19 vaccination response was rewarding for me.	13 (44.9)	11 (38.0)	1 (3.4)	3 (10.3)	1 (3.4)	24 (82.8)	5 (17.2)	4.1	5
	Working in the COVID-19 vaccination response was stressful for me. (R)	5 (17.2)	9 (31.0)	3 (10.3)	8 (27.6)	4 (13.8)	14 (48.3) 15 (51.7)^	15 (51.7) 14 (48.3)^	3.1^	4^
	Average domain score (R statement scores reversed for overall agreement)						67.2	32.8	3.6	-
Behavioural recognition	In my workplace, there were policies/procedures and processes that enabled the successful use of allied health professionals in the COVID-19 vaccination response.	5 (17.2)	11 (38.0)	7 (24.1)	4 (13.8)	2 (6.9)	16 (55.2)	13 (44.8)	3.4	5
	Average domain score						55.2	44.8	3.4	-

WHO IS AGAINST COVID-19 VACCINATION AND WHY? THE PERSPECTIVE OF OPPONENTS OF THE COVID-19 VACCINATION IN AN IRANIAN CONTEXT: A QUALITATIVE STUDY

Mehrdad Farrokhi¹, Hamid Reza Khankeh^{1,2}, Mohammad javad Hosseinabadi-farahani^{3,4}, Milad Rezaiye⁵, Seyed Tayeb Moradian⁵, Robabe Khalili⁵, Arya Hamedanchi⁶, Mariye Jenabi Ghods⁷, Mohammad Saatchi^{1,8}, Mohammad Pourebrahimi^{*5}

1. Health in Emergency and Disaster Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.
2. QUEST Center for Responsible Research, Berlin Institute of Health at Charité, Berlin, Germany.
3. Department of Nursing, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.
4. Clinical Research Development Center, Rofeideh Hospital. University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.
5. Nursing Care Research Center, Clinical Sciences Institute, Nursing Faculty, Baqiyatallah University of Medical Sciences, Tehran, Iran.
6. Shahid Beheshti University of Medical Sciences branch, ACECR, Tehran, Iran.
7. PhD Student of Nursing, Department of Nursing, University of social welfare and rehabilitation sciences, Tehran, Iran.
8. Department of Biostatistics and Epidemiology, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.

*Correspondence: Pourebrahimi62@gmail.com

ABSTRACT

OBJECTIVE

This study was conducted in Iran to explore the hesitancy of COVID-19 vaccinations from the perspective of opponents of the COVID-19 vaccination in Iranian society.

DESIGN

Qualitative design, using the conventional content analysis approach, has been used to collect and analyze data. 29 in-depth and semi-structured interviews were conducted with those individuals who held a stance against receiving the COVID-19 vaccine. Participants were selected using purposive sampling. The data analysis process was based on the Landman and Grenheim method with the aid of MAXQDA (20) software. In addition, Lincoln and Guba's criteria were followed to ensure the trustworthiness of the study findings.

SETTING

The study was conducted in Tehran, Iran from April 2022 to March 2023.

RESULTS

During the data analysis, 16 sub-categories were formed from 1,273 codes and after merging similar sub-categories in terms of similarities, seven main categories including (a. "Distrust", b. "Beliefs", c. "Emotions", d. "Ambiguity", e. "Alternative ways", f. "Attention to people's freedom of choice", and g. "The impact of politics on health") were extracted. These categories cover and reflect the participants' experiences of the phenomenon of opposition to COVID-19 vaccination.

CONCLUSION

To promote vaccine acceptance, comprehensive and accurate information, trust in healthcare, proper information management, effective vaccine selection methods, and guidance from successful experiences should be implemented.

KEYWORDS

Coronavirus, COVID-19 vaccination, vaccination hesitancy

INTRODUCTION

Due to the increase in the incidence of COVID-19 in many countries, on March 11, 2020, the World Health Organization (WHO) announced the pandemic of the century [1]. Currently, 221 countries in the world are affected by the COVID-19 virus. According to the official statistics of WHO, there have been more than 768 million confirmed infections and more than 6 million deaths from COVID-19. In Iran, more than 7 million people have been infected with the COVID-19 virus and about 146,000 individuals have died [2].

Although compliance with public health protocols can prevent the spread of COVID-19, vaccination-related evidence shows that vaccination is the best way to control this virus [3]. Therefore, many countries started to produce the vaccine for COVID-19 and for the first time since the beginning of the pandemic, Russia succeeded in producing and supplying the vaccine for COVID-19 under the name of "Sputnik" [4].

With the increase in people receiving vaccines, the number of infections and deaths caused by COVID-19 decreased significantly, and many studies were conducted on the effectiveness of vaccines and most of them confirmed the positive effect of vaccination [5-7]. However, despite the extensive evidence and documentation supporting these positive effects, misinformation and misunderstanding about the vaccine persist. Some individuals believe that receiving the vaccine can lead to irreversible side effects and harm [8, 9]. This hesitancy is not unique to Iran; it is a global phenomenon that has been documented in various contexts, including low- and middle-income countries [10-12].

Studies indicate that the causes of COVID-19 vaccine hesitancy are multifaceted and not limited to specific factors. A wide range of historical, cultural, individual, and social factors contribute to this phenomenon [10-12]. For instance, Yoosefi Lebni et al. (2022) identified structural barriers such as limited access to healthcare services, and socio-cultural factors, such as distrust in government and health authorities, as key determinants of vaccine hesitancy in Iran [13]. Similarly, Magesh et al. (2021) examined the association between race, ethnicity, COVID-19 outcomes, and socioeconomic determinants, highlighting socioeconomic disparities and health system inefficiencies as significant barriers [14]. These studies provide valuable insights into the broader context of vaccine hesitancy but do not fully address the perspectives of vaccine opponents, particularly their ideological and emotional motivations.

To successfully carry out a COVID-19 vaccination program, it is crucial to address not only the availability of a safe and effective vaccine but also the public's trust and acceptance. The lack of trust and hesitancy towards the vaccine can pose significant challenges and hinder the implementation of the program. Therefore, policymakers understand health system policymakers need to understand the current situation regarding vaccine acceptance and identify the obstacles and challenges. Given the critical role of vaccination in controlling the pandemic and the persistent challenges posed by vaccine hesitancy, this study aims to fill a gap in the literature by exploring the perspectives of vaccine opponents in Iran. While prior research has examined vaccine hesitancy in Iran and other contexts, few studies have focused specifically on the narratives and beliefs of those who actively oppose vaccination. By doing so, this study seeks to provide a more nuanced understanding of the ideological, emotional, and cultural factors that contribute to vaccine opposition, offering insights that can inform targeted interventions and policy decisions. This study was conducted in Iran to explore the COVID-19 vaccination hesitancy factors from the perspective of opponents of the COVID-19 vaccination in Iranian society.

METHODS

STUDY DESIGN

This qualitative study was carried out with a conventional content analysis approach based on the Landman and Grenheim method [15] to explore the COVID-19 vaccination hesitancy factors from the perspective of opponents of the COVID-19 vaccination in Iranian society. Content analysis is a research method commonly used in social and health research. Conventional content analysis is often used to investigate specific events when limited scientific evidence is available on the topic [16].

STUDY SETTING AND PARTICIPANT RECRUITMENT

This study is a joint study between The University of Social Welfare and Rehabilitation Sciences and Baqiyatallah Medical Sciences University, which was conducted in Tehran, Iran, from April 2022 to March 2023.

The study used purposive sampling with maximum variation in terms of age, gender, education degree, and expertise to gather information from participants who are opponents of the COVID-19 vaccination in Iranian society.

In this study, the participants were selected with certain inclusion criteria, such as having the verbal ability to participate in the interview, being over 18 years old, willing to participate in the study, and being fluent in the Farsi language were selected from among those who are opponents of the COVID-19 vaccination. These criteria were used to ensure participants were able to reflect on their experiences during interviews.

DATA COLLECTION AND INTERVIEWS

An in-depth and semi-structured interview was used to explore the COVID-19 vaccination hesitancy factors from the perspective of opponents of the COVID-19 vaccination. In general, 29 face-to-face interviews were conducted with 29 eligible study participants who were selected through purposive sampling. The interviews were conducted in a quiet setting with informed consent and confidentiality guaranteed. None of the participants withdrew from the study. After obtaining written consent, face-to-face interviews were conducted, audio recorded, and transcribed. The interviews lasted between 30 to 60 minutes. Semi-structured interviews, initially with more general open-ended questions such as "What do you think about the injection of the COVID-19 vaccine?" and "What could be the reasons for your opposition to the injection of the COVID-19 vaccine?" started, but the focus of the questions changed following the responses of the participants. Data collection continued until data saturation was achieved, and no new insights have been got with new data.

DATA ANALYSIS

MAXQDA (10) was used to manage data coding and analysis. Conventional content analysis based on Landman and Grenheim's method in 2004 was used [17]. In general, conventional content analysis is used when the objective of a study is to describe a phenomenon based on the experiences and perceptions of study participants [18], and there is limited knowledge [19] or fragmented knowledge about it [20]. Moreover, COVID-19 vaccination hesitancy factors from the perspective of opponents have vague aspects, which should be clarified through content analysis. Therefore, the following steps were taken in this study. In Table 1, an illustrative example of the coding and categorization process is displayed.

1. Transcription of the interviews verbatim and multiple revisions to understand the phenomenon as a whole.
2. Breakdown of text into reasonable and condensing meaning units.
3. Conceptualization of the condensed meaning units and labeling them with codes.
4. Categorization of the codes into subcategories and categories, depending on their similarities and differences.
5. Develop themes and main categories based on the latent content of the text.

TRUSTWORTHINESS OF RESEARCH

Research rigor was provided according to Guba and Lincoln's (1989) criteria [21]. The credibility of the research was ensured through prolonged involvement with the data and member checks. The Confirmability was achieved using an internal panel expert method, and the dependability was ensured through an audit trial. Maximum variation sampling contributed to transferability and credibility. The research team reviewed and discussed the coded and categorized data until a consensus was reached. Interview transcription, Initial data, categories, and themes were preserved until the end of the research process. Summaries of the interviews and primary results were returned to participants for confirmation of views.

TABLE 1- THE PROCESS OF EXTRACTING CATEGORIES

Category	Sub-category	Code
Alternative ways	Emphasis on vaccine alternatives	Prioritizing a healthy lifestyle instead of vaccination
		Believing in the efficacy of mental-psychological self-care in treating Covid-19
		Belief in the body's ability to heal by tolerating disease
	Effectiveness of traditional medicine in disease prevention and control	Belief in nature therapy in the treatment of disease
		Existence of better disease control methods other than vaccination
		The effect of using Iranian traditional medicine in the treatment of Covid-19
		The effect of consuming sea salt before and after each meal

RESULTS

PARTICIPANT CHARACTERISTICS

In general, 29 individuals participate in the study. Demographic characteristics indicated that the mean age of the participants was 54 years; the lowest level of education was a diploma and the highest was a PhD degree. Further information is presented in Table 2.

TABLE 2- DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS IN THE STUDY

Number of participants	29	
Mean age	54	
Gender	14 Females, 15 Males	
Average interview time	49 minutes	
Level of education	Diploma	6
	Associate	5
	BSc	10
	MSc	4
	PhD	4

CODING STRUCTURE FOR COVID-19 VACCINATION HESITANCY FACTORS

During the data analysis, seven categories emerged as COVID-19 vaccination hesitancy factors, including a. "Distrust", b. "Beliefs", c. "Emotions", d. "Ambiguity", e. "Alternative ways", "Attention to people's freedom of choice", and "The impact of politics on health". These categories included 16 subcategories and 1,273 codes. In the following, each of these factors are described.

1. Distrust

In general, this category highlights the issue of participants lacking confidence or having low confidence at various levels and for various reasons. Within this category, we observe a lack of trust towards managers and officials involved in COVID-19 crisis management, skepticism towards the information provided regarding the pandemic, and fear and mistrust of foreign vaccines. This category can be further divided into 3 sub-categories such as "distrust in health officials," "distrust in the World Health Organization," and "distrust in imported vaccines."

Participant number 12, a 65-year-old man, expresses that: "the Coronavirus was intentionally created to reduce the world's population. According to him, the vaccine is seen as a continuation of this alleged project, leading to his ongoing lack of trust."

2. Beliefs

In this study, the findings revealed a prevailing preference for pre-existing beliefs and personal convictions over scientific evidence and the proven effectiveness of vaccines. In some instances, participants even denied the existence of the disease altogether. These attitudes can be categorized into three sub-categories: "Cultural Beliefs," "Positive Beliefs in Natural Healing," and "Disbelief in Disease."

For instance, participant number 14, a 68-year-old female expressed her belief that life and death are in the hands of God, dismissing the impact of vaccines by stating, "I believe that this kind of work (vaccine) does not change anything."

3. Emotions

This category demonstrates that fear and doubt play a significant role in people's decision to avoid getting vaccinated. Moreover, the experiences of complications and regrets among those who did receive the vaccine only serve to reinforce their belief that it should not be administered. Within this category, there are two subcategories to consider: "fear" and "regret and doubt among vaccinated individuals".

Participant number 7, a 36-year-old woman, shared her perspective, acknowledging that while these side effects are not common and typically short-term, she still had apprehensions regarding potential complications.

4. Ambiguity

This category encompasses discussions on the potential flaws and concerns surrounding certain vaccine production processes. It also involves examining why some complications have arisen and the existence of mortality statistics despite vaccination efforts. This category can be divided into two sub-categories: "Insufficient scientific evidence regarding the vaccine production process" and "Uncertainty regarding the effectiveness of the vaccine."

Participant number 26, a 65-year-old man, raises an important point. He highlights that the vaccine in question has not yet received approval from the WHO. Their cautious approach is rooted in the need to observe the long-term effects, which typically take 3-5 years to ascertain. Consequently, it remains uncertain whether the WHO will ultimately endorse this vaccine.

5. Alternative ways

The findings in this category highlight the strategies employed by individuals who oppose vaccination. These individuals seek alternatives to vaccines, such as traditional medicine, and make lifestyle changes. Two subcategories emerged

within this category, namely "emphasis on vaccine alternatives" and "effectiveness of traditional medicine in disease prevention and control".

Participant number 16, a 38-year-old man, expressed his perspective on vaccines, stating, "Vaccines have no impact on this disease as Corona is not a new phenomenon and is akin to a common cold. Vaccines do not possess the ability to save people. Amidst the current challenges faced by the modern world, including the threat of emerging and incurable diseases, as well as multiple dangers and apocalyptic events in various fields such as biology, cybernetics, neuropsychology, and genetics, Tradition medicine has emerged as a beacon of hope and healing. It serves as a lifeboat, rescuing its people and bringing them to the shore of recovery."

6. Attention to people's freedom of choice

In this category, participants raised concerns about the compulsory vaccine and the importance of respecting people's freedom to choose. Their opposition to mandatory vaccination and the ethical implications of such enforcement were the main topics discussed. This category consists of two sub-categories, including: "Opposition to Compulsory Vaccination" and "Regarding People's Freedom of Choice".

Participant number 19, a 53-year-old man, expressed his concerns regarding the compulsory vaccine. He highlighted the importance of respecting people's freedom of choice when it comes to vaccination. According to him, forcing individuals to receive a vaccine with unknown long-term effects is cruel. The participant emphasized that he diligently follows public health measures to protect himself from infecting by COVID-19. However, he firmly believes that he will not get vaccinated until there is complete and clear information available. The man questioned the insistence of doctors on vaccination and the consideration of social exclusions for those who choose not to get vaccinated. According to him, it is ethically wrong to enforce vaccination on individuals. He labeled mandatory vaccination as cruelty towards people, and he expressed his disappointment in the lack of attention given to people's power of choice.

7. The impact of politics on health

The findings in this category shed light on the complex dynamics surrounding vaccine distribution in our country. Despite the challenges posed by sanctions and limited access to medicines and equipment, the COVID-19 vaccine has been relatively accessible. This has led to concerns about the vaccine's efficacy and safety. Furthermore, the economic incentives associated with vaccine production and sales contribute to the opposition some individuals have toward vaccination. This category can be further explored through two subcategories: "Negative role of sanctions in managing Covid-19" and "Economic war".

Participant number 4, a 47-year-old man, expresses his skepticism, questioning why countries that previously withheld medicines for cancer patients and special needs individuals are now offering vaccines. He wonders how it is possible that our country faced challenges during the sanctions period without widespread COVID-19 cases, yet now these countries are eager to provide vaccines to us.

DISCUSSION

The present study was conducted to explore the COVID-19 vaccination hesitancy factors from the perspective of opponents of the COVID-19 vaccination in Iranian society. Results indicated that distrust, people's beliefs, emotions including fear, ambiguity about the consequences of vaccination, belief in the existence of alternative ways of vaccination, and belief in the impact of politics on health were among the reasons for people's opposition to receiving the vaccine.

While previous studies have examined vaccine hesitancy in Iran and other contexts, this study contributes uniquely by focusing specifically on the perspectives of vaccine opponents, a group that has been underexplored in the literature. For instance, Yoosefi Lebni et al. (2022) identified determinants of non-injection of the COVID-19 vaccine in Iran, emphasizing structural and socio-cultural barriers [13], but did not delve deeply into the ideological and emotional

underpinnings of vaccine opposition as this study does. Similarly, Karimi et al. (2024) explored predictors of vaccine uptake among people who use substances in Tehran, highlighting socio-economic and health system factors [22], but their findings do not address the broader societal and political distrust that our study reveals as a key driver of vaccine opposition. By focusing on the narratives and beliefs of vaccine opponents, this study provides a more nuanced understanding of the psychological and cultural factors that contribute to vaccine hesitancy in Iran.

There is evidence indicating a potential correlation between the level of trust in the government and its associated media outlets, and the acceptance of vaccines as well as compliance with pandemic control guidelines. This suggests that individuals who have a higher level of trust in the government and its affiliated media are more likely to accept vaccines and adhere to public health guidelines during a pandemic [23, 24]. In this study, researchers discovered that one of the main reasons for people's lack of trust in the country's health officials and international health organizations was their skepticism towards the healthcare field. It became crucial to identify the underlying challenges that contribute to this distrust and propose practical solutions. By doing so, the study aimed to promote vaccine acceptance during potential future epidemics.

This finding aligns with prior research, such as that of Yoosefi Lebni et al. (2022), who also identified distrust in government and health authorities as a significant barrier to vaccine uptake in Iran [13]. However, our study extends this understanding by highlighting how distrust is not limited to domestic institutions but also extends to international organizations like the WHO, a dimension that has been less explored in the Iranian context.

Research has consistently shown that information sources, government institutions, and health professionals have a profound impact on individuals' vaccine decisions. To promote greater trust in these entities, reduce vaccine resistance, and enhance pandemic control, it is crucial to prioritize targeted efforts and strategic planning [25, 26]. However, it is important to acknowledge that distrust among vaccine opponents extends beyond governments and the media. There is evidence to suggest that there is also a lack of trust in the WHO. For instance, a study conducted in Ethiopia revealed that one of the primary reasons for opposition to and doubt in receiving vaccines was due to a specific case that eroded trust in the WHO [27].

The findings of the recent research reveal that individuals who oppose receiving the COVID-19 vaccine cite various reasons rooted in their beliefs. One prominent reason mentioned is the belief that the virus was intentionally created and enhanced in laboratories through human activity. Additionally, some vaccine opponents attribute their refusal to conspiracy theories, concerns about death resulting from the vaccine injection, and the perceived clash between science and religion. According to Garcia's observations, many people consider religious practices, such as religious training, prayers, and other rituals, as viable alternatives to medical treatments. This perspective has contributed to a sense of hesitation among individuals when it comes to receiving the COVID-19 vaccine [28]. Cultural and religious prejudices are widely recognized as powerful predictors of anti-vaccine sentiments. Consequently, to foster vaccine acceptance during epidemics, it is crucial to identify influential individuals and arrange informative briefings that delve into the intricacies of scientific research [29, 30]. By doing so, we can create a supportive context for the adoption of vaccines.

These findings resonate with prior studies, such as those by Yoosefi Lebni et al. (2022), Karimi et al. (2024), and Khankeh et al. (2021), which also identified cultural and religious beliefs as significant barriers to vaccine uptake in Iran [13, 22, 31]. However, our study adds to this body of knowledge by uncovering the specific narratives and conspiracy theories that fuel vaccine opposition, such as the belief in laboratory-created viruses and the perceived incompatibility of science and religion. These insights provide a deeper understanding of the ideological resistance to vaccination, which has not been fully explored in earlier research.

Regarding the skepticism surrounding vaccines, some individuals express concern about the lack of scientific evidence and limited information regarding the vaccine production process. These individuals believe that the available information is not adequately disclosed to the public, leading to doubts about the safety and efficacy of vaccines. To address these concerns, vaccine manufacturing companies need to be more transparent and provide accessible

information about the licensing process and vaccine production [32]. This transparency will help build trust and ensure that consumers have the necessary information to make informed decisions about vaccination.

The fear of side effects and death after receiving the vaccine was another issue raised by opponents of vaccination. The study conducted in Turkey also found that many vaccine opponents cited concerns about potential side effects, such as infertility, heart damage, and brain impairment, as their reason for refusing the vaccine [33].

The findings of this study suggest that government mandates and pressure from political and health institutions are correlated with increased resistance from vaccine opponents, leading to a reluctance to receive the vaccine. To effectively encourage individuals to get their vaccine booster shots it is crucial to shift away from policies of coercion and pressure and instead focus on using persuasive techniques.

It is important to note, however, that social pressure from governments does not always have negative effects on vaccine uptake. Numerous studies have demonstrated its positive impact. For instance, in Morales' study, some participants who were initially hesitant about receiving the vaccine ultimately chose to get vaccinated, citing government pressure as a motivating factor [34].

CONCLUSION

The mere production and availability of the COVID-19 vaccine will not suffice in eradicating this disease. Societies must implement and expand their vaccination programs successfully. A key step in this process is identifying the current status of vaccine acceptance and understanding the obstacles and challenges that exist. This study aimed to explore the COVID-19 vaccination hesitancy factors from the perspective of opponents of the COVID-19 vaccine injection in Tehran, the political-economic capital of Iran. The findings revealed that lack of trust, personal beliefs, emotions like fear, uncertainty about the consequences of vaccination, belief in alternative methods of immunization, and the perception of politics' influence on health were among the primary reasons for people's resistance towards receiving the vaccine. To successfully overcome obstacles and challenges in this area, it is crucial to have a thorough understanding of the relevant factors, pay close attention to them, and implement the necessary measures to address these challenges. It's obvious that developing clear and transparent risk communication and facilitating community engagement can improve vaccine acceptance in future biological events.

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The authors have no relevant financial or non-financial interests to disclose.

AUTHOR CONTRIBUTIONS:

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by [Hamid Reza Khankeh], [Mehrdad Farrokhi], [Seyed Tayeb Moradian], [Robabeh Khalili], [Arya Hamedanchi], [Mariye Jenabi Ghods], [Mohammad Saatchi], [Mohammad Pourebrahimi] and [Mohammad javad Hosseinabadi-farahani]. The first draft of the manuscript was written by [Milad Rezaiye] and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

DATA AVAILABILITY:

The datasets generated during and/or analysed during the current study are not publicly available due to confidentiality but are available from the corresponding author on reasonable request.

ETHICS APPROVAL:

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of University of Social Welfare and Rehabilitation Sciences (IR.USWR.REC.1400.278)

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IDENTIFYING KEY FACTORS AFFECTING ESTIMATING GENERAL PRACTITIONER WORKFORCE REQUIREMENTS WITH A SYSTEM DYNAMICS APPROACH: A SCOPING REVIEW

Mohammadreza Amiresmaili¹, Mohammad Hossein Mehrolhassani², Aliakbar Haghdoost³, Mahla Iranmanesh^{*4}

1. Faculty of Management and Medical Information Sciences, Kerman University of Medical Sciences, Kerman, Iran.
2. Health Foresight and Innovation Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran
3. Social Determinants of Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran
4. Health Services Management Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

*Correspondence: mahlairanmanesh1991@gmail.com

ABSTRACT

BACKGROUND:

The objective of this study is to identify the key factors influencing approaches to estimating general practitioner workforce requirements through a system dynamics approach. This analysis is essential for understanding workforce dynamics and informing healthcare policy. Consequently, a study was conducted to identify the key factors affecting the estimation of general practitioner numbers using a system dynamics approach.

METHODS:

This study involved a scoping review of articles concerning the healthcare workforce and general practitioners. Relevant articles were obtained from international databases such as PubMed, Scopus, Embase, and Web of Science, covering the period from 2000 to 2024, where full-text access was provided. An inductive approach was utilized to analyze the findings, enabling deeper insights beyond mere aggregation of information.

RESULTS:

Eighteen final studies out of 7,397 initially identified were included in the present research. The findings identified 77 variables and factors as exogenous and indigenous. Exogenous variables in the healthcare domain are classified into two main categories: demographic variables and health system variables. Indigenous variables are categorized into two primary groups: educational and workforce variables.

CONCLUSIONS:

The findings offer a comprehensive framework and identification of variables for this healthcare workforce by integrating demographic changes, labor market dynamics, and professional development. Accurate labor force estimation relies on high-quality data, which presents challenges due to regional differences and ongoing changes, making effective evidence-based workforce planning and policy development crucial through dynamic system thinking.

KEYWORDS

general practitioner, workforce estimates, system workforce, approach, scoping review

BACKGROUND

The rising trend in healthcare costs worldwide can be largely attributed to demographic shifts, continuous advancements in technology, increasing societal expectations, and changing disease patterns [1]. These interconnected factors have created a widespread resource scarcity challenge that healthcare systems around the globe must address [2]. Among these vital inputs are medical equipment and personnel, especially physicians, whose roles are crucial for the effective and efficient delivery of healthcare services. Therefore, they represent one of the most critical elements in healthcare resource allocation [3].

A report from the World Health Organization in 2006 highlighted a critical workforce crisis affecting physicians (including specialist physicians) and nurses in 57 countries, emphasizing the significance of human capital in the health sector. Many analysts contend that overlooking this aspect can lead to the failure of health policies. [4, 5]. Therefore, strategic planning and policymaking in health human resources are essential [6]. Accurate estimation of the necessary number of general practitioners is particularly vital, given the lengthy educational pathways and substantial costs associated with training [7]. In this study we focus specifically on general practitioners (GPs) because they are the main providers of primary care and determine population access, continuity, and first-line response; errors in estimating GP supply or distribution therefore have broader and more immediate system-level consequences than shortages limited to specialist cadres. Although we reviewed variables reported in specialist-focused studies to capture system-level spillovers (e.g. training capacity, remuneration, referral systems), the analysis and dynamic modelling explicitly target the supply and demand of GPs.

While various models and methodologies have been proposed globally over the years to forecast the demand for general practitioners, including the supply model [8], the population-to-healthcare workforce ratio model [9], and needs-based models from healthcare organizations [10], these approaches exhibit varying degrees of effectiveness and applicability. Additional methodologies, such as computational models based on service volume, adjusted needs-based models, and the World Health Organization's own models [11], highlight the breadth of research in this domain. Despite the extensive literature, there is a notable gap in customized approaches that consider the unique socio-economic and healthcare characteristics of Iran.

System dynamics, an advanced estimation and forecasting method that employs mathematical models, provides significant advantages for tackling these challenges [12]. It accurately captures temporal changes and integrates sophisticated algorithms, such as simulation techniques and sensitivity analyses, to pinpoint optimal strategies for health resource management and system optimization. The application of system dynamics results in substantial enhancements in efficiency, quality, and cost-effectiveness [13]. However, the effectiveness of this method is heavily dependent on the assumptions made at its inception, especially regarding the selection of key variables.

This study focuses on identifying the fundamental variables essential for system dynamics modeling in general practitioners. We present a comprehensive scoping review of dynamic systems studies in the medical field, emphasizing the crucial role of general practitioner physicians in this modeling process. A scoping review is a type of research synthesis that aims to map the existing literature on a particular topic, identifying key concepts, theories, sources of evidence, and gaps in research. This method is particularly useful for exploring broad topics or areas where the evidence is still emerging, as it helps clarify the scope of available research and provides a foundation for future investigations [14]. Our approach is unique, addressing a significant gap in the Iranian context, which has yet to implement such comprehensive system dynamics models. By clarifying the relevance and applicability of these models, we aim to encourage researchers and healthcare professionals interested in dynamic modeling to engage more deeply in this vital area of study, ultimately contributing to a more effective healthcare system in Iran.

METHODS

This study conducted a scoping review, and relevant articles were extracted using the databases: PubMed, Scopus, Embase, and Web of Science. Articles included in the present research had to be accessible in full text in English. They were published between 2000 and 2024. The search for articles was performed using related keywords and Boolean operators as follows:

SEARCH STRATEGY

"healthcare workforce" OR "Human resource" OR "Health Personnel" OR "Health Manpower" OR "Health Workforce" AND "Primary care physician" OR "Family physician" OR "family doctor" OR "family practice" OR "General Practitioner" OR "General Practice Physician" OR "General Physician" OR "Physician workforce" OR "GP" AND "Calculate" OR "Model" OR "Modelling" OR "Approach" OR "Forecast" OR "forecasting" OR "Estimation" OR "Estimating" OR "System" OR "Strategy" OR "planning"

The review aimed to identify the key variables and models used in system dynamics within the medical field, particularly focusing on the role of GPs. This comprehensive search and subsequent analysis provide a foundation for understanding the current landscape and future directions of dynamic modeling in healthcare.

To ensure that no relevant studies were missed and to monitor the target content more accurately, manual searching was also employed. Initially, backward searching was utilized, in which the references or works cited in an article were identified and examined. Following this, forward searching was used, where the researcher identified studies that cited an article or primary work after its publication. These processes specifically utilized the Google Scholar and Web of Science databases.

INCLUSION AND EXCLUSION CRITERIA

Articles included in the present research are those for which full text access is available, written in English, published between the years 2000 and 2024, and related to the assessment of general practitioners or specialists using a dynamic systems approach in the health field. Articles that were in a non-English language, lacked full text access, were not published within the specified timeframe, and studies that assessed general practitioners and specialists using other approaches.

DATA EXTRACTION

The study retrieval process for the scoping review involved several stages as follows:

In the first stage, a total of 7,397 articles were identified across scholarly databases. Specifically, 2,032 articles were retrieved from Web of Science, 2,756 from Embase, 5,848 from PubMed, and 4,375 from Scopus. After removing duplicates, 4,086 articles remained. In the second stage, 141 articles met the initial screening criteria, while 3,945 articles were excluded based on predefined inclusion criteria. In the third stage, the full texts of the remaining 141 articles were reviewed. Among these, 123 articles were further excluded based on Inclusion and Exclusion criteria.

Ultimately, 18 studies were included in this research, and the findings extracted from these studies have been elaborated upon. The details of the article retrieval process are illustrated in Figure 1 (PRISMA diagram). The characteristics of the studies included in this research are presented in Table 1. They focused on forecasting estimates from general or specialist physicians using a system dynamics approach in the healthcare domain. Editorial letters, conference papers, and systematic reviews were excluded from this research.

DATA ANALYSIS

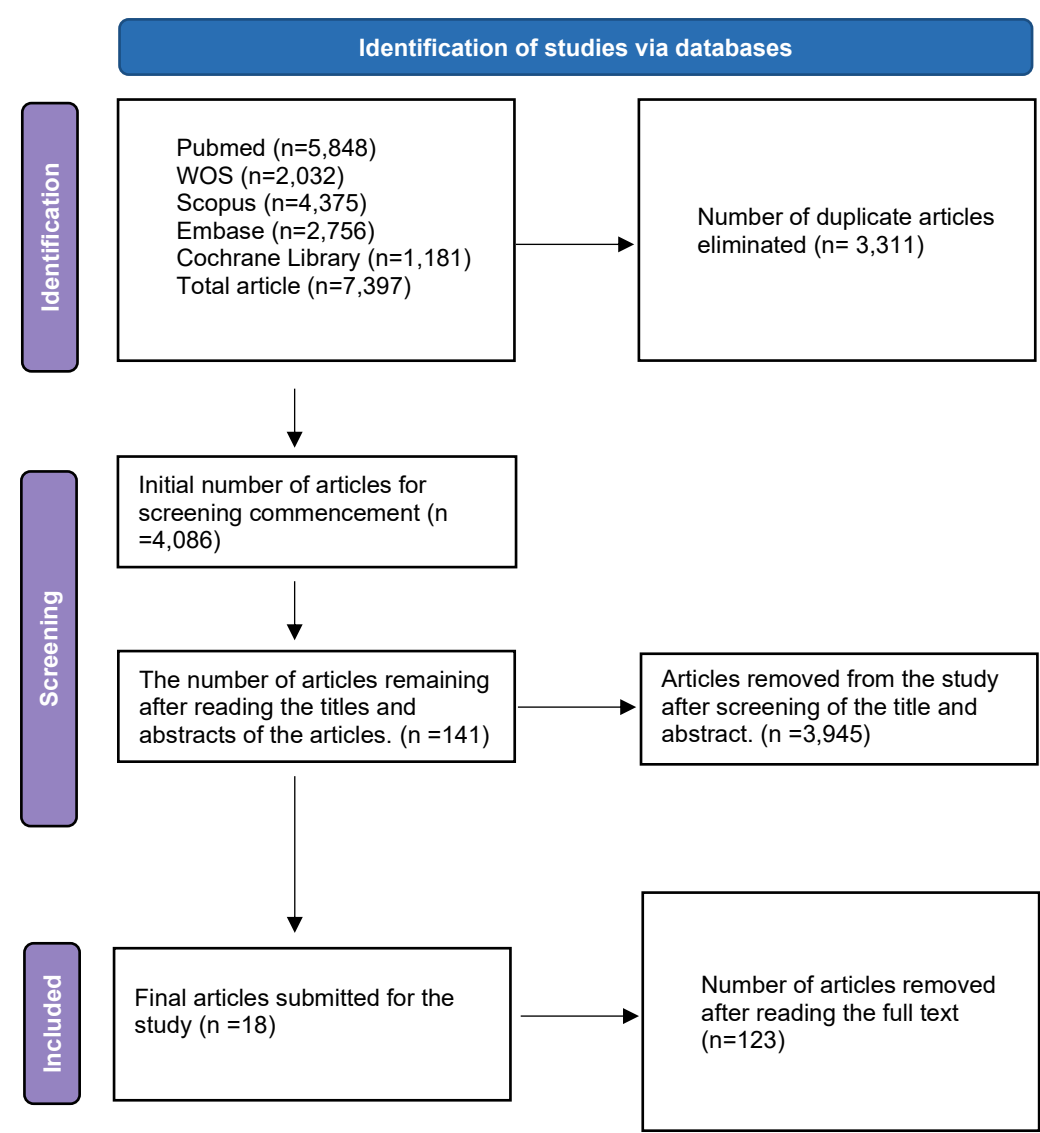
To analyze the findings, a content analysis and inductive approach were utilized. The process unfolded as follows: The research design was established by defining objectives, research questions, and inclusion/exclusion criteria. A list of studies

pertinent to the research topic was carefully selected and thoroughly reviewed. After systematically reviewing the studies, relevant findings were extracted. Similarities and differences among the findings and their themes were identified. Based on these similarities, the data were manually coded and initially categorized. The content of the findings was ultimately categorized and classified according to the research objectives. Subsequently, the results were interpreted. This structured approach ensured a comprehensive analysis of the data, facilitating a thorough understanding and interpretation of the research findings.

FINDINGS

The studies included in the review are categorized by year of publication as follows: 1 study in the period 2010-2006, 6 studies in the period 2011-2015, and 3 studies in the period 2021-2024. It should be noted that no studies were conducted between 2000-2005 on this topic. 8 studies were conducted between 2020-2016.

FIGURE 1: PRISMA FLOW DIAGRAM



The findings obtained from the scoping review were classified into two main tables, exogenous variables and indigenous variables in the healthcare domain.

TABLE1: DEMOGRAPHIC CHARACTERISTICS OF THE EXTRACTED ARTICLES

Article	Author	Year Published	Year Estimate	Target Population	Setting	Result	Journal	Reference N°
System dynamics modelling of health workforce planning to address future challenges of Thailand's Universal Health Coverage	Leerapan	2021	20 years	health workforce	Thailand	The simulation modelling found hospital utilisation created a vicious cycle of constantly increasing demands for hospital care and a constant shortage of healthcare providers. Moreover, hospital care was not designed for effectively dealing with the future demands of ageing populations and prevalent chronic illness. Hence, shifting emphasis to professions that can provide primary care, intermediate care, long-term care, palliative care, and end-of-life care can be more effective.	<i>Human Resources for Health</i>	(15)
A Study on Human Resources Management Based on System Dynamics	Liu	2012	Not applicable	Not applicable	China	Using system dynamics of qualitative analysis, and analyze the combination of principle and method to establish human resource management system quantitative, the model of enterprise human resources management in order to provide scientific basis for the correct decision.	advances in Asian social science	(16)
Theoretical System Dynamics Modeling for Taiwan Pediatric Workforce in an Era of National	Mei-Hwan Wu	2013	43 years	health workforce	Taiwan	Over the past decade in Taiwan, the child-to-pediatrician ratio has strongly correlated with infant mortality rates. Currently at 1742:1,	Pediatrics and Neonatology	(17)

Health Insurance and Low Birth Rates						the model suggests a ratio of 1009:1 based on Millennium Development Goals, projecting a decreasing trend in pediatric workforce and potential supply-demand discrepancies post-2017, which policy incentives could mitigate.		
Forecasting the need for medical specialists in Spain: application of a system dynamics model	Patricia Barber	2010	18 years	43 medical specialties	Spain	In the baseline model with moderate population growth, the shortage of medical specialists is projected to increase from 2% currently (2800 specialists) to 14.3% by 2025 (almost 21,000), with specialties like Anesthesiology, Orthopedic and Traumatic Surgery, Pediatric Surgery, and others facing the most significant deficits in the medium term.	Human Resources for Health	(18)
Forecasting the regional distribution and sufficiency of physicians in Japan with a coupled system dynamics—geographic information system model		2017	period 2010–2030 in 5-year increments.	practicing physicians	Japan	Forecast suggests physician shortage in Hokkaido Prefecture will largely be resolved by 2020. Based on current policies, four SMSAs in Hokkaido are projected to continue experiencing physician shortages beyond that date, with only one SMSA expected to remain understaffed in 2030.		(19)
Forecasting the absolute and relative shortage of physicians in Japan using a system dynamics model approach	Ishikawa T	2013	2008 until 2030	all clinical physicians and OB/GYN specialists.	Japan	The forecast predicted an increase in the number of physicians from 2008 to 2030, with the shortage expected to be resolved by 2026 for all clinical physicians.	Human resources for health	(20)

Strategic Workforce Planning in Healthcare: A multi-methodology approach	Willis G	2018	Horizon 2035	Workforce for healthcare at the national level	England	This paper outlines contributions in healthcare workforce planning models using System Dynamics, integrating multiple methodologies for strategic planning, and facilitating modeling through workshops.	European Journal of Operational Research	(21)
System dynamics modeling for general practitioner workforce forecasting in Kazakhstan	Koichubekov	2021	12 year	general practitioner workforce	Kazakhstan	All three scenarios indicate that the current number of graduated General Practitioners will exacerbate the shortage of primary care physicians. In general, the shortage can exceed 2,000 in a population of 18.3 million (2018).	Annali di igiene : medicina preventiva e di comunita	(22)
A dynamic, multi-professional, needs-based simulation model to inform human resources for health planning	MacKenzie A	2019	4 year	Nurses, including nurse practitioners (NPs) and registered nurses (RNs); Physicians—including family physicians (FPs), pediatricians, and psychiatrists; Psychologists; Social workers.	Canada.	The model explicitly identifies two key planning parameters in HRH: distribution of work among different types of HRH and level of clinical focus. These parameters, previously overlooked in HRH literature, greatly impact planning scenarios. Failure to consider them can lead to under- or over-estimation of HRH gaps.	Human Resources for Health	(23)

Modelling the future of the Canadian cardiac surgery workforce using system dynamics	Vanderby	2014	2008-2030	cardiac surgery workforce	Canadian	Simulation results show a cardiac surgeon shortage in Canada by 2025, depending on their response to demand-supply changes. If residency enrollment rates remain at 2009 levels, a significant shortage may develop, reaching nearly 50% of the Canadian cardiac surgical workforce.	Journal of the Operational Research Society	(24)
A retrospective of System Dynamics based workforce modelling at the Centre for Workforce Intelligence	Cave S	2016	2010-2016	health and social care workforce	England	The Centre for Workforce Intelligence (CfWI) has also improved its workforce planning framework through enhancements in elicitation and scenario generation, which are detailed in separate technical papers.	n34th International Conference of the System Dynamics Society	(25)
Comparing health workforce forecasting approaches for healthcare planning: The case for ophthalmologists	Ansah J	2017	2012-2040	ophthalmologists	Singapore	The needs based approach tends to project the largest number of required ophthalmologists, followed by integrated, utilization based and workforce-to-population ratio approaches in descending order. The four different approaches vary widely in their forecasted workforce requirements and reinforce the need to be discerning of the fundamental differences of each approach in order to choose the most appropriate one. Further, health workforce planning should also be approached in a comprehensive and integrated manner that accounts for	International Journal of Healthcare	(26)

						developments in demographic and healthcare systems.		
How many Medical specialists do Ministry of Health- Sri Lanka need by 2025: Use of system dynamics modelling for policy decisions	De Silva MD	2017	2016 -2025	Medical specialists	Sri Lanka	Results By December 2015 there were 1860 clinician medical specialists with an average age of 46.8 years, in the government hospitals in Sri Lanka. In the surgical group of specialties the Proposed Training Rate is more than Current Training Rate while in Medical and Paediatric groups and in Radiology, Anaesthesiology, Psychiatry, Dermatology and Hematology Proposed Training Rate is less than the Current Training Rate.	Ceylon Medical Journal	(27)
Application of a system dynamics model in forecasting the supply and age distribution of physicians	Relić D	2020	2017-2041	physicians	Croatia	The two scenarios showed that Croatia would not face physician shortage in the future. The scenario 1 projected that Croatia would certainly reach the current European Union (EU) average of 360 physicians per 100 000 inhabitants by 2021, and that this figure would increase to 430 per 100 000 inhabitants by 2041. The scenario 2 suggested a similar trend, with Croatia reaching the current EU average by 2021 and the number of physicians increasing to 451 per 100000 inhabitants by 2041. Both scenarios indicated that the Croatian physicians' age distribution	Croatian medical journal.	(28)

						will recover in favor of younger age groups of specialists.		
How many doctors should we train for Sri Lanka? System dynamics modelling of training needs	De Silva	2017	a period of 15 years from 2017 to 2032	doctors	Sri Lanka	The key output parameters were "percentage need met" and the "doctor to population ratio". At present the doctor to population ratio is 1:671 and 91% of the need has been met. This study shows that currently there is a shortage of doctors in the country. However, the supply will match the need by 2025/26. Increasing the number of doctors, will result in oversupply of doctors towards the latter part of the next decade.	The Ceylon medical journal	(29)
Designing a human resource productivity model with a system dynamics approach in the health sector	Baibordy L	2023	2011-2031	human resource in the health sector	East Azerbaijan province.	Factors influencing human resource productivity in the health sector were labor numbers, education, in-service training, geographical health facility coverage, and staff research. A model was created, validated, and simulated to enhance productivity through scenario analysis, emphasizing dynamic improvements in the sector. Expert input and quantitative relationships were pivotal in model development and testing	International Journal of Nonlinear Analysis and Applications	(30)
Transformation of potential medical demand in China: A system dynamics simulation model	Yu W	2015	2014	patients not seeking medical care	China	Decreasing the number of hospitals, increasing the number of CHSs, and raising the proportion of health insurance compensation would effectively increase the	Journal of Biomedical Informatics	(31)

						transformation of potential medical demand. But currently, changes of the outpatient prices didn't play a role in the transformation of potential medical demand		
An Innovative Interactive Modeling Tool to Analyze Scenario-Based Physician Workforce Supply and Demand	Gupta S	2015	2015	health workforces	USA	A model was built to analyze future pathologist supply and demand trends up to 2030, with a focus on workforce dynamics and financial impacts. It offers quantitative forecasting for various effort areas and can test hypotheses regarding pathologist workforce requirements. The model introduces a new pathology practice taxonomy that considers both population-wide and individual patient work, highlighting the need for physician adaptation to evolving payment models.	Academic pathology	(32)

Based on the findings of this study (Tables 2 and 3), exogenous variables in the healthcare domain are classified into two main categories: demographic variables and health system variables, comprising 8 sub-categories and 32 codes. Indigenous variables are categorized into two main groups: educational and variables, and workforce variables, encompassing 8 sub-categories and 45 codes, which will be further detailed below.

EXOGENOUS VARIABLES

External or exogenous variables in healthcare systems are factors that influence community health or the healthcare system but are not entirely under the direct control of healthcare human resource management. These variables are divided into two primary categories: demographic variables and health system variables. Considering these variables in the analysis and assessment of healthcare human resources is essential, as they can help identify external factors and unforeseen interferences affecting the healthcare workforce, thus enabling effective management. Based on conducted studies, eight sub-categories have been identified related to external variables, including demographics, health and needs, sector performance, service provision (prevention level), financing, facilities, and capacity (training capacity).

POPULATION

Population variables are recognized as factors that directly influence health based on the population and its characteristics. These variables can be classified into various forms; in this study, demographic characteristics and health needs are categorized as sub-categories. According to the findings, population size, sex distribution, and geographical location are the most significant factors affecting physician estimation within the healthcare system. Population size can heavily influence physician estimation. For instance, regions with a larger elderly population may require physicians specializing in age-related diseases. Additionally, disparities in gender distribution may indicate the need for specialized healthcare services tailored to both women and men. Healthcare and treatment needs may vary between genders, necessitating tailored physician estimation strategies. The geographical location of populations also significantly impacts physician estimation. Remote or underserved areas lacking adequate healthcare access may require an increased number of physicians and roles to meet local health needs.

HEALTH AND NEEDS

Based on the World Health Organization framework, healthcare system variables were categorized into five sub-categories: performance, service provision, sector financing, and facilities, comprising a total of 23 codes. The nature and type of sector in which general practitioners operate are crucial factors influencing their estimation, extensively discussed in numerous studies. Furthermore, regarding healthcare functions, efficiency and productivity are the primary factors highlighted in various studies. Research has also demonstrated that financial mechanisms within the healthcare system are critically important, particularly in determining physicians' income and the extent to which the services they provide are covered by insurance.

TABLE 2: EXOGENOUS VARIABLES FOR ESTIMATION BASED ON SYSTEM DYNAMICS

Categories	Sub-categories	Codes	Description of the Codes	References
population	demographic	Population size	a key demographic variable that directly influences the healthcare system's workforce estimation. It considers the total number of individuals within a population and serves as a fundamental factor in predicting healthcare needs	(19-21, 24)
		sex distribution	the gender composition of a population and its role in influencing healthcare workforce planning and physician estimation within the healthcare system. Variations in gender distribution among populations can indicate the need for specialized healthcare services tailored to men or women.	(20, 21)
		age distribution	the demographic composition of a population based on various age groups and its critical influence on the demand for healthcare services and workforce planning. Age distribution significantly affects the estimation of physicians, as varying age groups have diverse healthcare needs.	(15, 20, 21, 32)
		sub-populations	specific demographic subgroups within the broader population that influence healthcare needs and resource planning. These subgroups may be defined based on characteristics such as ethnicity, socio-economic status, or other relevant factors. Understanding sub-populations is critical in workforce estimation, as they often exhibit distinct health behaviors, disease patterns, and care requirements.	(17, 32)
		Population Exchange Rate	the dynamics of migration and demographic shifts between regions or countries, influenced by factors such as war, economic opportunity, or environmental changes. Unlike traditional currency exchange rates, this	(21)

			concept focuses on how populations move or are relocated, often under governmental policies or historical circumstances.	
	Health and needs	health literacy	the ability to access, understand, evaluate, and use health information to make informed health decisions. It includes skills such as reading medical texts, interpreting numerical data (like medication dosages), and navigating the healthcare system. High health literacy leads to better health outcomes and increased adherence to treatment, while low health literacy can cause misunderstandings about health information and poorer health management.	(15)
		the population with diseases	groups of individuals within a specific geographic area or community who are affected by various health conditions or illnesses. This concept is often used in public health to study disease prevalence, distribution, and the associated risk factors, in order to inform healthcare strategies, resource allocation, and interventions aimed at improving health outcomes and reducing the burden of disease.	(26, 32, 33)
		the unmet health needs of the population	healthcare demands that are not adequately addressed within a population. This includes individuals who are unable to access necessary medical services due to barriers like geographical constraints, economic limitations, or insufficient healthcare resources. Addressing unmet health needs is crucial for aligning the healthcare workforce with the actual demands of the population. .	(15, 16, 19, 21, 23, 26, 27, 30)
health systems	sector	health sector growth in the country	the expansion of healthcare services through the establishment of new facilities, adoption of technologies, and increased capacity. This growth drives	(27)

			demand for a larger, specialized medical workforce, influenced by policies and initiatives from health ministries and governing bodies.	
		Number of Doctors in the Ministry of Health	the total number of physicians employed by a nation's Ministry of Health. This metric indicates the capacity of the public healthcare system and helps assess the distribution and availability of medical personnel for delivering government health services, aiding in workforce planning to meet healthcare needs.	(29)
		Number of doctors in University academic staff (medically qualified)	the count of medically qualified individuals working as educators in universities, crucial for training and developing healthcare professionals.	(29)
		Number of Doctors in Full time Private sector	the count of licensed doctors working full-time in private healthcare facilities, contributing to non-government medical services.	(29)
	performance	Level of access to excess services	the extent to which individuals can access healthcare services beyond their essential needs.	(30)
		Efficiency(training efficiency)	the effectiveness and resource optimization in medical training programs, impacting workforce supply and healthcare outcomes.	(16, 19, 22, 26, 30)
		the effectiveness of population health interventions	the impact of public health strategies aimed at improving overall community health outcomes.	(15)
		Patient Protection and Affordable	policies or measures aimed at improving healthcare accessibility, affordability, and quality for the population.	(32)
		satisfaction	the level of patient satisfaction with healthcare services, reflecting care quality and overall experience.	(30)
		utilization	the use of healthcare services, such as outpatient visits and hospital admissions, influenced by access, availability, and workforce quality.	(32, 33)
		changes in workforce productivity	variations in healthcare workforce efficiency influenced by training, workload, and systemic factors.	(21, 23, 24, 30)

	Service provision (prevention level)	people's self-care	individuals managing minor health issues and adopting preventive health behaviors to reduce healthcare demand.	(15)
		primary care pediatricians.	pediatricians specializing in providing basic healthcare, early intervention, and preventive care for children.	(17)
		visits	description of the code people's self-care. Write the description very, very briefly	(26)
		size of the labour market in non-hospital care	the workforce size specific to non-hospital healthcare settings, highlighting its capacity and distribution.	(15)
		size of the labour market of hospital care	the workforce scale dedicated to hospital settings, reflecting personnel capacity in providing inpatient and specialized medical services.	(15)
		Published scientific-research articles	scholarly articles that contribute to academic knowledge and support evidence-based practices in the healthcare domain.	(20, 30)
		technologies	innovations and advancements, such as medical devices or telemedicine, that influence healthcare delivery and workforce dynamics.	(25, 32)
		Rate of presentation of innovative and pragmatic projects	the frequency of introducing practical and groundbreaking initiatives in the healthcare system.	(20, 30)
	financing	resources	the financial, infrastructural, and human assets essential for healthcare delivery, training, and workforce retention.	(31)
		income	the financial earnings of healthcare workers, influencing workforce retention and overall healthcare system sustainability.	(33)
		rates of insurance across population groups	the distribution and coverage levels of health insurance among different demographic or socioeconomic populations.	(25, 27, 32, 33)
	facilities provided for the public compared to the expected status		the gap between available healthcare infrastructure and	(30)

		services versus anticipated or ideal levels.	
	current capacity loss rate	the reduction in healthcare system capacity due to factors like workforce attrition, resource constraints, or inefficiencies.	(16, 27)

INDIGENOUS VARIABLES

The term "indigenous variables" refers to factors determined by internal elements of the healthcare system. In this study, education and workforce are identified as two Indigenous variables within the healthcare system. The factor of education has three sub-categories: education level, educational features, and education evaluation. The educational attainment level of personnel can significantly influence the quality of healthcare and medical services provided.

For instance, employees with higher education levels may possess the most current medical knowledge and technologies, potentially leading to enhanced healthcare services. The workforce factor pertains to both the quantity and quality of available personnel. To deliver high-quality healthcare services, the workforce must have the necessary expertise and skills. Furthermore, an adequate workforce is crucial to meet the healthcare needs and demands of society. In this context, five sub-categories, including Demographic, Active Workforce, Labor Market, Growth and Excellence, and Specialty, have been highlighted in relevant studies. Human resource training and workforce development, as two intrinsic variables, can directly and indirectly influence the quality, accessibility, and efficiency of the healthcare system. Therefore, healthcare managers and decision-makers must prioritize the management and development of these two variables to ensure the enhancement of overall healthcare performance and services.

Education

The variable of human resource training and education plays a vital role in enhancing the quality of healthcare and medical services provided by general practitioners. In this study, 13 codes were identified that relate to the specialized and scientific education a general practitioner may acquire. Among the factors associated with the sub-category of education level, residency training has been emphasized in numerous articles as a significant determinant influencing the performance of healthcare personnel. Studies have examined the transition of general practitioners into specialized and residency training levels to understand their impact. Within the sub-category of educational features, the duration and stages of training have been recognized as key factors in human resource development in many articles. Additionally, enrollment criteria and methods have garnered significant attention in educational evaluations across various studies. Furthermore, the gender and age of physicians have been referenced in several studies as well.

Workforce

The workforce factor in the assessment of general practitioners encompasses a range of elements that influence the selection, training, development, and ranking of these professionals. These elements include demographic characteristics of the active workforce, labor market dynamics, considerations of growth and excellence, and specialization. They are crucial factors in evaluating general practitioners within the medical field. Given the substantial impact of medical services on community health, effective strategies for attracting, retaining, and enhancing skills and knowledge among general practitioners to address societal needs are critically important. In this study, 32 codes were identified related to workforce factors, focusing on aspects such as the utilization of trained personnel, their full-time engagement, and their active participation in healthcare delivery. Key elements within the human resource market include workforce demographics, dynamics of workforce size, attrition rates including migration and retirement, and the effects of retirement and migration on the workforce system. Within the specialty sub-category, most studies have focused on the role of general practitioners, with fewer investigations into specialized areas.

Table 3: Indigenous variables for estimation based on system dynamics

Categories	Sub-categories	Codes	Description of the codes	References
Education	Education level	General educational level	the overall academic attainment of individuals, which influences their qualifications and readiness for further training.	(30, 33)
		Student	individuals enrolled in medical education programs, representing the initial stage of the healthcare workforce pipeline.	(24)
		Training personnel number	the count of individuals undergoing training programs aimed at entering or advancing within the healthcare workforce.	59, (18, 19)
		Graduate students number	the count of students who have successfully completed their higher education programs, particularly in medical and healthcare-related fields.	(19, 23, 24), 58, ,
		Past graduation numbers	the count of individuals who have completed educational or training programs in the past.	(20)
		Residencies	postgraduate training programs for medical graduates specializing in specific fields to enhance their skills and qualifications.	57, ,(17, 19, 24)
		Fellowship & subspecialty	advanced medical training programs undertaken after residency to obtain expertise in specialized areas of practice.	(17, 24)
	Educational features	Education attrition	the dropout rates or discontinuation of students from educational or training programs.	(23)
		Stages and duration of the training	dropout rates in training programs, while "stages and duration of the training" pertain to the distinct phases and timeframes of medical education.	(23, 24, 27, 28)
	Education evaluation	The number of enrolled	the count of individuals registered in educational or training programs.	(23, 24, 28)
		Entrants	individuals newly admitted into educational or training programs.	(23)
		National exam	standardized exams that assess qualifications for entry into medical training or licensing.	(19, 20)

		Rates of passing	the proportion of candidates successfully passing national or other relevant healthcare exams.	(19)
Workforce	Demographic	The age medical population	the age distribution of individuals in the medical workforce.	(19)
		Sex medical population	the gender composition within the medical workforce.	(19)
	Active workforce	The current number of members of that profession currently licensed to practice	the total currently certified professionals eligible to practice in their field.	(23)
		Unemployed	the number of healthcare professionals not currently engaged in any active employment within the medical workforce.	(24)
		Active employees	healthcare professionals currently engaged in the workforce.	(30)
		Full-time	healthcare professionals engaged in full-time work within the medical workforce.	(18)
		Rate of staying	the retention rate of healthcare professionals within the workforce.	(19)
		Working pressure on staff in the healthcare system	the workload and stress levels healthcare professionals experience in their roles.	(30)
	Labor market	The number of new providers entering that stock (either as new graduates or in-migrants from other jurisdictions)	the influx of healthcare professionals, including newly graduated or migrating providers, entering the workforce.	(23)
		Population workforce size	the total number of individuals working in the healthcare sector.	(24, 30)
		Exits from the health workforce due to another reason	workforce departures caused by factors other than retirement or migration.	(22, 23)
		Immigration rate	the rate of healthcare professionals moving across borders or jurisdictions.	(18, 22, 23)
		Rates of retirement	the proportion of healthcare workers leaving the workforce due to retirement.	(18-20, 22, 30)
		Workforce Demand	the need for healthcare professionals based on population health requirements and service demand.	(21)

		Workforce Supply	the availability of healthcare professionals to meet system demands.	(21)
	Growth and excellence	The actual capacity value and the difference between the expectation values	the comparison between a workforce's current capacity and the expected or required capacity.	(16, 29)
		Training rate	the pace at which healthcare professionals undergo training within a specific timeframe.	(16, 27)
		Career option rate	the frequency at which individuals select specific career paths in healthcare.	(20)
		Roles	the specific functions or responsibilities assigned to healthcare professionals within the workforce.	(23, 32)
		Participation	the active involvement of healthcare professionals in delivering services within the workforce.	(23)
		Norms	the standard practices and behaviors that influence staff motivation and applied skills in the healthcare workforce.	(27)
		Staff motivation	factors that inspire and influence healthcare staff to achieve their goals and enhance performance.	(30)
		Level of applied skills in human resources	the practical competencies demonstrated by healthcare personnel in their roles.	(30)
	Specialty	Change of specialty	the transition of healthcare professionals from one medical specialty to another.	(20)
		Consultants	specialized healthcare professionals offering expert advice and services in their respective fields.	(29)
		Dentists	healthcare professionals specialized in oral health and dental services.	(19)
		Pharmacists	healthcare professionals specializing in the preparation and dispensing of medications.	(19)
		Physicians	medical professionals responsible for diagnosing and treating illnesses to ensure patient health.	(19, 20, 29, 30)

		Specialty	The code "specialty" refers to a specific field of medical practice chosen by healthcare professionals.	(20, 27)
		Surgeon	medical professionals specializing in performing surgical procedures to treat injuries, diseases, and disorders.	(24)
		Hospital staff	healthcare professionals providing medical and support services within a hospital setting.	(17)
		Other specialty	medical fields outside the primary categories, encompassing diverse specialized practices.	(19)

DISCUSSION

This scoping review offers a comprehensive framework of key variables analyzed in studies modeling the dynamic system for forecasting the necessary medical workforce, including GPs. Identifying these variables is a crucial step toward creating accurate and dynamic models to predict future healthcare workforce requirements.

EXOGENOUS VARIABLES

Population

Demographic factors emerge as fundamental drivers of healthcare needs, influencing both the demand for and the allocation of the medical workforce. Population size, growth trends, and structural characteristics such as age and gender distribution are pivotal in workforce planning [32]. For instance, an aging population necessitates a stronger focus on geriatric care and chronic disease management, while diverse demographic subgroups may require culturally adapted care to ensure equitable outcomes [34, 35]. Furthermore, geographical factors—such as urban/rural distribution and access to education and healthcare facilities—play a critical role in shaping the accessibility and availability of healthcare services. Addressing these disparities is essential for ensuring the equitable distribution and strategic allocation of the workforce across various regions [36].

Health literacy levels within the population further underline the demand for healthcare services [37]. Higher health literacy fosters better self-care practices, improves adherence to treatments, and enhances the effectiveness of preventive measures, reducing dependence on healthcare resources. Conversely, lower health literacy necessitates additional resources and specialized communication strategies.

In addition, the prevalence and distribution of diseases or specific health conditions directly influence the composition and skill set required of the healthcare workforce [38, 39]. For example, populations with significant infectious disease burdens demand public health interventions and specialized skills among healthcare providers, emphasizing the need for targeted workforce strategies.

Diverse healthcare needs, ranging from preventive to rehabilitative care, underline the necessity of a dynamic workforce capable of addressing multifaceted health demands [10]. Conducting assessments of population health requirements ensures alignment between medical workforce supply and healthcare service demand. Such evaluations foster a better understanding of resource needs and guide planning efforts for preventive, therapeutic, and rehabilitative care.

Health Systems

The factors influencing the healthcare system provide a multifaceted perspective on the variations impacting the demand and utilization of the medical workforce. The growth of the healthcare sector has been notably stimulated by the establishment of new medical facilities, advancements in technology, and enhanced service capacity. These developments have significantly increased the need for a larger and more specialized medical workforce to manage the complexity of modern healthcare systems [40, 41]. Moreover, the role of health ministries and governing bodies remains pivotal in setting policies and standards, which define the framework within which workforce requirements are determined. These organizations directly influence healthcare service accessibility and efficiency, further shaping the demand for medical professionals. The formulation of clear policies by these bodies ensures that both public and private healthcare institutions can strategically address workforce challenges while aligning with national and regional health priorities [42, 43].

Access to and the capacity of educational institutions, along with their active faculty members, are critical for the continuous training of a specialized healthcare workforce and for addressing workforce needs. The establishment of adequate infrastructure, including a sufficient number of medical schools and well-equipped universities supported by experienced and committed educators, facilitates the development of a skilled next generation of physicians [44]. These educational systems form the backbone of human resource development in healthcare, ensuring a steady supply of qualified professionals to meet growing societal demands.

The private healthcare sector, in addition to government facilities, plays a significant role in workforce dynamics. Its expansion has heightened the need for specialized workforce strategies to meet increased demand. For instance, Sri Lanka provides a notable example, where the private healthcare sector has alleviated skilled workforce shortages since the 1980s. Private hospitals in Colombo, despite operating in a monopolistic framework, have significantly contributed to addressing such shortages by attracting and retaining skilled healthcare professionals who might have otherwise pursued opportunities abroad [29].

Comprehensive workforce management also requires maintaining equitable access to healthcare services and monitoring accessibility rates to specialists, as these are key performance indicators directly linked to workforce distribution [45]. The quality and effectiveness of medical education programs—measured through graduation rates, efficiency, and economic feasibility—underscore how vital these factors are in shaping the healthcare workforce [46]. Ensuring alignment between training programs and workforce needs will enhance not only supply but also the overall efficiency of resource use within the sector.

Healthcare interventions and service delivery align closely with the competencies of the current workforce. These elements contribute directly to achieving societal health outcomes and ensuring that workforce skills meet population needs [47]. Investments in capacity building, ongoing training, and competency monitoring improve service efficiency and lay the foundation for continuous improvement. Collaborative efforts between educational institutions and healthcare providers further validate workforce competencies, ensuring that training aligns with real-world requirements [47]. Furthermore, emphasizing care quality, patient safety, and cost-effectiveness often necessitates additional workforce-centric interventions, such as targeted education or incentive-based policies.

Patient satisfaction serves as an indirect indicator of workforce performance, reflecting crucial aspects like communication, care quality, and the overall patient experience [48]. Utilization rates of healthcare services, such as outpatient visits, hospital admissions, and preventive care, provide further insights into workforce supply and demand imbalances, highlighting areas of shortage or overcapacity [49]. Encouraging population self-care can relieve pressure on the healthcare workforce while promoting preventive practices to reduce demand for medical services.

Primary care accessibility is another vital consideration. The distribution of primary care physicians [22], including pediatricians, ensures basic healthcare, enables preventative efforts, and reduces the need for specialized and emergency services. Similarly, the capacity and distribution of non-hospital healthcare facilities—such as community

health centers and clinics—affect workforce demand by diversifying healthcare environments. Hospitals also require a greater skilled workforce for specialized treatments and complex care delivery.

Research activities and the adoption of new technologies represent transformative forces within the healthcare landscape. Innovations such as telemedicine [50] and digital health tools [51] redefine workforce roles, expand skill requirements, and shift distribution strategies. Establishing a forward-thinking, innovative ecosystem fosters [52] continuous adaptation, creating long-term workforce needs that emphasize the dynamic evolution of skills.

Finally, financial resources, infrastructure, and human resource availability significantly influence an institution's ability to train, employ, and retain skilled professionals. Socio-economic factors, such as income levels, healthcare affordability, and socio-economic status, drive demand for services, shaping workforce needs. Furthermore, the coverage of health insurance schemes impacts care accessibility patterns, ensuring sustainable resource use while influencing workforce allocation.

INDIGENOUS VARIABLES

Education

The identified educational factors encompass a comprehensive array of diverse stages and processes within the medical education, which are essential components for accurately modeling the healthcare workforce supply [53]. Variables such as the number of enrolled students, dropout rates, postgraduate career pathways, and licensure attainment act as critical indicators for estimating the specialized healthcare workforce [53]. By explicitly considering potential dropout rates at various stages, through metrics such as dropout rates and pass rates in examinations, modeling capabilities for estimating effective outputs entering the workforce are significantly enhanced. This level of detail addresses the limitations of some previous workforce models that relied on oversimplified assumptions about educational dynamics within the training.

The inclusion of a temporal dimension—such as the duration of training courses—in workforce supply models is crucial for valid predictions regarding the supply of general practitioners in the healthcare system [54, 55]. Accounting for the time intervals between a student's initial admission and their final licensing as specialists allows for a more accurate representation of the medical education process [55]. Unlike models that primarily focus on macro metrics such as graduation rates, the identified educational factors provide a more granular and phased representation of the medical education process.

This level of detail holds considerable value, as it takes into account the complex dynamics and interactions among various components of the medical education system over time. Incorporating a systemic dynamic approach enables a comprehensive and evolving understanding of how educational factors influence the healthcare workforce [55]. In contrast to models that focus solely on overall educational attainment, this systemic approach integrates feedback loops and intricate interactions among components, providing a more realistic and actionable depiction of medical education dynamics and its downstream effects on the supply of general practitioners.

Such an approach ensures that workforce supply models are not only evidence-based but also adaptive, permitting policy interventions to address emerging workforce challenges. The focus on nuanced variables enhances planning, making it possible to better sync the medical education with future workforce needs and healthcare demands.

Workforce

The factors related to the healthcare workforce encompass a broad range of variables that collectively illustrate the intricate dynamics shaping both the status and future outlook of the medical workforce. Demographic variables, such as age and gender composition, serve as pivotal indicators for predicting retirement rates, labor force participation rates, and workforce alignment with population age structures. Such demographic shifts profoundly influence supply-demand dynamics. For example, women in medical professions often exhibit preferences for part-time arrangements or extended maternity leave compared to their male counterparts, underscoring the significance of designing workforce planning and retention strategies that address these unique needs and support work-life balance [56, 57].

Variables tied to the licensed and active workforce immediately reflect current supply capacity. However, additional factors, such as unemployment rates and workload pressures, often uncover imbalances between labor supply and demand. For instance, an oversupply of surgeons has led to challenges, including unemployment and unfilled residency positions, triggering debates about potentially reducing training opportunities in specific specialties. Workload-related aspects, such as job fatigue and volume, also have a pronounced influence, as they directly impact workforce performance, employee retention, and the overall sustainability of the workforce [24, 58].

Labor market indicators, such as the influx of new graduates, domestic and international migration rates, and workforce attrition due to emigration or retirement, represent crucial metrics for forecasting labor supply. These metrics offer critical support for mathematical models aimed at analyzing workforce inputs and outputs over time. Accurate forecasts grounded in a thorough analysis of these indicators are essential for long-term workforce planning, economic projections, and evidence-based policy formulation [18, 22].

Dynamic system modeling further highlights influential factors such as professional development, competency alignment, and the identification of skill gaps. These elements reinforce the necessity of closing the gap between individual abilities and workforce expectations. Addressing training opportunities, career pathways, and employee motivation forms the backbone of strategies to nurture a skilled and adaptable workforce [16, 59]. This comprehensive approach enables the workforce to respond effectively to the evolving healthcare demands of diverse populations.

In addition to broader workforce variables, dynamic system models include specialty-specific considerations encompassing physicians, surgeons, dentists, pharmacists, and counselors, thereby enabling a more precise understanding of workforce composition and skill distribution. For instance, in Japan, it has been observed that specialty choices among general practitioners influence labor distribution across various medical fields. Should a significant number of practitioners opt for further specialization, shortages in general physician supply could become exacerbated [20]. By capturing these intricacies, the model reveals areas where shortages or surpluses are likely to arise, informing the development of targeted interventions to balance workforce dynamics effectively.

This in-depth, system-oriented framework offers a highly detailed representation of healthcare workforce challenges, enabling healthcare policymakers and planners to address labor market dynamics comprehensively. The integration of demographic trends, labor market variables, and specialty-specific factors into these models supports robust, data-driven decision-making and planning for sustainable workforce development.

STUDY LIMITATIONS AND STRENGTH

The current study represents one of the pioneering comprehensive examinations that employ a dynamic systems approach to investigate the key variables for forecasting both general and specialist physicians. It aims to aid researchers in identifying state variables and rates as essential steps in the dynamic systems approach, despite the existence of numerous studies focused on physician forecasting.

Regarding the limitations of this study, it is possible that related research in non-English languages exists, which was not included due to the criteria for data input and output. Various models and frameworks may also be available for categorizing the findings of this study, which future research could utilize. The primary focus of the current research has been on extracting key variables for physician forecasting and has not explored other steps in the dynamic systems approach to physician forecasting, which future studies could investigate.

CONCLUSION

In contrast to older models that depend on general figures or fixed assumptions, the factors considered within the new framework of system dynamics provide a more comprehensive representation of the healthcare workforce. This scoping review, which adopted a systems dynamics approach, provides a comprehensive map of the key variables influencing

the estimation of general practitioners' workforce and organizes them into two main categories: "exogenous" (demographic and health system-related) and "endogenous" (education and human resources). Focusing on general practitioners revealed that accurate estimation of their supply and demand, particularly in the context of structural population changes, disease burden, financial shifts, and advancements in health technologies, is crucial for accessibility, continuity of care, and the responsiveness of the frontline health system.

The findings highlight that valid modeling and effective policymaking are not feasible without considering the concurrent dynamics of the supply pathway (training capacity and efficiency, stages and duration of training programs, dropout rates, entry into the workforce, migration, retirement, and retention), the demand pathway (age-sex population structure, unmet needs, utilization patterns), and the functional characteristics of the health system (geographical distribution, skill mix, productivity, payment mechanisms and insurance coverage, private sector capacity, and primary care level). The framework derived from this study can serve as a minimum list of variables for developing dynamic models of general practitioners, reducing the risk of reliance on oversimplified assumptions or static macro-level indicators.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Ethics Committee of Kerman University of Medical Sciences (KUMS) with the Approval ID IR.KMU.REC.1403.045.

AVAILABILITY OF DATA AND MATERIAL

If requested by the authors for valid and logical reasons, all datasets analyzed during the current study are available upon request.

COMPETING INTERESTS

The authors declare that they have no conflict of interest.

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AUTHORS' CONTRIBUTIONS

MI and MHM conducted the search and retrieval of resources, data collection, and its coding; AAH assisted in data analysis; MRA proposed the search strategy, subject, and study design. All authors have read and approved the final version and are responsible for the final content of this article.

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A BIBLIOMETRIC ANALYSIS OF HOSPITAL FINANCIAL PERFORMANCE: EMERGING TRENDS AND FUTURE DIRECTIONS

Wingghayarie Patra Gandhi*, Firman Pribadi

Master of Hospital Administration, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

Correspondence: wingghayariepg@gmail.com

ABSTRACT

BACKGROUND

The financial performance of hospitals significantly influences the quality and sustainability of healthcare services, particularly amid rising operational costs and evolving healthcare regulations. While various financial metrics have been studied, there remains a lack of comprehensive bibliometric analyses that map the growth, emerging themes, and future research directions in this field. This study aims to fill that gap by examining the development and patterns of hospital financial performance research.

METHODS

A bibliometric analysis was conducted using the SPAR-4-SLR protocol on 2,387 publications retrieved from the Scopus database, spanning from 2014 to October 12, 2024. Bibliometric techniques such as co-authorship, keyword co-occurrence, and citation analysis were performed using VOS viewer to identify research trends, leading contributors, and thematic clusters.

RESULTS

The analysis revealed a steady increase in publications from 2014 to 2021, peaking at 341 papers. A slight decline in subsequent years is likely due to indexing delays, not reduced research activity. Thematic clustering identified four main areas of focus: (1) hospital, (2) COVID-19, and (3) healthcare. In recent years, additional attention has been given to emerging themes such as health equity, access, and the application of artificial intelligence. These findings suggest a dynamic and evolving research landscape that reflects broader shifts in healthcare priorities.

CONCLUSION

Research on hospital financial performance has expanded notably over the past decade. The COVID-19 pandemic exposed financial system vulnerabilities, shifting research priorities. The United States remains the leading contributor to global output in this field. The identified themes highlight both established and emerging priorities that are likely to shape future inquiry. These insights are essential for informing hospital administrators, policymakers, and healthcare professionals in developing more resilient and equitable financial strategies and health policies. Continued bibliometric monitoring will be valuable for tracking progress and guiding strategic interventions.

KEYWORDS

hospital financial performance, financial statement, hospital financial standing, bibliometric analysis

INTRODUCTION

Hospital financial performance significantly impacts healthcare quality and sustainability [1, 2]. Hospitals currently encounter escalating operational expenses, rapid changes in healthcare regulations, and increasing patient service demands, presenting challenges in balancing high-quality care and financial sustainability [3, 4]. Consequently, evaluating hospital financial performance is crucial for administrators, policymakers, researchers, and healthcare professionals to enhance the efficacy of policies and practices.

Despite substantial research, there is a gap in bibliometric analyses that systematically outline trends, contributors, and developments in this area. Most studies focus on specific aspects like efficiency, reimbursement, or cost control, limiting a comprehensive view of the literature's evolution and emerging priorities. This gap restricts the identification of knowledge trends and opportunities for collaboration and innovation.

Recent events, such as the COVID-19 pandemic, have further exposed financial vulnerabilities and highlighted the need for adaptable strategies, especially in low-resource settings [5–7]. The pandemic accelerated the adoption of digital technologies, including cashless transactions and digital currencies, which introduced both opportunities and challenges in financial management [8]. Countries with limited infrastructure and regulatory capacity have faced greater difficulties in adapting to such technological shifts, widening the disparity in healthcare system resilience [9].

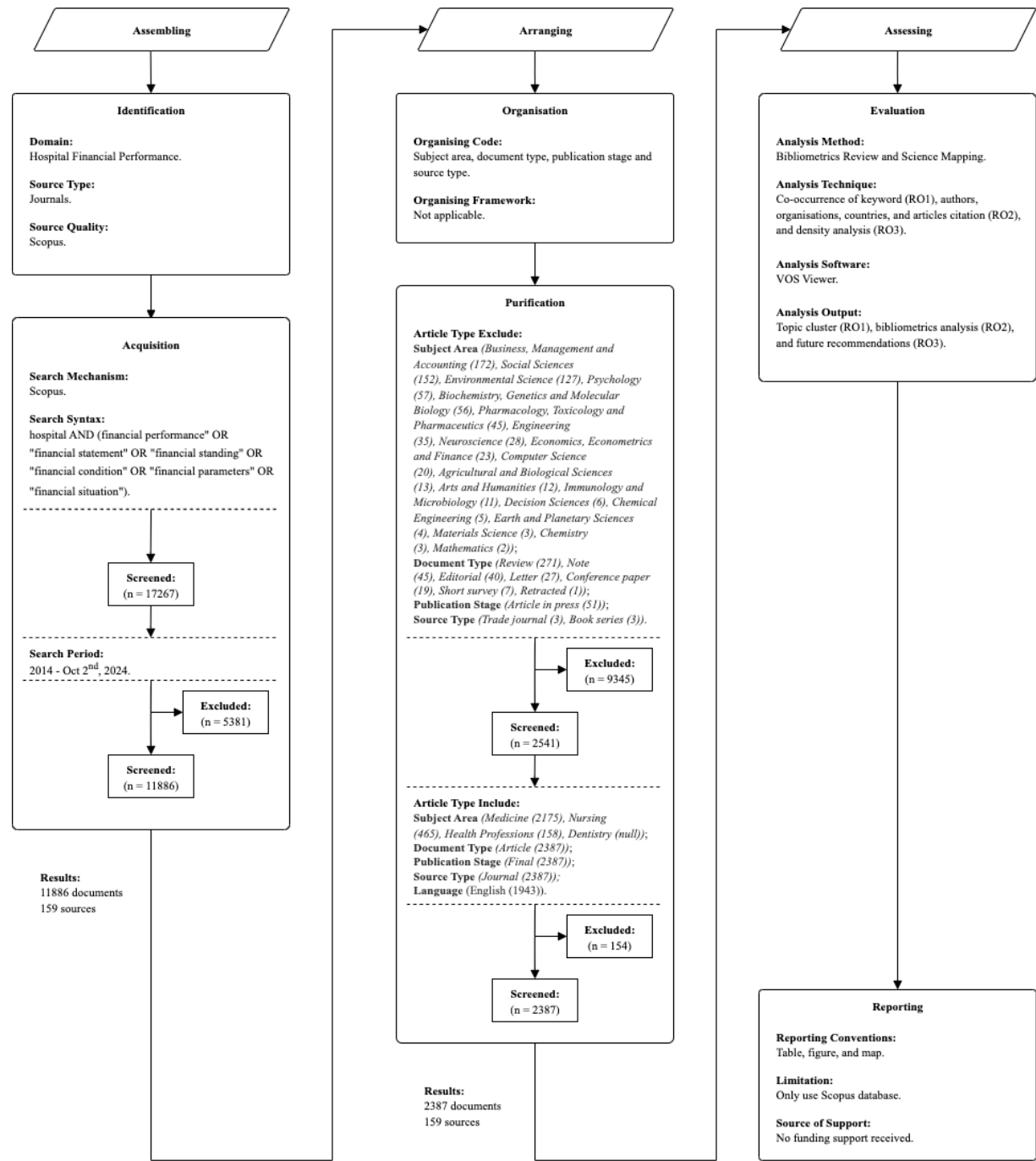
This study applies bibliometric analysis to critically map the existing body of literature on hospital financial performance. Its objectives are threefold: first (RO1), to investigate the publication trends and developmental patterns in this research area; second (RO2), to identify the key contributors, including authors, institutions, and collaborative research networks; and third (RO3), to uncover emerging themes and suggest future directions for research within the domain. Through this analysis, the study aims to address critical knowledge gaps and provide a structured foundation for future academic research and informed financial decision-making in hospital management.

MATERIAL AND METHODS

This study employed bibliometric analysis to investigate trends in hospital financial performance research, employing VOS viewer (<https://www.vosviewer.com/>) for its advanced capabilities in visualising citation relationships, keyword co-occurrence, and thematic research patterns.

To ensure a systematic and replicable review, the SPAR-4-SLR protocol was followed, providing a structured framework for scientific literature reviews. As illustrated in Figure 1, the protocol comprises three key stages: assembling, arranging, and assessing [10]. This approach strengthens the methodological rigour and transparency of the bibliometric study.

FIGURE 1. SUMMARY OF METHODS EMPLOYED IN THE SPAR-4-SLR PROTOCOL.



ASSEMBLING

The research commenced with data acquisition from the Scopus database, selected for its comprehensive coverage of peer-reviewed literature. The data collection period, from 2014 to 12 October 2024, was selected to ensure the inclusion of recent publications that more accurately reflect current developments and challenges in hospital financial performance. The following search query was used: "hospital" AND ("financial performance" OR "financial statement" OR "financial standing" OR "financial condition" OR "financial parameters" OR "financial situation"). This search yielded 11,886 documents from 159 scholarly journals.

ARRANGING

The collected data were refined to retain only articles relevant to medicine, nursing, and health professions, while excluding records from domains such as business, management, and social sciences. This filtering ensured the analysis

focused on clinical and health services research perspectives, rather than administrative or macroeconomic approaches. Inclusion criteria were: (1) subject areas of medicine, nursing, health professions, and dentistry; (2) original research articles; (3) final publication stage; (4) journal as the source type; and (5) English-language publications. Exclusion criteria are presented in Figure 1. The process yielded 2,387 relevant articles from 159 distinct publishers, categorised by subject area, document type, publication stage, source type, publication stage, source type.

Only English-language articles were included, with no filters applied for peer-review status or methodological quality. The reliance on Scopus exclusively may have limited the scope, as relevant publications indexed in other databases may not have been captured. Nevertheless, Scopus was deemed sufficient due to its high-quality indexing and analytical compatibility.

ASSESSING

In the final stage, the analysis involved examining keyword co-occurrence and mapping connections among authors, institutions, and countries. VOS viewer was used to generate network visualisations that reveal relationships within the research landscape and highlight influential contributors. The assessment identified major thematic clusters, citation patterns, research gaps, and emerging areas for future investigation [11–13].

RESULTS

ANALYSIS OF PUBLISHING PATTERNS

From 2014 to 2024 (Figure 2), studies on hospital financial performance indicated a general rising trajectory, marked by considerable annual variability. Publications rose from 129 in 2014 to 185 in 2018, with a notable surge from 2019 to 2021, reaching a zenith of 341 in 2021. A decline occurred, with 324 papers published in 2022 and 282 in 2023. As of October 2024, a total of 224 publications have been recorded; yet this figure remains incomplete. The noted decline post-2021 results from a lag in data updates rather than a reduction in research activities. This trend indicates rising global focus on hospital financial health, driven by structural reforms, health crises, and increased investment in health systems research. Understanding these temporal patterns helps hospital managers anticipate policy shifts or innovations.

FIGURE 2. TRENDS IN THE DISSEMINATION OF RESEARCH ON HOSPITAL FINANCIAL PERFORMANCE AND RELATED DOMAINS: (A) HOSPITAL FINANCIAL PERFORMANCE, (B) HEALTHCARE COST MANAGEMENT, AND (C) HEALTH ECONOMICS (2014–2024).

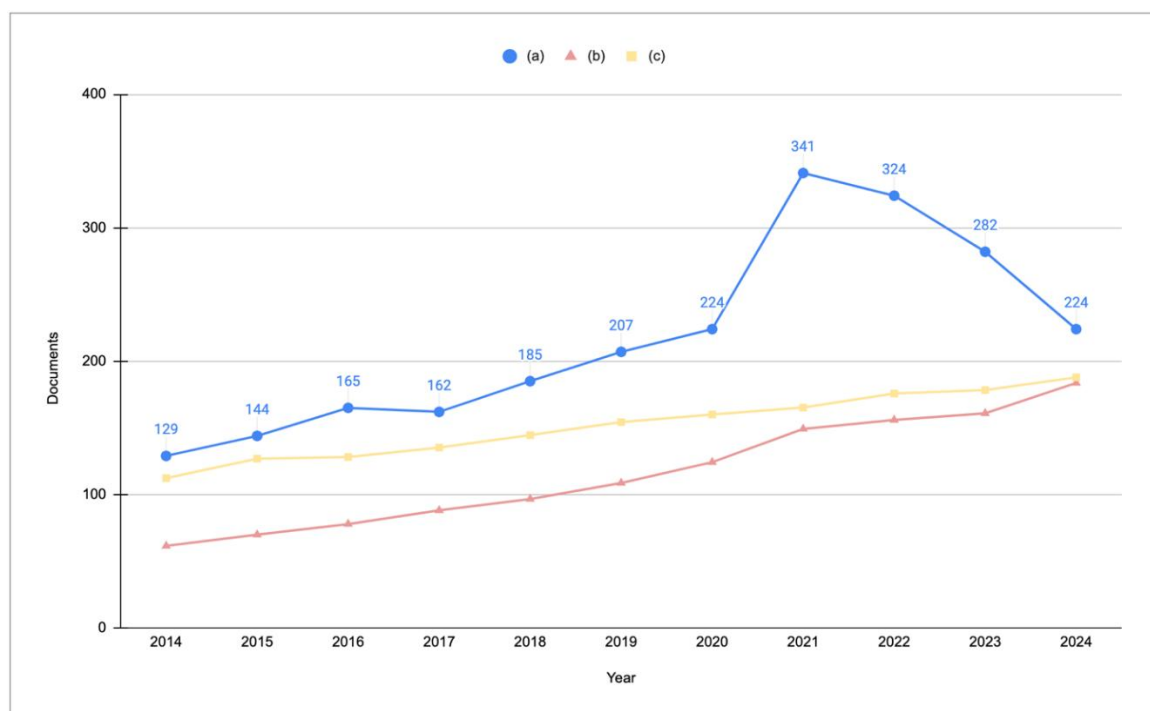
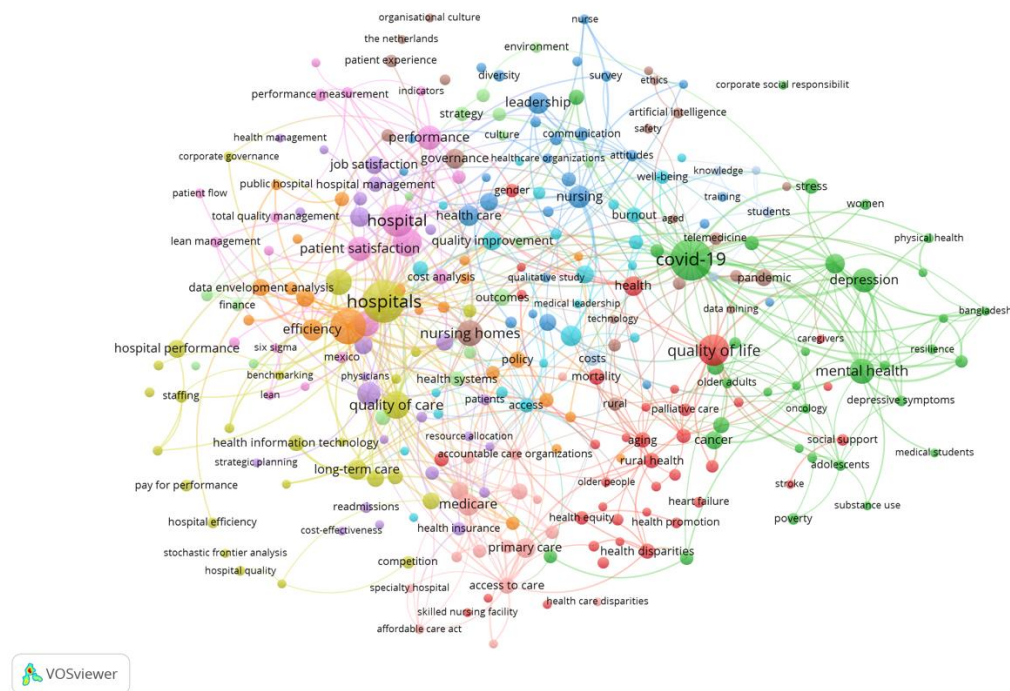


FIGURE 3. RESULTS FROM THE CO-OCCURRENCE KEYWORD ANALYSIS.



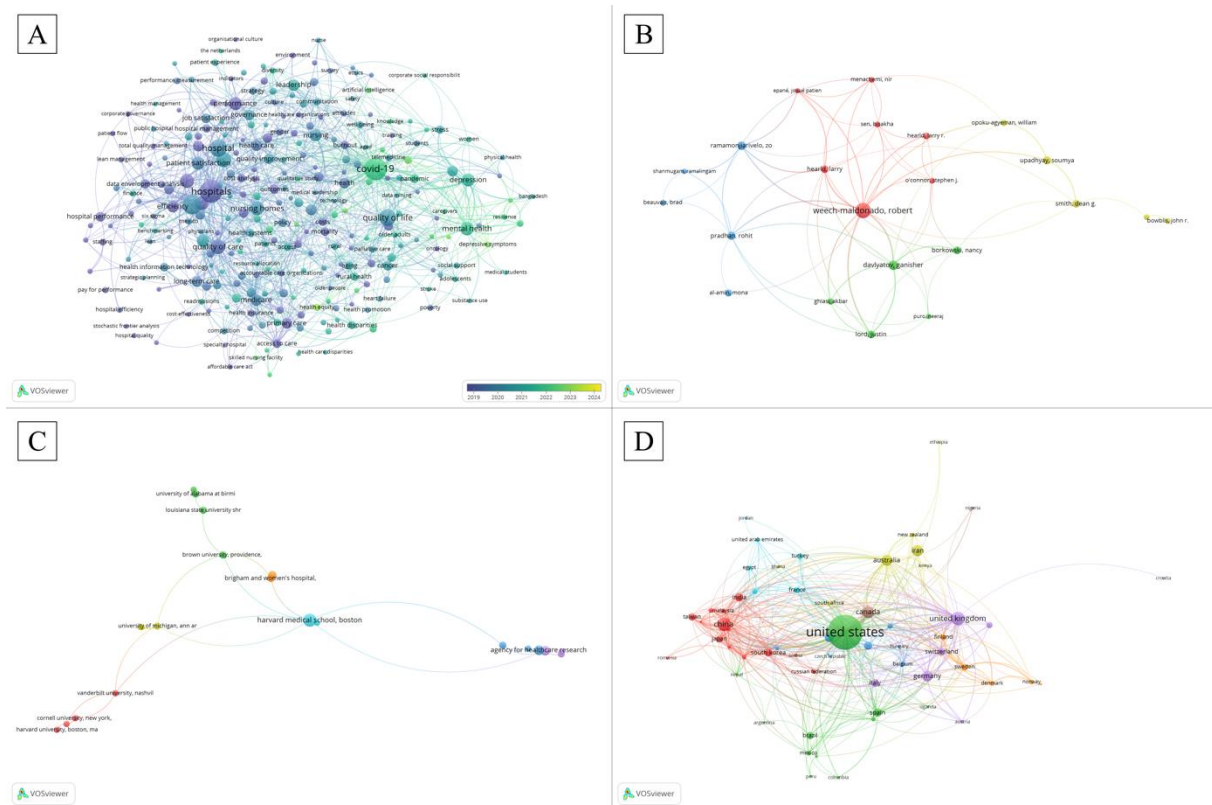
Common research areas

A keyword co-occurrence analysis identified major thematic clusters influencing hospital financial performance. Key themes included financial sustainability, efficiency, quality of service, and patient satisfaction, each closely tied to healthcare outcomes and hospital management. Research on financial sustainability often intersected with reimbursement policies, while service quality was tied to patient safety, satisfaction, and accreditation.

The impact of the COVID-19 pandemic was evident through emerging keywords such as “COVID-19,” “telemedicine,” and “mental health,” highlighting focus on remote care and staff-patient well-being. Workforce stability, technological innovations, and policy reform emerged as dominant topics, driven by staff shortages and digitalisation demands (Figure 3). Ageing populations and rural access frequently appeared, highlighting equity concerns in service delivery. These clusters are critical for hospital administrators and policymakers. The link between workforce stability and digital innovation calls for integrated human-technology strategies to sustain operations. The ongoing emergence of equity-related themes requires investment and policy changes in under-represented regions.

Between 2019 and 2024, thematic shifts were notable, with a moved from cost-effectiveness and hospital performance to health equity and AI integration (Figure 4A). AI and telemedicine showed the most rapid growth, indicating rising influence on hospital finance and healthcare policy. This shift suggests that hospitals must enhance their capabilities to assess not only financial outcomes but also equity, technology adoption, and policy responsiveness. AI's application in hospital finance, though underexplored, offers opportunities for predictive analytics and operational optimisation.

FIGURE 4. PROGRESSION OF RESEARCH ON HOSPITAL FINANCIAL PERFORMANCE (A), AUTHOR NETWORK (B), INTERCONNECTED CO-AUTHORING ORGANISATIONS NETWORK (C), AND AUTHORS' COUNTRY NETWORKS (D) FROM 2014 TO 2024.



Authorship analysis

Table 1 presents the most frequently cited authors in hospital financial performance research based on Scopus data. Key contributors include Robert Weech-Maldonado, Ali M. Mosadeghrad, and George Pink. Weech-Maldonado has 41 publications, primarily focused on nursing homes, while Ali M. Mosadeghrad has nine articles on healthcare quality, and Pink specialises in healthcare financing.

Figure 4B visualises author collaborations across institutions and countries, highlighting shared concerns like hospital closures and financial distress. Prolific authors contribute cross-disciplinary insights from public health, economics, and policy, shaping research priorities and debates in hospital financial management. Their work highlights the importance for hospital managers to engage with literature beyond financial journals, incorporating health policy and clinical administration insights to enhance decision-making.

TABLE 1. THE MOST FREQUENTLY CITED AUTHORS.

No	Author	Articles	Main Topic	Article Citation	Google Scholar Citation
1	Ali M. Mosadeghrad	9	Healthcare Quality	576	12840
2	George H. Pink	11	Healthcare Financing	425	5760
3	George M. Holmes	8	Healthcare Financing	387	9079
4	Robert Weech-Maldonado	41	Nursing Homes	309	6186
5	Richard C. Lindrooth	6	Hospital Closure	223	5492
6	Richard S. Hoehn	5	Safety-Net Hospital	212	2264
7	Shimul A. Shah	5	Safety-Net Hospital	212	17807

Note: Article Citation refers to the total number of citations for the author's articles included in this study, based on Scopus data. Google Scholar Citation reflects the author's overall citation count across all publications as indexed by Google Scholar.

Organizational analysis

Table 2 presents the most frequently cited organisations in hospital financial performance research. The Tehran University of Medical Sciences leads with six publications, accumulating 525 citations, focusing on healthcare quality and organisational efficiency in middle-income settings. The University of North Carolina at Chapel Hill, particularly through its Gillings School of Global Public Health and the Cecil G. Sheps Center, contributes three high-impact articles on health policy, rural hospital sustainability, and healthcare access. Harvard Medical School, with 13 publications and 224 citations, excels in health systems financing and academic hospital performance.

Other notable contributors include the University of Central Punjab, researching financial resilience in South Asia private sector hospital, and the Icahn School of Medicine at Mount Sinai, exploring emergency care delivery and cost-effectiveness. These institutions offer diverse geographic and institutional perspectives, with Tehran University and UNC-Chapel Hill focusing on middle-income countries and U.S. rural healthcare, respectively.

Collaboration networks (Figure 4C) reveal active partnerships among institutions such as Brigham and Women's Hospital, Brown University, and Vanderbilt University, reflecting an interdisciplinary approach to financial performance. However, strategies effective in U.S. rural hospitals may not apply to middle-income urban settings. Hospital leaders must consider the institutional context when implementing research findings.

TABLE 2. THE MOST CITED ORGANIZATIONS.

Rank	Organization	Articles	Citations
1	School of Public Health, Tehran University of Medical Sciences, Tehran, Iran	6	525
2	Department of Health Policy and Management, Gillings School of Global Public Health and the Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, Chapel Hill, NC, United States	3	256
3	Harvard Medical School, Boston, MA, United States	13	224
4	Faculty of Management Studies, University of Central Punjab, Lahore, Pakistan	3	147
5	Department of Emergency Medicine, Icahn School of Medicine at Mount Sinai, New York, United States	6	140

Note. *Citations* refer to the total number of citations received by Scopus-indexed articles included in this study that are affiliated with each organisation.

Country analysis

The United States leads with 1,011 articles and 12,817 citations followed by the United Kingdom, China, Germany, and Australia. Regional clusters (Figure 4D) demonstrate collaboration among Europe, Asia, and North America, emphasising policy and system effectiveness. These collaborations promote knowledge transfer from resource-rich countries to developing health systems. The dominance of U.S.-based literature highlights the need for more research representation from low- and middle-income countries.

Article analysis

The five most-cited articles (Table 3) each exceeded 100 citations. These studies focus on operating room cost analysis, diversity's role in organisational performance, and the application of Data Envelopment Analysis to measure hospital efficiency. More recent topics include nurse turnover, COVID-19 effects, and rural hospital closures. These high-impact articles have shaped hospital financial research through widely adopted frameworks and methods. However, reliance on established topics risks overlooking emerging issues such as digital finance systems, AI integration, and regional disparities. Policymakers and administrators must recognize these gaps to stay ahead of future trends.

TABLE 3. THE MOST CITED ARTICLES.

Rank	Author	Citation	Title
1	Childers et al.	550	Understanding costs of care in the operating room
2	Gomez et al.	527	Diversity improves performance and outcomes

3	Mosadeghrad et al.	373	Factors influencing healthcare service quality
4	Kohl et al.	267	The use of Data Envelopment Analysis (DEA) in healthcare with a focus on hospitals
5	Kaufman et al.	244	The Rising Rate of Rural Hospital Closures

KEYWORD MAPPING BY CLUSTER

Table 4 organises seven principal concepts into five thematic clusters, prevailing patterns in hospital financial performance studies. Common terms include "hospital," "COVID-19," and "healthcare," while "financial performance" and "efficiency" remain central to the discourse. The increasing presence of the term "artificial intelligence" indicates an emerging research area, although its current citation frequency remains low. This trend reflects a shift in research priorities towards digital innovation, signalling that AI integration in hospital financial studies remains under-explored. This suggests that hospital leaders must enhance digital literacy and prepare for AI-driven financial tools.

TABLE 4. TREND AND THE MOST CITED KEYWORDS BY CLUSTERS.

Cluster	Keyword	Occurrence				Citations
		2014 to 2016	2017 to 2019	2020 to 2024	Total	
Yellow	Hospitals [hospital, hospitals]	26	51	79	156	2143
	Financial Performance	14	13	45	72	704
	Quality of Care	10	9	21	43	625
Green	COVID-19 [covid-19, covid-19 pandemic, covid 19, pandemic covid-19, coronavirus disease 2019 (covid-19), covid]	0	0	113	113	1407
Blue	Healthcare [healthcare, health care]	6	18	44	68	1141
Purple	Job Satisfaction	1	4	13	19	531
Brown	Artificial Intelligent	0	0	7	7	224

DISCUSSION

TRENDS AND PATTERNS IN HOSPITAL FINANCIAL PERFORMANCE EVOLUTION (RO1)

Over the past decade, research on hospital financial performance has intensified. Between 2014 and 2018, the focus was on financial management strategies to improve cost-effectiveness while maintaining clinical quality. The recognition of the link between sound financial practices and improved healthcare delivery contributed to increased hospital expenditures. These findings underscore the role of financial assessments in optimising resource allocation and enhancing performance, coinciding with global policy reforms that sparked academic interest in evaluating financial reforms and cost-containment efforts.

From 2019 to 2021, publication activity peaked, driven largely by the COVID-19 pandemic, which exposed weaknesses in hospital financial systems. Revenue drops and rising costs stressed the need for financial resilience. Studies demonstrate that hospitals with adaptable financial strategies were better positioned to manage crises. Government stimulus packages and emergency funding also influenced how hospitals budget restructuring and service prioritisation, offering new grounds for empirical analysis [14].

Although publication volumes declined slightly after 2021, this trend is likely attributable to *data lag*. Nonetheless, interest in hospital financial sustainability remains strong, with publication outputs in 2022 and 2023 surpassing pre-pandemic levels. The emergence of digital health innovations, such as telemedicine billing models and AI-assisted budgeting, has further shaped research, enhancing cost-efficiency and real-time decision-making [15–17].

IDENTIFICATION OF PRINCIPAL CONTRIBUTORS AND RESEARCH NETWORKS (RO2)

Recognising key contributors and collaborative research networks in hospital financial performance reflects the growing maturity of this field. Ali M. Mosadeghrad linked healthcare quality to financial outcomes, stressing the importance of operational efficiency [18, 19]. Similarly, contributions from George Pink and George Holmes underscore the relevance of financial metrics in healthcare financing, reinforcing the view that sound financial management is integral to hospital sustainability. These scholars not only produce high-impact publications but also shape research agendas through editorial positions and academic collaborations. These suggest the growing need for interdisciplinary approaches that integrate operational, financial, and service quality dimensions.

Institutions such as Tehran University's School of Public Health and UNC-Chapel Hill have emerged as leading centres of excellence. The high citation impact of their publications signifies substantial influence in shaping global discussions on financial sustainability. However, the dominance of high-income countries raises concerns about geographic bias, potentially overlooking the distinct financial challenges faced by hospitals in low- and middle-income countries (LMICs) [9]. These regions often face distinct financial constraints and operational challenges, which could enrich global understanding and policy design.

At the national level, the U.S. leads in output and impact, reaffirming its role in advancing this field. Its influence is reinforced by strong collaborations with countries such as the UK and China, signalling a shared global agenda for improving hospital financial efficiency. Comparative research across systems helps derive broadly applicable policies [20, 21].

Notable works by Childers et al. and Gomez et al. explore themes like cost control, workforce diversity, and financial alignment, thereby illustrating how financial performance intersects with organisational and social dimensions [22, 23]. These works reflect the complexity of financial challenges facing hospitals and the need for multidisciplinary responses, particularly within varied socioeconomic environments.

This analysis reveals a concentration of contributions from a few regions and institutions, suggesting a need for broader representation, especially from LMICs. Future research should prioritise inclusivity through cross-border collaborations, local data collection, and increased funding for LMIC-based researchers. [24].

EXPLORING NOVEL RESEARCH DIRECTIONS IN HOSPITAL FINANCIAL PERFORMANCE (RO3)

The COVID-19 pandemic has dramatically altered research priorities concerning hospital financial performance, exposing weaknesses and underscoring the need for adaptive financial strategies [25–27]. Terms like "financial performance" and "efficiency" indicate the essential need for hospitals to integrate sustainability with fair access to high-quality care. This prompts critical enquiries regarding how hospitals might navigate financial constraints while upholding healthcare excellence.

This study underscores the necessity of tracking financial trends over time to inform resilience and recovery planning [28]. Predictive analytics and cost-optimisation frameworks offer tools to adapt to changing expectations [29, 30]. This strategy seeks to diminish disparities in health care disparities while ensuring financial sustainability, offering valuable insights for legislators and administrators.

Emerging themes such as health equity and AI offer new research avenues. The global focus on health equity highlights the necessity for policies that reduce healthcare access disparities. However, questions persist concerning the impact of equity-driven policies on hospital efficiency and financial sustainability [31, 32]. AI has the potential to transform financial management in healthcare by utilising resources and forecasting costs, but its effectiveness, especially in resource-limited

settings, needs further empirical validation [33–37]. Integrating AI-driven solutions in financial dashboards could improve transparency and budgeting accuracy, but adoption remains slow due to regulatory, infrastructural, and human resource limitations.

Notably, although the term *artificial intelligence* is increasingly prevalent in recent publications, as illustrated in the keyword mapping (Table 4), its citation frequency remains relatively low. This contrast indicates that while interest in AI is growing, the field remains emergent and under-explored. The limited citation volume suggests the need for longitudinal studies, experimental implementations, and case studies that evaluate AI's real-world impact on hospital efficiency, financial planning, and sustainability.

Ongoing regulatory changes, including the global shift towards value-based care, also raise new challenges requiring adaptive financial planning [38–43]. The epidemic has expedited regulatory modifications and highlighted gaps in hospital financial processes. These evolving regulations may require dynamic costing models, integrated reporting systems, and new metrics for evaluating hospital success beyond profitability. Future research should explore sustainable financial models, such as public-private partnerships and outcomes-based funding, while addressing the intersection of finance and ethics in healthcare access may offer a replicable framework for developing more stable and adaptable financial systems [44–48].

The convergence of conventional financial management and new innovations highlights the increasing complexity of hospital financial performance. Operational efficiency and sustainability are essential; however, the integration of contemporary frameworks such as artificial intelligence and health equity-focused strategies can enhance inclusivity and adaptability. Therefore, the future of hospital financial research lies in exploring how technological advancement, regulatory evolution, and social accountability can be harmonised in strategic financial planning. Aligning such innovations with evolving healthcare regulations, reimbursement systems, and patient expectations should become a key direction for future research [49, 50].

IMPLICATIONS AND LIMITATIONS

This study provides a comprehensive overview of the evolution in hospital financial performance research, focusing on resilience, efficiency, and sustainability. The findings reveal increased collaboration across authors, institutions, and countries, advancing financial strategies in hospital management. Emerging themes such as artificial intelligence and health equity represent promising avenues for future exploration, though these areas remain underdeveloped.

However, several limitations should be acknowledged. First, perspectives from resource-constrained settings may be underrepresented. The dominance of institutions and researchers from high-income countries may limit the applicability of findings to low- and middle-income contexts [24]. Future research should include diverse data sources and regional perspectives to ensure a more inclusive understanding of hospital financial dynamics.

Second, the pandemic context may have skewed the research landscape towards crisis-specific financial issues. As a result, findings may disproportionately reflect emergency-driven responses rather than long-term structural insights. This could limit the generalisability of certain trends or priorities beyond the pandemic period.

Third, the methodological dependence on bibliometric analysis presents inherent constraints. Bibliometric approaches measure research activity based on publication volume, citation frequency, and co-occurrence patterns, but they do not assess the actual quality, depth, or practical impact of the studies. It also excludes grey literature, unpublished work, or publications indexed outside of Scopus, potentially omitting relevant insights. Additionally, it cannot account for contextual, cultural, or qualitative factors that influence financial decision-making in hospitals.

Despite these limitations, this study provides a valuable foundation for future empirical work. By identifying key contributors, collaboration networks, and emerging themes, it offers a roadmap for researchers, policymakers, and healthcare administrators seeking to enhance financial performance across varied healthcare environments.

CONCLUSION

This bibliometric analysis investigates the financial performance of hospitals, emphasising trends, contributions, and deficiencies in prospective research. The COVID-19 pandemic has emerged as a vulnerability within the financial system, resulting in a shift in research objectives. Significant influence in the field has been exerted by key contributors, notably the United States. Additionally, emerging areas such as artificial intelligence, health equity, and policy changes offer opportunities for future exploration. This study highlights the significance of assessing financial performance, so enabling administrators, legislators, and healthcare professionals to formulate more successful and impactful healthcare policies and practices.

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APPENDIX

FIGURE 3. RESULTS FROM THE CO-OCCURRENCE KEYWORD ANALYSIS

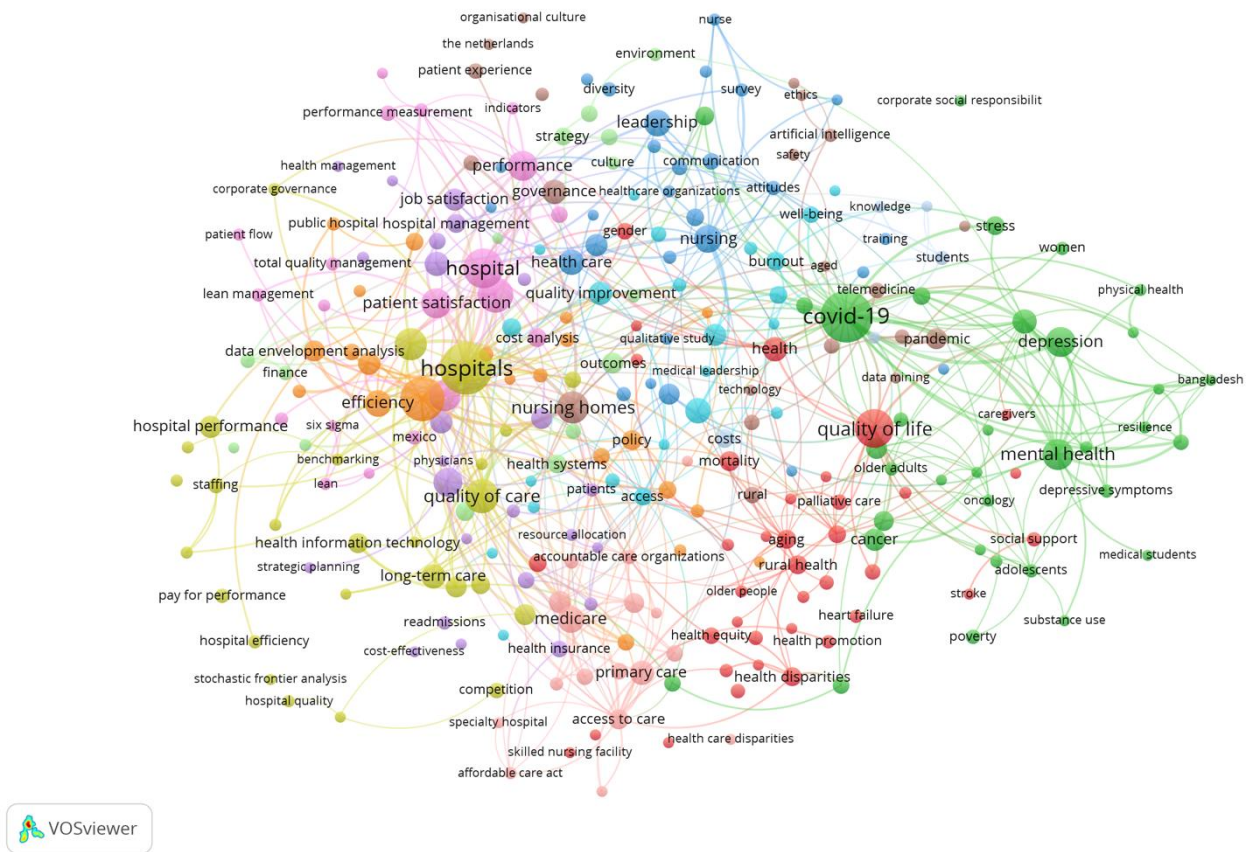


FIGURE 4A. PROGRESSION OF RESEARCH ON HOSPITAL FINANCIAL PERFORMANCE FROM 2014 TO 2024.

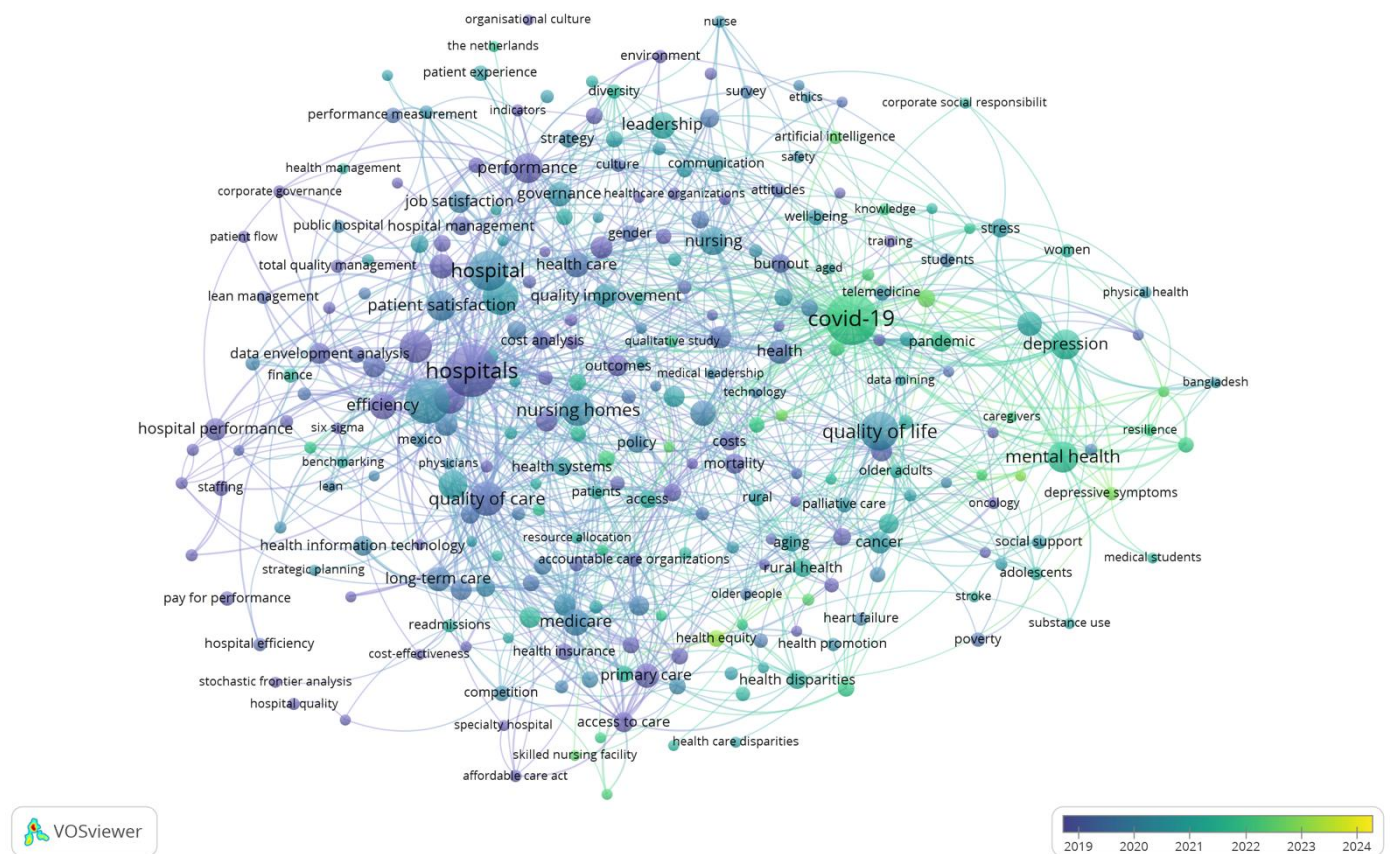


FIGURE 4B. AUTHOR NETWORK FROM 2014 TO 2024.

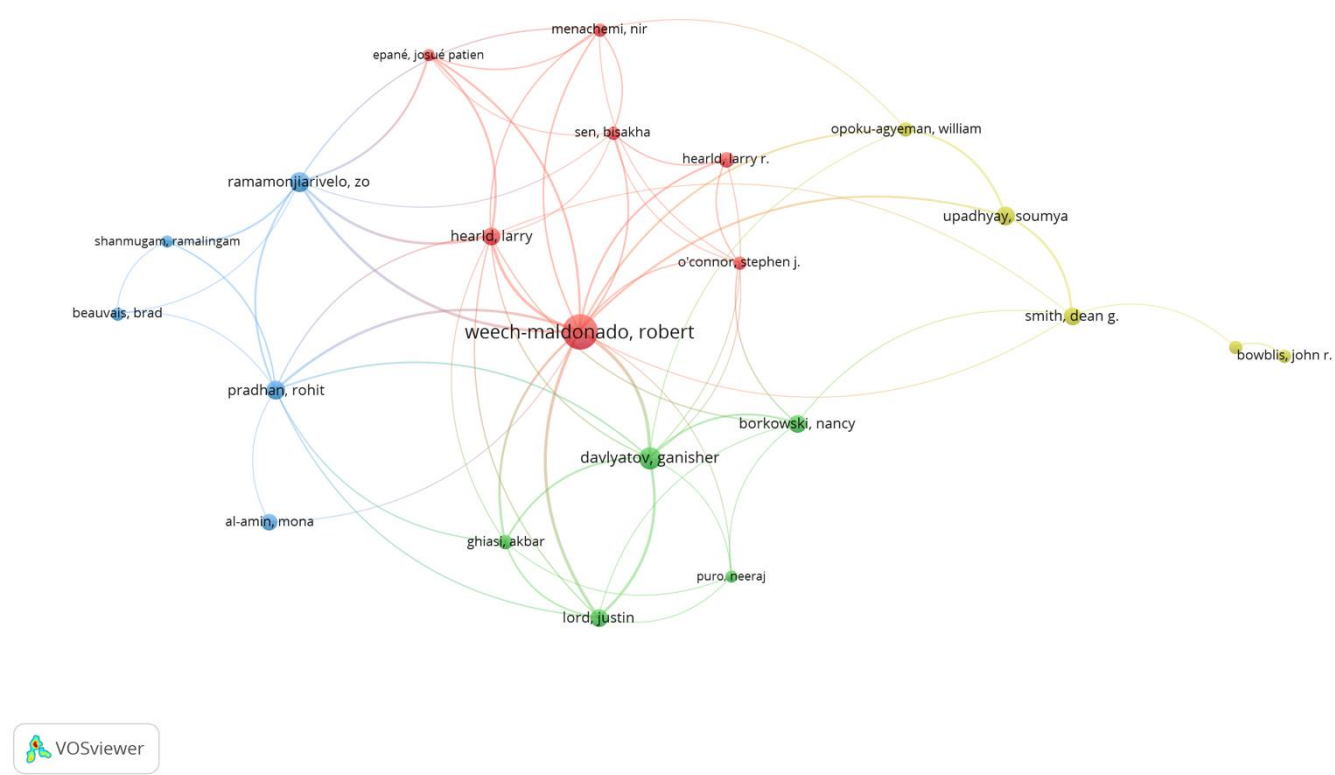


FIGURE 4C. INTERCONNECTED CO-AUTHORING ORGANISATIONS NETWORK FROM 2014 TO 2024.

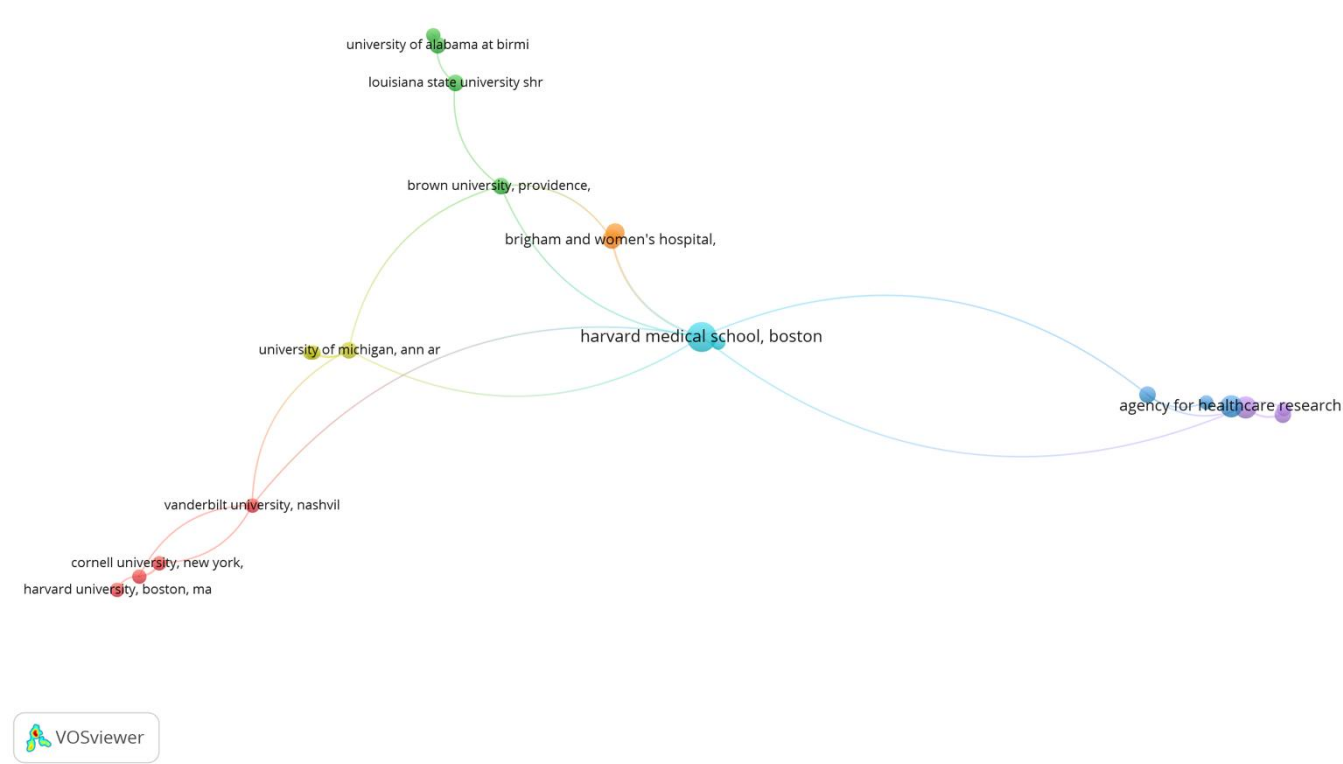
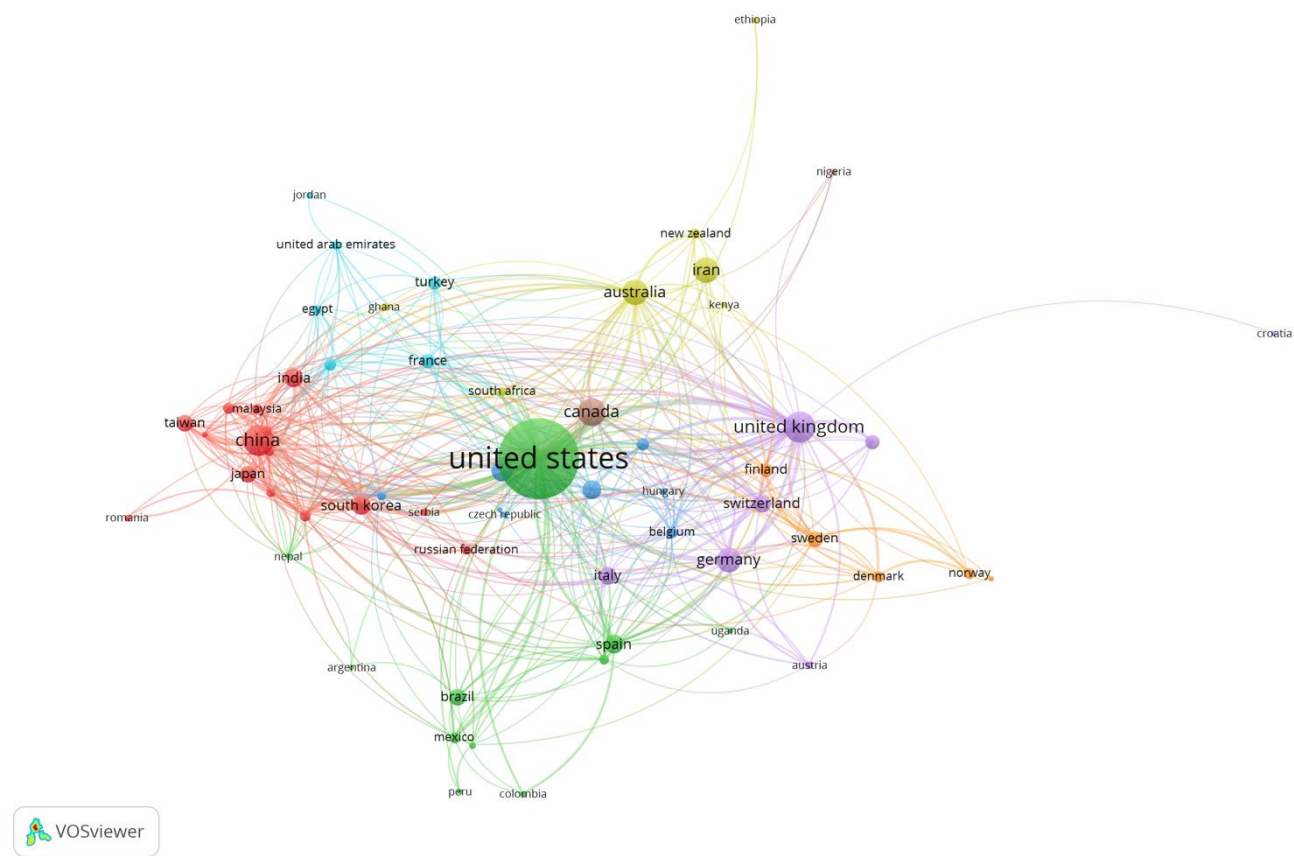


FIGURE 4D. AUTHORS' COUNTRY NETWORKS FROM 2014 TO 2024.





IS THE UNITED STATES READY FOR UNIVERSAL HEALTHCARE?

Fardin Quazi*, Nandhakumar Raju

Independent Researcher, McKinney, TX, 75072, United States of America

Correspondence: farding@gmail.com

ABSTRACT

The debate over universal healthcare in the United States remains a deeply polarizing issue, with advocates and critics presenting compelling arguments. This article explores the readiness of the U.S. for universal healthcare by examining its current healthcare system—an intricate mix of private and public insurance—alongside the challenges of high costs, inequitable access, and administrative inefficiencies. Drawing comparisons with healthcare models in countries like Australia, the UK, Canada, and Sweden, the article highlights global best practices, including universal coverage, equity-focused policies, and cost control mechanisms.

While the U.S. excels in medical innovation, advanced technology, and patient choice, it struggles with fragmented care and systemic inefficiencies, leaving room for significant improvement. The article presents actionable steps, such as expanding affordable access, simplifying administrative processes, addressing health disparities, and prioritizing preventive care. It also explores the feasibility of hybrid models that blend universal coverage with private-sector innovation.

Ultimately, the path to universal healthcare in the U.S. depends on balancing equity, cost, and choice while addressing the unique cultural and systemic challenges of a diverse nation. This article serves as a call to action for meaningful reforms to create a healthcare system that is fair, accessible, and sustainable for all Americans.

KEYWORDS

universal healthcare, U.S. healthcare system, health disparities, affordable care, preventive care, global healthcare models, healthcare reform

INTRODUCTION - US HEALTHCARE SYSTEM

The United States healthcare system is a complex combination of private and public insurance options. Private insurance, predominantly employer-sponsored, covers the majority of Americans, while government programs like Medicare and Medicaid address specific populations. Medicare provides healthcare for individuals aged 65 and older, as well as certain individuals with disabilities. Medicaid, on the other hand, offers coverage to low-income individuals and families.

In 2024, approximately 92.1% of the U.S. population had health insurance, with Medicare covering 14.3% and Medicaid accounting for 19.6% [1]. The healthcare sector also represents a significant economic force. Healthcare profit pools are projected to grow at a compound annual growth rate (CAGR) of 7%, increasing from \$583 billion in 2022 to \$819 billion by 2027 [2].

Is the United States ready for Universal Healthcare?

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The Affordable Care Act (ACA), commonly known as Obamacare, has played a pivotal role in expanding access to insurance by broadening Medicaid eligibility and establishing online marketplaces for private coverage. Prior to the ACA's implementation in 2010, the uninsured rate among nonelderly Americans was approximately 16%. Following the rollout of major ACA provisions in 2014, this rate declined significantly, reaching a historic low of 8.6% in 2022 [18]. This substantial decrease underscores the ACA's impact on reducing the number of uninsured individuals in the United States.

Despite this progress, challenges persist, including high administrative costs, disparities in care, and fragmented access to services. Private insurance remains the predominant form of coverage, with 54.8% of the population enrolled in employer-sponsored group plans. Another 13.9% of individuals purchase insurance directly, often through health insurance marketplaces [3]. While direct-purchase plans allow customization to suit individual needs, they are typically more expensive without employer contributions. These figures highlight the ongoing complexities within the U.S. healthcare system, where significant advancements in coverage coexist with persistent issues related to cost and access.

Regulation of the healthcare system involves multiple layers of oversight. At the federal level, the Centers for Medicare & Medicaid Services (CMS) oversees compliance with the ACA, enforces coverage standards, and ensures consumer protections [4]. The Health Insurance Portability and Accountability Act (HIPAA) is another key regulatory framework, focusing on the privacy and security of health information and setting standards for electronic health records.

State governments also play a critical role in regulating health insurance, managing Medicaid programs, overseeing insurance marketplaces, and implementing local consumer protection laws. States often develop additional regulations to address regional challenges. For dispute resolution and compliance, each state's Office of the Insurance Commissioner addresses consumer complaints. Nationally, the National Association of Insurance Commissioners (NAIC) provides model laws and guidelines to help maintain consistent standards across states.

The U.S. healthcare system remains a multi-faceted framework of public and private entities, supported by federal and state regulations. While it has achieved substantial coverage and economic growth, ongoing challenges raise questions about whether a universal system could address these gaps. At its core, the healthcare debate is both ethical and policy-driven: Is healthcare a right or a privilege? Some view it as a fundamental right essential for equity and public health, while others argue it is a market-driven service. This divide shapes healthcare access, affordability, and reform efforts in the U.S.

DEFINING UNIVERSAL HEALTHCARE AND UNIVERSAL COVERAGE

The terms "universal healthcare" and "universal coverage" are often used interchangeably but can have distinct meanings. Universal healthcare broadly refers to a system where all individuals have access to healthcare services, but the financing model varies—ranging from single-payer (government-funded), multi-payer (public and private mix), or hybrid systems (regulated private insurers). Universal coverage, on the other hand, means that healthcare is available to all residents, but the extent of services covered, cost-sharing mechanisms, and access to specialized care differ by country. Understanding these distinctions is crucial to assessing healthcare models globally in the next section.

EXPLORING HEALTHCARE MODELS AROUND THE WORLD

Building on the complexities of the U.S. healthcare system, it's worth exploring how other nations approach healthcare. Each has its unique model, tailored to its population and priorities, but there are some common threads—universal coverage and a focus on equity. Let's take a closer look:

AUSTRALIA

Australia balances public and private healthcare. The government-funded Medicare program ensures universal coverage, with medications subsidized through the Pharmaceutical Benefits Scheme (PBS) [5]. Healthcare is primarily

financed through general taxation and a 2% Medicare levy, which directly funds public healthcare services. In 2022–23, government health spending accounted for 24.3% of total taxation revenue [19, 20]. Private health insurance is incentivized through tax benefits, providing access to additional services. This structure ensures accessible, high-quality healthcare without compromising efficiency [5, 6].

UNITED KINGDOM

The UK's National Health Service (NHS) is a cornerstone of public healthcare, offering comprehensive services—from general practitioner visits to emergency care—free at the point of use. Funded primarily through taxation, the Department of Health and Social Care allocated £181.7 billion to NHS services in England for the fiscal year 2022-23, with over 94% spent on day-to-day operations such as staff salaries and medicines [21]. Despite its extensive reach, the NHS faces challenges, including a hospital treatment waiting list. In January 2025, over 61,000 patients experienced waits exceeding 12 hours for emergency admissions [22].

NORWAY

Norway's healthcare system provides universal coverage, funded by general taxes (74%) and insurance contributions (11%), with out-of-pocket payments covering 15% of total healthcare revenue [23]. The system caps out-of-pocket expenses, reducing financial burdens for patients. Municipalities manage primary care, while the national government oversees specialized care. The average tax rate for a single worker is 28.1%, above the OECD average of 24.9% [24]. Private insurance plays a minor role, mainly for faster access, reflecting Norway's strong commitment to equity and preventive care [8].

CANADA

Canada's single-payer Medicare system follows the principles of the Canada Health Act: accessibility, universality, portability, comprehensiveness, and public administration. Provinces manage healthcare, with public funding covering 70% of total health expenditures (\$331 billion in 2022, \$8,563 per capita) [25]. The remaining 30% comes from private sources, mainly for prescription drugs, dental, and vision care [26]. This system ensures universal coverage while relying on private insurance for non-covered services to reduce financial strain [9].

NETHERLANDS

The Netherlands operates a dual-level healthcare system with mandatory health insurance under strict government regulation. Funding comes from payroll taxes (46%), general taxation (22%), insurance premiums (21%), and copayments (11%) [10]. Employers and employees contribute through income-based payroll taxes, while individuals pay premiums to private insurers. While competition enhances efficiency, the system faces high premiums, deductibles, and out-of-pocket costs, impacting middle-income earners. To support low-income individuals, the government provides subsidies to ensure universal access [10].

SWEDEN

Sweden maintains a publicly funded healthcare system with universal coverage for all residents. Healthcare services are decentralized, managed at national, regional, and municipal levels. In 2022, health expenditure accounted for 10.7% of Sweden's GDP, with 86% of this spending publicly financed [11]. Funding primarily comes from regional and municipal taxes, supplemented by national government grants. Private insurance plays a minor role, as the public system emphasizes accessibility, equity, and quality. Preventive care and healthy lifestyles are central to Sweden's approach, ensuring long-term benefits for its population [11].

These systems show that universal healthcare isn't a one-size-fits-all solution. Each country adapts to its specific needs, but a common theme emerges: equitable access and efforts to minimize financial barriers. At the same time, they face key challenges such as long wait times for specialist care and elective procedures and increasing reliance on private healthcare options to bypass delays, highlighting the ongoing struggle to balance accessibility, affordability, and efficiency in universal healthcare systems. As we continue evaluating the U.S. readiness for universal healthcare, these global examples provide valuable insights.

Commented [A1]: This section addresses the comment "More Thorough Discussion of Long Wait Times". This is also addressed in the section "Is the US healthcare system really that worrisome?"

IS THE US HEALTHCARE SYSTEM REALLY THAT WORRISOME?

Not necessarily. While the U.S. healthcare system has its problems, it also has a lot of good things going for it. Sure, people often complain about the high costs and complicated processes, but let's not forget the strengths. Considering how large and diverse the U.S. population is—one of the most diverse in the world—it's not surprising that our system faces unique challenges. So, what are the good and bad sides of U.S. healthcare? Let's take a closer look [12][13].

PROS

- **Advanced Medical Technology:** The U.S. leads the way in medical innovation, with cutting-edge technology and world-class research facilities driving breakthroughs in treatment and care.
- **High-Quality Care:** Some of the best hospitals and medical centers in the world are right here, offering specialized care that's second to none.
- **Choice and Flexibility:** Patients often enjoy a wide array of options when it comes to choosing providers and treatment plans. This level of flexibility is rare in many other countries.
- **Minimal Waiting Times:** The U.S. often has shorter wait times for elective procedures due to abundant resources and advanced infrastructure. However, waits vary based on insurance, provider networks, and specialist availability, with cost barriers sometimes delaying care for uninsured or underinsured patients, particularly in high-demand specialties or rural areas.

CONS

- **High Costs:** It's no secret that healthcare in the U.S. is expensive. From insurance premiums to medical procedures or even a simple visit to doctor's office, the financial burden can be overwhelming for many.
- **Inequitable Access:** High costs disproportionately affect low-income individuals, racial minorities, and those with lower education levels. Social determinants of health—like income and location—worsen disparities, leading to delayed care, higher chronic disease rates, and preventable hospitalizations.
- **Complex Insurance System:** Navigating the insurance system can feel like running a marathon. Varying coverage options and unpredictable out-of-pocket expenses add to the confusion.
- **Administrative Burden:** Paperwork, red tape, and bureaucracy are significant drawbacks, often consuming time and driving up costs for both providers and patients.

While there are clear advantages, the drawbacks are just as noticeable. This is why the idea of a universal healthcare system sparks so much debate. It's not just about adopting a new model—it's about understanding the unique needs of our population and finding solutions that work for everyone.

WHERE THE US STANDS AMONG THE WORLD'S BEST HEALTHCARE SYSTEMS?

With a glimpse of healthcare systems worldwide, it's time to see how the U.S. stacks up. According to the *Mirror, Mirror 2024* report by the Commonwealth Fund, the United States ranks 10th among the top 10 healthcare systems [14]. While the U.S. excels in care delivery processes, it struggles in other critical areas, especially when considering its immense healthcare spending.

(Notably, Norway, which we discussed earlier as a model for universal care and ranked first in the 2021 report, is absent from the 2024 edition as it chose to exit the Commonwealth Fund's international surveys.)

One of the key issues is the high cost of care, coupled with significant barriers to accessing affordable services. Administrative overhead, fragmented care systems, and glaring disparities in access are major contributors to these challenges. The report makes it clear: systemic reforms are urgently needed to improve both the efficiency of healthcare delivery and equitable access for all.

FIGURE 1: HEALTHCARE SYSTEMS PERFORMANCE RANKING

	AUS	CAN	FRA	GER	NETH	NZ	SWE	SWIZ	UK	US
OVERALL RANKING	1	7	5	9	2	4	6	8	3	10
Access to Care	9	7	6	3	1	5	4	8	2	10
Care Process	5	4	7	9	3	1	10	6	8	2
Administrative Efficiency	2	5	4	8	6	3	7	10	1	9
Equity	1	7	6	2	3	8	—	4	5	9
Health Outcomes	1	4	5	9	7	3	6	2	8	10

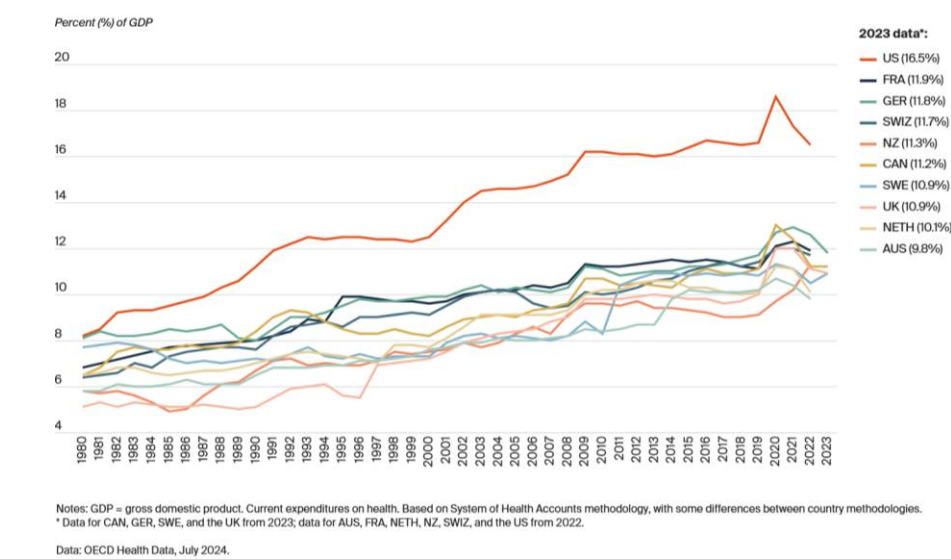
Note: SWE overall ranking calculation does not include Equity domain. See "How We Conducted This Study" for more detail.

Data: Commonwealth Fund analysis.

Source [14]: David Blumenthal et al., *Mirror, Mirror 2024: A Portrait of the Failing U.S. Health System — Comparing Performance in 10 Nations* (Commonwealth Fund, Sept. 2024). <https://doi.org/10.26099/ta0g-zp66>

Despite having some of the highest healthcare spending as a percentage of GDP, the U.S. consistently falls short in overall performance compared to nations like Australia, the Netherlands, and the United Kingdom. For instance, between 1980 and 2023, the U.S. healthcare system showed significant gaps in outcomes despite consistently high investments. This performance gap isn't just a statistic—it's a call to action. If the U.S. is to improve its ranking and, more importantly, deliver better healthcare for its people, addressing inefficiencies and prioritizing equitable, affordable access must be at the heart of future reforms.

FIGURE 2: HEALTHCARE SPENDING AS A PERCENTAGE OF GDP, 1908-2023



Source [14]: David Blumenthal et al., *Mirror, Mirror 2024: A Portrait of the Failing U.S. Health System — Comparing Performance in 10 Nations* (Commonwealth Fund, Sept. 2024). <https://doi.org/10.26099/ta0g-zp66>

LIMITATIONS OF THE STUDY

The manuscript references data from the Commonwealth Fund's "Mirror, Mirror 2024" report and the 2024 Biennial Health Insurance Survey [14]. It's important to clarify that these reports, published in 2024, are based on data collected in prior years. The "Mirror, Mirror 2024" report utilizes data from surveys conducted between 2021 and 2023. Similarly, the 2024 Biennial Health Insurance Survey gathered information from March 18 through June 24, 2024. Therefore, the statistics presented are retrospective, reflecting the most recent data available up to the time of publication.

BUILDING A BETTER US HEALTHCARE SYSTEM

Improving the U.S. healthcare system requires action in several critical areas. Here are some key steps that can make a real difference [15][16]:

1. Expand access to affordable care

Affordable healthcare must be within reach for everyone. Increasing funding for Medicaid and expanding eligibility can provide coverage to more low-income individuals and families. Policies to lower out-of-pocket costs for medical services and prescription drugs will also help make healthcare accessible to all, regardless of income.

2. Simplify administrative processes

The complexity of the current system adds unnecessary costs and confusion. Simplifying the insurance process, cutting down on paperwork, and streamlining operations can lower administrative expenses. Standardizing electronic health records (EHRs) can further reduce administrative burdens. EHRs enhance efficiency by decreasing paperwork, improving safety, and reducing test duplication. A McKinsey report highlighted that implementing 30 targeted interventions, such as automating repetitive tasks and standardizing processes, could potentially save up to \$265 billion each year [27].

3. Address health disparities

Bridging gaps in healthcare access and outcomes is crucial. This means increasing support for community health centers, funding preventive care initiatives, and ensuring underserved populations have access to high-quality services. Promoting health equity must be at the heart of any reform efforts.

4. Prioritize preventive care

Prevention is better than cure. Encouraging healthy habits and expanding access to preventive services can reduce the impact of chronic diseases and improve population health. Preventing illnesses before they become severe can also ease the strain on the healthcare system, saving both lives and resources.

5. Learn from global best practices

There's no need to reinvent the wheel. Countries like Australia, the Netherlands, and the UK offer valuable lessons in achieving universal coverage and efficient healthcare management. Borrowing elements like a single-payer system or improving primary care services can provide the U.S. with practical solutions to longstanding challenges.

By focusing on these actionable steps, the U.S. can build a healthcare system that is more efficient, equitable, and accessible. However, any major reform must navigate significant political and ideological hurdles. Public opinion remains divided on the role of government in healthcare, and past reform efforts—such as the Affordable Care Act—faced strong partisan resistance. Achieving meaningful change requires bipartisan cooperation, stakeholder engagement, and gradual policy shifts that balance economic, social, and political feasibility while ensuring long-term sustainability.

WILL THE UNITED STATES EVER HAVE UNIVERSAL HEALTHCARE?

The debate about universal healthcare in the U.S. has been going strong for years, and it's likely to continue. Supporters of a single-payer system believe it could simplify the way healthcare works, cut overall costs, and make sure everyone gets access to essential care. They argue that reducing out-of-pocket costs could ease the financial burden on families and improve health for the entire population [17].

But there's another side to the argument. Critics worry that a universal healthcare system might mean higher taxes and more government control over personal healthcare choices. They also point to challenges in other countries with universal systems, like long wait times for certain treatments or limited availability of resources, which might not sit well with Americans used to quicker access and broader options.

Is the United States ready for Universal Healthcare?

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While a fully single-payer model remains controversial, hybrid healthcare systems—blending universal coverage with private-market competition—have proven successful in countries like Germany, Switzerland, and the Netherlands. In Germany, statutory health insurance (SHI) covers approximately 89% of the population, while high-income individuals and civil servants can opt for private health insurance (PHI), which covers about 11% [28]. Switzerland mandates private health insurance for all residents, with government regulations ensuring affordability and income-based subsidies provided to approximately 27.3% of individuals [29]. The Netherlands operates a regulated private insurance system, offering universal coverage with government subsidies for lower-income citizens.

The U.S. has already made progress with programs like the Affordable Care Act, which expanded coverage and brought the uninsured rate down. But achieving truly universal healthcare is a different ballgame. Some experts suggest looking at hybrid models—blending elements of the current system with successful strategies from other countries, like universal coverage paired with private options to maintain choice and innovation.

HEALTHCARE: A RIGHT OR A PRIVILEGE?

A core debate shaping U.S. healthcare policy is whether healthcare is a fundamental right or a privilege. Advocates of healthcare as a right argue that access to medical care is essential for public well-being, economic stability, and social equity, warranting government intervention to ensure affordability and universal access. Conversely, proponents of healthcare as a privilege believe that access should be market-driven, emphasizing personal responsibility, competition, and limited government involvement. This divide influences policy choices—funding mechanisms, regulatory frameworks, and coverage mandates—ultimately determining the feasibility and structure of any universal healthcare model in the U.S.

CONCLUSION

Ultimately, the path forward depends on how the U.S. balances fair and affordable healthcare with concerns about cost, quality, and choice. While universal healthcare might not be imminent, policymakers, researchers, and healthcare institutions can take incremental steps to improve access and affordability. Expanding pilot programs, strengthening data collection on healthcare disparities, and incrementally broadening public coverage through Medicaid and ACA subsidies can provide practical pathways for reform. As the debate continues, a data-driven, collaborative approach will be key to shaping a more equitable and effective healthcare system that serves all Americans.

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THE EFFECTS OF BELIEFS AND HEALTH LITERACY ON MEDICATION USE IN CULTURALLY AND LINGUISTICALLY DIVERSE POPULATIONS: A LITERATURE REVIEW

*Ebuka-Olisaemeka Nwafor*¹, Julie Stevens¹, Sarah Hosking³, Eman Rafhi¹, Joon Soo Park², Sang-Woon Jeon⁴, Kate Wang¹*

1. School of Health and Biomedical Sciences, RMIT University.
2. Discipline of Pharmacy, School of Allied Health, The University of Western Australia
3. Faculty of Health, School of Medicine, Deakin University
4. Hanyang University, Seoul, South Korea

Correspondence: mekmolly@gmail.com

ABSTRACT

Social and individual factors (beliefs, and health literacy) play a crucial role in health promotion and disease prevention among older culturally and linguistically diverse (CALD) populations. This review examines the recent publications regarding the impact of health beliefs, and health literacy on patients' medication use involving adherence, polypharmacy, and potentially inappropriate medications (PIMs) in older CALD population.

Databases were systemically searched for articles published from inception to January 2025. Thirteen research articles on beliefs and medication use (randomized control trials [n=1], cross-sectional [n=6], observational [n=1], qualitative [n=2], or unknown [n=3]) were obtained from databases. Ten research articles (observational [n=2], cross-sectional [n=2], interview [n=5], randomized control trials [n=1]) were retrieved for health literacy and medication use. Findings were categorized into four themes: (1) beliefs and health promotion and disease prevention, (2) beliefs and medication adherence, (3) beliefs and polypharmacy, and PIM, and (4) health literacy and medication use.

Results highlighted that beliefs and health literacy often negatively influenced medication use and health outcomes. While these findings, were specific to groups like Mexican Americans, African Americans, Indian Americans, and British Bangladeshis, the results emphasize the need for research into the influence of health beliefs, and health literacy on medication use in other older CALD populations. Future studies should address these gaps to develop culturally sensitive, interventions, and support mechanisms.

KEYWORDS

health beliefs, health literacy, CALD, medication adherence, polypharmacy, PIMs, health promotion, disease prevention

INTRODUCTION

The World Health Organization (WHO) projects that by 2050, the global population aged 80 and above will reach 446 million, a significant increase from 126 million in 2015. Currently, 617 million individuals, representing 8.5% of the global population, are aged 65 or older [1]. In this context, the use of medications in older adults continues to rise.

Health beliefs refer to personal perceptions, ideas, and attitudes individuals hold about their health, illness, and the factors that influence health outcomes [2]. It might alternatively be described as those components of the health belief model that offer a well-established theoretical framework for research on the safety and usage of medications [3].

The term "CALD" or "Culturally and Linguistically Diverse" population refers to groups of people who come from various cultural backgrounds and speak languages other than the dominant languages of the region in which they reside in. In Australia, this group includes individuals living in Australia who were born overseas, have parents born overseas, or speak multiple languages other than English. It may also include individuals born overseas but whose first language is English or from non-English-speaking backgrounds [4].

It is believed that social and individual factors like beliefs, and health literacy can impact medication use, and safety in older adults [5, 6]. Older adults from CALD backgrounds (≥ 65 years) present a unique opportunity to benefit from medical advancements. However, they also face a significantly elevated risk of medication-related harm [7]. To combat the growing burden of chronic illness in older CALD population, healthcare is shifting towards proactive strategies like health promotion and disease prevention [8]. Individuals bring their own beliefs, perceptions, and understanding of medicines into their healthcare, which can shape their attitudes toward healthcare and influence their use of medications [9]. A recent study indicates that factors such as ethnicity, socioeconomic status, and other key determinants significantly impact medication use and safety, particularly in cases of polypharmacy among older adults [10]. These factors often contribute to poorer health outcomes.

Given the global diversity of ethnicities, and the known cultural influences on medication beliefs and adherence, further research in suboptimal medicines use in diverse communities is warranted [5]. Such studies could uncover additional influences, such as healthcare access, system barriers, and costs, that may affect medication use and participation in health promotion initiatives [11, 12]. While some research exists on medication use in health promotion and disease prevention among CALD populations [13, 14], there is limited focus on the impact of health beliefs and health literacy on medication use in older CALD adults. This literature review aims to examine the social and individual factors influencing health promotion and disease prevention involving medication use (adherence, polypharmacy, and PIMs) in older CALD populations.

METHODOLOGY

SEARCH STRATEGY

A systematic literature search was conducted across multiple databases (from inception to 2025), including PubMed, Scopus, PsycINFO, CINAHL, and Web of Science, to identify relevant studies. The search terms were developed using a combination of keywords and medical subject headings (MeSH) related to: "health beliefs," "cultural beliefs," "medication perceptions," "attitudes toward medication"; "health literacy," "medication literacy," "health knowledge," "patient education"; "medication use," "medication adherence," "prescription use," "drug utilization," "medication compliance"; "culturally and linguistically diverse populations," "ethnic minorities," "migrant health," "culturally diverse," "limited English proficiency," "non-native speakers". The search was limited to peer-reviewed articles published in English.

SELECTION CRITERIA

Included studies examined health beliefs, health literacy, medication use, or medication-related behaviors in culturally and linguistically diverse populations. Excluded studies comprised of general population studies without a CALD focus;

studies not linking beliefs or health literacy to medication use; editorials, commentaries, case reports, non-peer-reviewed articles, and non-English publications.

STUDY SELECTION

Two reviewers independently screened titles and abstracts, and assessed full-text eligibility. Discrepancies were resolved through discussion.

DATA EXTRACTION

The following data were extracted from eligible studies into a standardised extraction tool. Data extracted included the study and year, number of participants, participant or population, study type, country, and key findings. Table 1 presents the effectiveness of belief-related outcomes associated with health promotion and disease prevention; Table 2 presents the effectiveness of belief-related outcomes associated with medication adherence; and Table 3 presents the effectiveness of health literacy outcomes associated with medication use.

RESULTS

BELIEFS AND HEALTH PROMOTION AND DISEASE PREVENTION AMONGST CALD POPULATIONS.

Health beliefs are significant factor influencing health promotion or disease prevention, particularly among older adults [13, 14, 20]. Eight articles explored the impact of beliefs on health promotion or disease prevention in the CALD population [14-21]. Of these, five were conducted in the United States [14-18], two in the United Kingdom [19, 20], and one in Norway [21] (Table 1).

A cross-sectional study conducted by Rovner & Casten showed that African Americans (67 years ~ mean age) with higher discordant health beliefs and no telehealth use tended to have worsened diabetes than those with less discordant health beliefs and access to telehealth use [14]. For instance, the participants who highlighted, "Medicines worry me" were 0.32 times [CI 0.86, 1.19] as likely to utilize telehealth as those who did not possess that belief [14]. According to this study, African Americans with diabetes frequently have contradictory health beliefs, which are linked to poorer glycemic control, diabetes self-care, and low telehealth utilization. Although these results are limited by the small sample, underpowered analysis, and limited generalizability, they are consistent with earlier research showing poor telehealth use among CALD groups [14].

Brown et al. conducted a study comparing the effects of health beliefs on diabetes management interventions among Mexican Americans aged 35 to 70 years [15]. Participants were divided into two intervention groups: (i) weekly instructional meetings covering topics such as exercise, home glucose monitoring, nutrition, and self-care, and (ii) support group meetings focused on encouraging behavioral changes through goal setting, problem-solving, and food preparation demonstrations. Both groups showed significant improvements in mean health belief scores across subscales, including perceptions of barriers, benefits, control, job impact, and social support [15]. Notably, perceptions of control over diabetes significantly improved in both groups. Participants in the extended program experienced more sustained improvements in health attitudes at 12 months, with the health belief subscale "control" emerging as the strongest predictor of HbA1c levels. The study concluded that culturally competent diabetes self-management education programs effectively promoted positive health beliefs and improved diabetes management outcomes. These results on health beliefs show that the intervention had a dose effect and reinforced the need for continuous interaction through support groups to achieve longer-lasting gains in health beliefs [15].

Moreover, the cross-sectional study on "culture" in diabetes-associated beliefs among high and low-education Indian American, White, and African American older adults (60 years or older) conducted by Grzywacz et al. reported that "ethnicity or culture or belief played a significant role in their diabetes disparities ($p < 0.01$)" [16]. The study showed a cultural basis for diabetes-related beliefs among Indian Americans, whites, and African Americans [16]. The limitations of the study must be taken into account while evaluating the research's contributions. Since the sample was not drawn at random and was made up of people from a specific geographic area, it is questionable whether the study's conclusions can be

applied to communities outside of the Southeast United States. People from other ethnic groups with a higher incidence of diabetes, such as Koreans, or Latinos were excluded from the sample [16].

In summary, the intervention to promote the knowledge of individuals is an important action to be taken toward a healthy lifestyle with support from healthcare professionals. Therefore, considering the growing older CALD population, healthcare professionals should prioritize developing interventions to prevent diseases and promote health in this populace. There is a need for further studies to determine the impacts of health beliefs in promoting health and preventing disease for this group.

BELIEFS AND MEDICATION ADHERENCE AMONGST CALD POPULATIONS.

Medication adherence is a significant health-related behaviour that promotes quality of life. A total of five articles reported on the impact of beliefs on medication adherence in the CALD population [22-26]. Of these, two were from the United States [24, 25], two from Australia [23, 26], and one from Finland [23] (Table 2). The National Institute for Clinical Excellence defines medication adherence as the degree to which a patient's behavior aligns with prescribed guidelines [27]. Adherence is critical for effectively managing chronic illnesses and achieving positive health outcomes [28]. However, poor adherence remains a significant challenge for healthcare professionals and a major obstacle to effective treatment [29].

It has been revealed that medication adherence is multifaceted. Cultural and personal beliefs are known psychosocial factors that contribute to medication adherence [30]. According to a recent cross-sectional study by Rees et al. (African Americans and Singaporeans of Chinese descent (≥ 65 years; $P < 0.05$; 57%, and 48%, respectively) significantly reported less or poorer medication adherence due to their beliefs, whereas the White Australians and Americans significantly reported greater medication adherence (65% and 67% reported total adherence respectively) [22]. The belief about the treatment of glaucoma was predictive of medication adherence in White Americans and Australian samples ($P < 0.05$) [22]. The relatively small sample size in the African American group may have hampered the groups' comparisons. There might be more variations among the samples that this study did not evaluate. For instance, it's unclear if the samples were similar in terms of visual symptom experience, disease type, or stage. It's also possible that the samples' views of the stigma attached to acknowledging poor adherence vary [22]. Self-reported rates may have been greater in some groups because participants may have been less inclined to acknowledge not taking doses. In conclusion, this study discovered that varied populations had notable variations in adherence rates and attitudes toward glaucoma and its management. Further cross-cultural studies are needed to investigate more into the nature of beliefs held by various groups. Identifying crucial predictors of adherence, particularly in non-western cultures [22].

Eh et al. investigated issues related to culture and other factors affecting the self-management of type 2 diabetes by Chinese immigrants (mean age of 64 years) in Australia [23]. The patients were found to have moderate adherence to medications and poor general self-management practices [23]. A greater level of acculturation predicted good adherence to medications, while stronger beliefs in Traditional Chinese Medicine (TCM) predicted poor adherence to medications [23].

Stronger beliefs in traditional Chinese medicine (TCM) were linked to poorer medication adherence, while higher levels of acculturation were associated with improved adherence [23]. Additionally, diabetes self-management practices were influenced by factors such as gender, education level, and the duration of diabetes. However, this study has several shortcomings. The small sample size limits the findings. The results may not be applicable to the entire Chinese immigrant population in Australia due to potential bias introduced by the convenience sample [23]. Additionally, the Royal Prince Alfred Hospital (RPAH) Diabetes Centre provided the majority of the sample. Nonetheless, there were no appreciable variations in self-management techniques between those sourced from the community and those recruited from the RPAH Diabetes Centre. Furthermore, the results may be an imprecise assessment of self-management performance because they relied on participants' self-reports. Causality cannot be established because this study was cross-sectional [23].

In summary, health beliefs are a significant factor in improving medication adherence. It is essential to assess patients' beliefs during clinical evaluations and incorporate them into strategies designed to enhance adherence. To foster positive attitudes and support therapeutic adherence, patient counseling and education about medical conditions, the importance of treatment, and potential side effects are crucial. Delivering patient-centered care and understanding individual beliefs about medications are vital for clinicians to achieve optimal health outcomes.

BELIEFS AND POLYPHARMACY AND POTENTIALLY INAPPROPRIATE MEDICATION AMONGST CALD POPULATIONS.

The usage of five or more medications in the community and nine or more in aged care is known as polypharmacy [31]. This issue is of considerable concern due to the associated risks and potential mortality, particularly given the growing population of older adults. Over the past decade, factors such as polypharmacy have contributed to the rising prevalence of geriatric syndrome, which refers to clinical conditions in older adults that do not fit into specific disease categories [32]. A patient's beliefs about medication can significantly influence their expectations, adherence, and willingness to discontinue treatment [33].

Conversely, potentially inappropriate medications (PIMs) refer to drugs where the risks outweigh the benefits, especially when safer, more effective alternatives are available [34]. The combination of an aging population, polypharmacy, multimorbidity (three or more chronic conditions), and shifting health beliefs poses a significant challenge for healthcare systems worldwide. The number of prescribed medications remains the primary risk factor for the use of PIMs [35]. Few studies, across a vast range of conditions, have provided insight into the opinions held regarding prescribed medicines among older patients experiencing polypharmacy or PIMs.

In a mixed-method study by Clyne et al. on elderly patients (mean age = 76.5) with polypharmacy, the majority (96.3%) believed their medications were necessary, although 33.9% expressed significant concerns. Positive and negative attitudes coexisted with strong beliefs in medications. It's possible that the doctor-patient relationship shaped attitudes and beliefs about medications, emphasizing the value of solid doctor-patient relationships that must be taken into account while deprescribing [36]. However, this study has few limitations. The topic guide was not designed to expressly address polypharmacy-related difficulties, the sample was restricted to trial participants who might not be representative of all older adults, and the average interview length was shorter (14 minutes) than one might anticipate. A more thorough interview might have yielded a more nuanced perspective, even though the ideas discussed here were clearly drawn from the data [36].

Another study by Reeve et al. investigated individuals' (≥ 18 years; median 71.5) beliefs, attitudes, and experiences concerning polypharmacy, and willingness to deprescribe [37]. The study found that participants were taking an average of ten different prescription and over-the-counter medications, including complementary treatments, both regularly and as needed. More than 60% of respondents felt they were on too many medications, and 92% indicated they would be willing to stop one or more of their prescriptions if possible [37]. Interestingly, factors such as age, the number of medical conditions, or the amount of regular medications did not influence participants' desire to discontinue a medication, with similar results observed for both older and younger individuals [37].

Considering the significant role of beliefs in the use of medications in older adults, it is important to study the impacts of beliefs on older CALD populations with polypharmacy and PIMs. This will help address polypharmacy and PIMs in the context of older CALD adults.

HEALTH LITERACY AND MEDICATION USE AMONGST CALD POPULATIONS.

Health literacy refers to an individual's ability to access, understand, evaluate, and use health information and services to make informed decisions and take appropriate actions for their health and well-being [38]. It plays a crucial role in improving health outcomes (polypharmacy, PIMs, and medication adherence), reducing health disparities, and empowering individuals to participate in their healthcare actively [39-41]. Low patient health literacy has been linked to poor health outcomes, such as higher hospitalisation, diagnosis delays, suboptimal use of preventive interventions, and an increased mortality risk in adults [42]. Only one article reported on the influence of health literacy on medication use in the CALD population (Table 3) [43].

In an observational study by Bauer et al. on health literacy and medication adherence among adults with diabetes (including Asians, African Americans, Latinos, and Filipinos) [43]. Among 2,040 patients newly prescribed an antidepressant, complete health literacy data was available for 1,366 (67%), the majority of whom (72%; n=984) reported having some health literacy limitations. After adjusting for clinical covariates and sociodemographic factors, those with limited health literacy showed significantly poorer medication adherence compared to those without such limitations [43]. In summary, there is a scarcity of research examining the impact of health literacy on medication use within CALD populations, indicating a need for further investigation in this area. The study findings emphasize the vital role of health literacy and education in promoting treatment adherence and improving access to healthcare.

DISCUSSION

The key findings obtained from the various themes of this study underscore the significant impact of health beliefs and health literacy on medication use involving adherence, polypharmacy, and PIMs in older CALD populations. While research highlights the role of cultural and personal beliefs in shaping health behaviours [2, 44], gaps persist in understanding their detailed effects, particularly concerning older adults from CALD populations. Only thirteen articles addressed the evaluations of health beliefs, while ten articles focused on health literacy across different conditions in older CALD populations, however, prospective experiments were lacking. This highlights that evidence on the impact of health beliefs on health promotion and disease prevention remains exploratory.

The first theme, "Beliefs and Health Promotion and Disease Prevention", examines the influence of health beliefs on medication use in treating conditions such as psychosis, diabetes, and hypertension among various populations, including African Americans, Indian Americans, Bangladeshi, Mexican Americans, Nigerians, Taiwanese, and both White males and females. The findings suggest that older CALD adults tend to hold more negative beliefs about their medications compared to White patients. Furthermore, these older CALD patients were more likely to report underuse of medications, reflecting more negative beliefs/attitudes than their White counterparts [14-21].

Understanding the impact of health beliefs on medication usage is essential for healthcare professionals to provide patient-centered and tailored interventions [2]. Moreover, it is important to recognize that patients make rational decisions about their health and take medications based on their knowledge, experience, and beliefs. Therefore, healthcare providers should strive to understand and address patients' concerns and beliefs to improve medication adherence and health outcomes. By acknowledging and integrating diverse health beliefs into treatment plans, healthcare professionals can better support patients in managing their health conditions effectively.

The second theme, "Beliefs and Medication Adherence", explores the extent to which a patient's health beliefs align with and influence established therapeutic guidelines. For example, the participants perceived that diabetes medicines were a significant and efficient part of their therapeutics, and they reported higher comfort in the adherence to their prescribed treatment regimens than in making life-long lifestyle changes. Researchers reported that in this group, participants' evaluations of their condition and treatment, as well as their adherence to diabetes self-care activities, were significantly correlated. Poorer adherence to dietary advice, exercise, blood glucose testing, and foot care were highly significantly linked with Arabic-speaking participants (ASPs) negative beliefs about diabetes [22-26]. Addressing medication adherence, quality of life, and patients' understanding of their diseases is essential for optimizing health outcomes. Future research efforts should focus on implementing targeted interventions, exploring psychosocial factors, and evaluating innovative healthcare delivery models to improve patient care and enhance treatment outcomes. No studies were identified specifically addressing the impact of health beliefs on health promotion and disease prevention among older CALD populations dealing with polypharmacy and potentially inappropriate medications (PIMs); instead, studies focused on older populations more generally.

The fourth theme, health literacy and medication use discusses the impact of health literacy on medication use involving adherence, polypharmacy, and PIMs [42]. According to the result of the studies, health literacy and education play a

crucial role in treatment adherence and access to medical care. Improving health literacy is essential for enhancing medication adherence, managing polypharmacy, and minimizing PIM use, particularly among older CALD populations. Healthcare providers should address the needs of culturally and linguistically diverse populations with tailored educational materials, target CALD patients with low literacy levels, offer additional support to manage complex treatment regimens and ensure CALD patients understand instructions through demonstration or repeat-back techniques. By integrating these strategies, healthcare systems can address disparities, improve adherence rates, and enhance health outcomes in diverse CALD populations. Limited studies were obtained on health literacy on polypharmacy and PIMs amongst CALD populations.

Despite the positive outcomes, this review has shown that the relationship between health beliefs and health literacy in the older culturally and linguistically diverse (CALD) population is not sufficiently incorporated into health-related discussions or healthcare planning. This highlights the need for greater cultural competency in healthcare to address the unique needs of these populations. Older CALD individuals are predominantly positioned as patients rather than represented among healthcare professionals or policymakers, limiting their influence on the system.

Individuals from CALD backgrounds face challenges navigating health and social systems due to limited English proficiency, cultural differences, and several interrelated socioeconomic factors, including lower income, education, and access to resources. These barriers are compounded by the prevalence of chronic conditions and multimorbidity, which require tailored and equitable approaches to care. To effectively prevent and manage diseases, health systems, and services must prioritize culturally relevant health treatments that align with diverse health beliefs and practices.

Acculturation also plays a significant role, as varying levels of adaptation to the dominant culture influence health beliefs, health literacy, and interactions with healthcare providers. Addressing these disparities requires practical measures such as ensuring the availability of multilingual health resources and on-site interpreters, which are critical for overcoming language and cultural barriers and enhancing healthcare access.

Given the limitations of existing studies on the influence of health beliefs and health literacy on promoting health and preventing disease in the older Korean population, it is essential to build on available findings and focus on strategies that guide future research. More studies are needed to explore how cultural health beliefs, health literacy, socioeconomic status, and acculturation intersect and influence health promotion and disease prevention in this demographic. These insights can inform culturally competent healthcare planning and ultimately improve health outcomes for older CALD populations.

CONCLUSION

This review highlights how health beliefs and health literacy can affect medication adherence, polypharmacy, and potentially inappropriate medications, as well as health promotion and disease prevention. However, no direct findings were available regarding the impact of health beliefs on polypharmacy and PIMs in older CALD populations. Also, there is a scarcity of research examining the impact of health literacy on medication use within CALD populations. Addressing these concerns underscores the need for further research in this area. Future studies should focus on examining the effects of health beliefs on health promotion and disease prevention in older CALD populations to better understand their support needs and inform the development of targeted interventions.

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APPENDIX

TABLE 1. SELECTED STUDIES ASSESSING THE EFFECTIVENESS OF BELIEF OUTCOMES ASSOCIATED WITH HEALTH PROMOTION AND DISEASE PREVENTION

S/N	Study and year	N	Participant/Population	Study type	Country	Key findings	Refs.
	Rovner & Casten, 2021 [14]	94	African American with diabetes at Thomas Jefferson University Hospital	Cross-sectional. (Telehealth)	USA	When compared to participants with fewer beliefs (n=45; 47.7%), those with two or more beliefs (n=49; 52.3%) reported worse diabetic self-care (lower DSC-R scores, 47.0 [SD 14.9] vs 55.5 [16.9], respectively)	[14]
	Brown et al, 2007 [15]	216	Mexican Americans with type 2 diabetes	Randomized controlled trial (Questionnaires)	USA	Each subscale Mean health belief scores increased for both intervention groups. For participants in the lengthier, extended program, improvements in health attitudes lasted longer at 12 months. The HbA1c levels at 12 months, were most significantly predicted by the health belief subscale control.	[15]
	Grzywacz et al, 2012 [16]	593	African American, American Indian, and White males and females from eight (8) South Central North Carolina Counties	Cross-sectional (Questionnaires)	USA	There is significant overlap in the ideas about diabetes held by African Americans, American Indians, and White people. Diabetes beliefs were most comparable in the areas of "symptoms" and "consequences" as opposed to "causes" and "medical management."	[16]
	Piette JD et al, 2010 [17]	806	African American and White diabetes patients	-	USA	The patients with diabetes have negative beliefs about their use of medications. The African Americans portrayed more negative beliefs/attitudes than White patients and were more	[17]

likely than White patients to report underuse related to the use of medicine (19% versus 13%; p5.02)

Weller SC et al, 1999 [18]	161	Latino adults from four diverse communities: Hartford, Connecticut; Edinburg, Texas; Guadalajara, Mexico; and rural Guatemala	-	USA (Hartford, Connecticut, Edinburg, Texas; Guadalajara, Mexico; and rural Guatemala)	The CCM facilitated the assessment of cultural beliefs regarding diabetes and its management. Above all, the cultural beliefs of Latinos about diabetes were concordant with the biomedical model. Higher acculturation, greater educational attainment, and higher diabetes prevalence were linked with greater cultural knowledge about the disease condition "diabetes".	[18]
Akinlua, Meakin, Freemantle, 2017 [19]	27	Immigrants of Nigerian descent	Qualitative (Interview)	UK	The meaning of the term "hypertension", "perceptions" of causation", "effects of hypertension", and "perceptions of treatment" were the four main categories in which participants stated their beliefs. The survey showed a variety of hypertension beliefs that included both conventional and culturally defined notions.	[19]
Greenhalgh et al, 1998 [20]	40	Diabetes patients from Bangladesh living in Britain and non-Bangladesh controls were gathered from primary care,	Qualitative (Semi-structured interviews, focus groups, and pile sorting exercise	UK	There was minimal indication of a fatalistic or deterministic approach [attitude] to prognosis. The majority of the informants appeared to be quite motivated to change their diet and follow the treatment plan. Barriers to behavior change that structural and material were at least as significant as those that were "cultural".	[20]

Berg et al, 2018 [21]	277	40 first- and 40 second-generation immigrants from Europe, America, and Oceania (n = 37), Asia including Turkey (n = 28) or Africa (n = 15 with Psychosis	Cross-sectional (Structured-clinical interview)	Norway	First-generation immigrants were less likely than the reference group to recognize psychotic symptoms [odds ratio (OR) 2.9; Wald = 8.977, d.f. 1, P = 0.003] and to perceive hospitalization (OR 5.2; Wald = 20.388, d.f. 1, P = 0.001) and treatment by a psychiatrist (OR 4.9; Wald = 6.609, d.f. 1, P = 0.01)] as less helpful. More alternative explanations were held by immigrants from Asia (OR 0.3; Wald = 6.567, d.f. 1, P = 0.010). In the reference group, there were noticeably greater correlations between clinical insight and socio-cultural values.	[21]

NOTE: SD, standard deviation; CI, confidence interval; DSCI-R, diabetes self-care inventory-revised; HbA1c, haemoglobin-A1c; TB, tuberculosis; d.f., degrees of freedom; CCM, cultural consensus model

TABLE 2. SELECTED STUDIES ASSESSING THE EFFECTIVENESS OF BELIEF OUTCOMES ASSOCIATED WITH MEDICATION ADHERENCE

S/N	Study and year.	N	Participant/Population	Study type	Country	Key findings	Refs
	Rees G et al, 2014 [22]	475	White Americans, African Americans, white Australians, and Singaporeans of Chinese descent with glaucoma	Cross-sectional	Helsinki, Finland	White Australians and Americans significantly reported greater adherence (65.0%, 67.0% reported total adherence to medication) than Singaporeans or African Americans (57.0%, 48.0%, respectively; P<0.05). The belief about the treatment of glaucoma was predictive of medication adherence only in White Americans and Australian samples (P<0.05).	[22]
	Eh K et al, 2016 [23]	139	Australian Chinese immigrants in Royal Prince Alfred Hospital (RPAH), Sydney with T2D	Cross-sectional	Australia.	The patients were found to have low adherence to medications and poor general self-management practices. 24% of participants reported a belief shame surrounding the diagnosis of their diabetes. The participants (13.7%) reported incorporating traditional Chinese medicine into their treatment.	[23]

Greater level of acculturation predicted good adherence to medications, while stronger beliefs in traditional Chinese medicine predicted poor adherence to medications.

Soones TN et al, 2017 [24]	433	Hispanic and non-Hispanic blacks from hospital and community practices in New York, New York, and Chicago, Illinois with asthma		New York, and Chicago, Illinois, USA	The participants (36%) with less health literacy, had more beliefs and were more likely to have asthma misconception ($P < .001$), and its medications. Health literacy had an indirect ($P = .002$; $\beta = 0.033$), and direct ($P < .001$; $\beta = 0.089$) effect on medication adherence mediated by concerns. Neither illness beliefs ($P = .143$; $\beta = 0.007$), nor medication necessity ($P = .138$; $\beta = 0.044$;) indicated a mediational role between medication adherence and health literacy	[24]
Krauskopf K et al, 2015 [25]	188	Black and Hispanic adults from outpatient primary care and pulmonary clinics, the inpatient service of the Mount Sinai Medical Center (East Harlem, New York), Northwestern Memorial Faculty Foundation (Chicago, Illinois), and Mercy Family Health Center (Chicago, Illinois)	Observational	New York, and Chicago, USA	The nonadherent participants were more likely to be Hispanic or black ($p = 0.001$), had lesser years of formal education ($p = 0.002$), and to have reported minimal income ($p = 0.002$). In adjusted analyses, the concerns on COPD medicines predicted non-adherence independently (CI: 0.36-0.75, odds ratio: 0.52, 95%). In unadjusted comparisons, the participants with non-adherence reported having high concern about their COPD (Cohen's $d = 0.43$; $p = 0.011$), higher concerns about COPD medications (Cohen's $d = 0.81$; $p < 0.001$), and more emotionally affected by the disease (Cohen's $d = 0.54$; $p = 0.001$).	[25]
Alzubaidi et al, 2015 [26]	701	Caucasian English-speaking people and Arabic-speaking immigrants with T2D	Cross-sectional (Questionnaire)	Australia	Participants' evaluations of their condition and treatment, as well as their adherence to diabetes self-care activities, were significantly correlated. Poorer adherence to dietary advice, exercise, blood glucose testing, and foot care were highly significantly linked with ASPs' negative beliefs about diabetes.	[26]

When compared to ESPs, ASPs had significantly lower adherence to all facets of diabetes self-care, including dietary practices ($P = <0.01$; 95% confidence interval (CI) = -1.17, -0.84), exercise and physical activity ($P = <0.001$, 95% CI -1.14, -0.61), blood glucose testing ($P = <0.001$) and foot-care ($P = <0.001$). Only 11.2% of the ESPs had doubts regarding diabetes treatments that had been prescribed, compared to 52.8% of ASPs. 88.3% of ESPs, respectively, did not take their medication as directed.

NOTE: ASP, Arabic speaking participants; COPD, chronic obstructive pulmonary disease; CI, confidence interval

TABLE 3. SELECTED STUDIES ASSESSING THE EFFECTIVENESS OF HEALTH LITERACY OUTCOMES ASSOCIATED WITH MEDICATION USE.

S/N	Study and year	N	Participant/Population	Study type	Country	Key findings	Ref.
	Bauer et al, 2013 [43]	1366	Individuals (Asians American, African American, Caucasian, Latino, Filipino, multiracial, and others/unknown) from specialty center or clinic	Observational study	USA	Patients [Asian American (n=69, 7.0%), African American (n=177, 18.0%), Caucasian (n=264, 26.8%), Filipino (n=72, 7.3%), Latino (n=250, 25.4%), Multiracial (n=113, 11.5%), other/unknown (n=39, 4.0%)] with health literacy limitations had significantly poorer adherence after adjusting for clinical covariates and sociodemographic, compared to those with no limitations, whether measured as early non-persistence (46 % versus 38 %, $p < 0.05$), non-persistence at 180 days (55 % versus 46 %, $p < 0.05$), or NPMG (41 % versus 36%, $p < 0.01$)	43

NOTE: NPMG, new prescription medication gap

A REVIEW OF PATIENT EDUCATION STRATEGIES IN CHRONIC CONDITIONS, LIKE EPILEPSY AND POST-STROKE CARE

Rajesh Pandita*, Rachna Patel

Institute of Management Studies, Indus University, Ahmedabad, Gujarat, India

Correspondence: rajesh.eri1@gmail.com

ABSTRACT

"Every patient holds a perspective regarding their condition."

Since the inception of patient care within the healthcare sector, patient education has been a vital component. It involves systematic efforts to alter patient behaviour and facilitate improvements in the skills, knowledge, and attitudes essential for maintaining or enhancing health outcomes. Rooted in the Latin term "doctor," which comes from "docere," meaning "to educate," it falls upon every physician to educate patients, their families, and the broader community.

The aim of this research is to critically review and evaluate patient education strategies employed in the management of chronic conditions, specifically epilepsy and post-stroke care, to determine their effectiveness in improving patient outcomes and self-management.

Family physicians play an essential role in spearheading patient education initiatives. By leveraging their position as primary care providers, they foster enduring and trustworthy relationships with patients. This unique bond helps to promote and facilitate shifts in health-related behaviours. Consequently, patient education is a fundamental aspect of residency training for family doctors.

Improving patients' quality of life through structured, regular interactions should be the foremost aim of patient education to optimize outcomes. However, the limited time allocated for each patient visit—usually under five minutes in urban settings and much shorter in public hospitals—indicates that patient education remains significantly inadequate in India. Due to this reduced Turnaround Time (TAT), comprehensive patient education programs are largely unfeasible.

KEYWORDS

patient education, care, quality of life, epilepsy, post-stroke, India.

INTRODUCTION

Worldwide, chronic diseases are prevalent and play a major role in mortality and health complications. In the United States, 60% of individuals have a chronic condition, leading to annual healthcare costs nearing \$USD4.5 trillion.[1]

In India, patient education for chronic neurological conditions like epilepsy and stroke remains suboptimal, often hindered by limited health literacy, poor accessibility, and inconsistent follow-up care. The turn-around-time (TAT)—the delay between diagnosis, counselling, and initiation of appropriate therapy—significantly affects long-term outcomes.

Prolonged TAT can lead to poor medication adherence, recurrent events (e.g., seizures or strokes), and preventable disability, especially in rural or resource-constrained settings. A study by Gourie-Devi et al. (2017) emphasized the urgent need for structured epilepsy education programs to reduce stigma and improve compliance. Similarly, Pandian et al. (2018) highlighted that delayed post-stroke rehabilitation and inadequate caregiver education directly contribute to poor functional recovery. These delays underscore the need for streamlined patient education and early intervention protocols to improve outcomes in chronic neurological care in India. [2,3] With more than 80% of medical consultations worldwide about chronic diseases, these ailments are the main cause of seeking medical attention. Chronic illnesses are linked to significant psychosocial impairment and a worse quality of life in addition to their harmful biological effects.[4]

The diagnosis and treatment methods for chronic illnesses have been significantly improved by recent developments in medical research. Our knowledge of the causes of chronic illnesses has significantly increased over the last ten years as a result of advancements in epidemiology and public health. This has brought attention to the negative effects of unhealthy behaviours and lifestyles, such as alcohol drinking, tobacco use, poor eating habits, psychological stress, and physical inactivity. Innovative medical practices, pharmacological advancements, and new technology have all helped manage chronic illnesses and improve patient outcomes. [5, 6]

Since patient education remains less of a priority of the clinicians in India, due to very high patient turnover on daily basis, a literature review was completed from 2000 to 2022. However, owing to the nature of the review, a few studies were included from prior of 2000 to get more insight of the patient education.

Literature Review:

- Records identified through PubMed, Scopus, EMBASE, Google Scholar, (n = 203)

After Screening:

- Records after duplicates removed (n = 120)
- Records screened by title/abstract (n = 120)
- Records excluded (n = 59)
- Full-text articles assessed for eligibility (n = 61)
- Excluded irrelevant (n = 5)

Studies included in qualitative synthesis (n = 54)

According to a recent WHO report, 5 million people globally are thought to receive an epilepsy diagnosis each year. The incidence rate is around 49 per 100,000 people annually in high-income countries. On the other hand, the incidence rate can rise to 139 per 100,000 people annually in low- and middle-income nations. Stroke remains the second leading cause of mortality and the third leading cause of combined mortality and disability globally, as measured by disability-adjusted life years (DALYs). [7]

The estimated global economic burden of stroke exceeds \$USD 721 billion, equivalent to 0.66% of the global GDP. Between 1990 and 2019, the stroke burden, in terms of the absolute number of cases, increased substantially: incident strokes by 70.0%, stroke-related deaths by 43.0%, prevalent strokes by 102.0%, and DALYs by 143.0%. The majority of the global stroke burden, comprising 86.0% of stroke-related deaths and 89.0% of stroke-related DALYs, is confined to low-income and lower-middle-income countries (LMICs). This data is presented in the World Stroke Organization (WSO) Global Stroke Fact Sheet 2022. [44,45,62]

Healthcare professionals who disseminate Therapeutic patient education (TPE), are designed to empower patients to understand their conditions, actively participate in clinical decision-making, and effectively manage their health. Many educational interventions for patients have demonstrated significant improvements in medical outcomes, self-efficacy, and treatment satisfaction across various chronic conditions. [7,8,9,10] These interventions facilitate lifestyle modifications and enhance adherence to treatment regimens. Developing these skills is crucial for fostering self-efficacy and self-care behaviours, ultimately leading to better biomedical and psychosocial outcomes in individuals with chronic disorders. [11,12,13]

Chronic illnesses, like epilepsy and post-stroke, affect patients who may live a quality of life provided they get proper therapeutic patient education by clinicians or rehab-specialists. However, the following challenges often make it very difficult to impart patient education owing to the varied nature of patients coming from different strata of our Indian society: [14]

THE CHRONIC ILLNESS

- Often refractory to treatment.
- Typically remains asymptomatic except during acute exacerbations.
- The associated pain is generally persistent in nature.
- Subjective symptom severity often shows a weak correlation with objective biological markers.
- Disease progression is unpredictable.
- Potentially modifiable by lifestyle factors.

THE PHYSICIAN

- Oversees treatment while exerting indirect control over disease progression.
- Educates patients on managing their treatment and promotes shared decision-making.
- Primarily manages the condition during its asymptomatic phase.
- Provides acute care during exacerbations.
- Monitors for late-stage complications.
- Facilitates psychological and social support.
- Adapts to evolving medical roles and responsibilities.
- Collaborates effectively within a multidisciplinary team.

THE PATIENT

- May not achieve a cure but can manage the illness.
- Must tailor treatment to align with personal life factors.
- Experiences the illness as asymptomatic outside acute episodes.
- Faces relapse if vigilance wanes.
- Requires training to respond promptly during crises.
- Must accept a certain degree of compromised integrity.

THE TREATMENT

- Essential for maintaining survival and/or daily well-being.
- Effectiveness exhibits significant variability.
- Frequently necessitates patient education for optimal management.
- Requires consistent daily adherence.
- Often time-intensive for the patient.
- Commonly interferes with social activities.

Patient education has a well established role in improving health outcomes, especially for individuals with chronic diseases. Chronic conditions are persistent, and enhancing health literacy and self-efficacy is essential for effective disease management. Patients with a clear understanding of their health conditions are more likely to engage actively in their care, resulting in better health outcomes. As a result, patient education has become an integral aspect of healthcare management, as it strengthens patients' health literacy. [15,16]

Advancements in technology and the widespread accessibility of the Internet have positioned online media as a promising tool for patient education. Many patients have reported dissatisfaction with traditional in-person education, attributing it to factors such as healthcare professionals' heavy workloads, insufficient communication skills, and the challenge of conveying extensive information within constrained time limits. Consequently, online patient education presents a valuable supplementary resource that may help address these issues by offering accessible and comprehensive health information. [17,18]

DISEASE BURDEN:

The global economic burden of epilepsy, determined by multiplying the per capita cost by the estimated 52.51 million people affected by the condition worldwide and adjusting for the treatment gap, is approximately \$USD119.27 billion. [19]

In 2019, approximately 12.2 million new stroke cases were reported globally, contributing to the loss of 143 million disability-adjusted life years (DALYs) and 6.6 million fatalities. As a result, stroke ranked as the second leading cause of mortality and the third leading cause of disability worldwide. [20]

Research indicates that patient education is pivotal in managing chronic non-communicable diseases (NCDs) at both the population and individual levels. [21] Often, patients are merely handed a leaflet and sent home, leading them to rely on informal online chatrooms for support. [22]

Therapeutic Patient Education (TPE) is a structured, evidence-based learning process in which trained healthcare professionals guide patients in acquiring the skills needed to manage their conditions. [23] This approach is patient-centred and incorporates techniques such as skills development and self-monitoring. By involving caregivers and family members, TPE empowers individuals to manage chronic conditions over their lifetime, adapting to changes in their health and encouraging them to modify their lifestyle. Countries within the WHO European Region are at varying stages of incorporating TPE into the foundational curricula for health professional training. [24]

Countries within the WHO European Region are at varying stages of incorporating Therapeutic Patient Education (TPE) into the core curricula of health professional training. To support the implementation and expansion of TPE programs for healthcare providers, policymakers can adopt several strategies:

- Modify workforce regulations to enable collaborative patient education among health professionals, broadening their roles and responsibilities.
- Integrate TPE into the specifications for healthcare provider commissioning.
- Revise educational approaches and introduce accredited programs in patient education for health and allied professionals.
- Mandate TPE training for healthcare professionals, including in undergraduate nursing and medical school curricula.

However, these measures alone are insufficient to guarantee the successful integration of TPE at the population level. Individuals from lower socioeconomic backgrounds often have reduced health literacy, necessitating initiatives that ensure these underserved populations have access to, and can effectively utilize health information. [20,24] Political commitment is essential to overcoming barriers to patient education for those facing the greatest healthcare challenges.

The Special Initiative on Non-Communicable Diseases (NCDs) and Innovation has highlighted the importance of TPE in the broader context of health system transformation for NCD management. TPE must be embedded within professional healthcare training, requiring policy adjustments and investments to develop such programs. This investment can yield significant benefits, strengthening the patient-provider relationship and empowering individuals with the knowledge, skills, and confidence to manage their conditions and seek appropriate care when necessary. [25,26]

A comprehensive step-by-step guide has been developed for policymakers, senior health professionals, and professional healthcare bodies responsible for workforce training and education. This guide aims to support the practical integration of TPE into healthcare systems. [27]

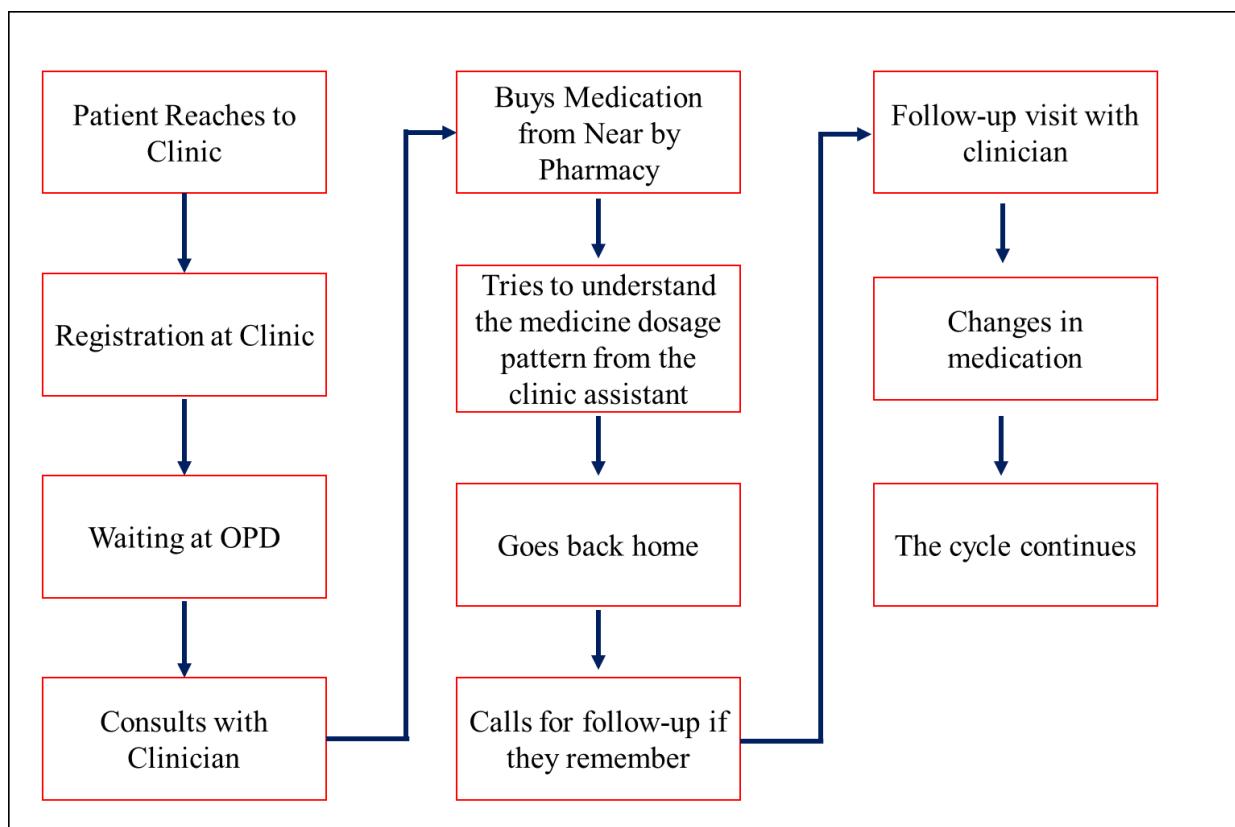
THERAPY ADHERENCE:

Post-stroke quality of life (QOL) in survivors shows a positive association with adherence to pharmacotherapeutic regimens prescribed for secondary prevention. Achieving optimal adherence to pharmacological treatments is crucial for maximizing therapeutic outcomes, thereby reducing morbidity and mortality rates associated with stroke.[27] Improved adherence is linked to a reduction in stroke recurrence and an enhancement of QOL indicators. However, the World Health Organization (WHO) estimates that medication adherence for chronic conditions remains suboptimal, with rates approaching 50%.[28]

Medication adherence transcends mere quantification of pharmacological compliance; it encompasses a holistic assessment of the multifaceted etiologies contributing to a patient's reluctance or incapacity to adhere to recommended therapeutic protocols.[29] It is incumbent upon healthcare practitioners to identify and scrutinize the determinants influencing medication adherence, thereby facilitating the formulation and implementation of targeted interventional strategies. Such strategies aim to foster concordance within the therapeutic alliance, culminating in a synergistic pursuit of predefined health outcomes by both the patient and the medical provider.

Particularly in India, there exists a spectrum of health outcome disparities influenced by socioeconomic variables, which elude complete elucidation through conventional paradigms such as substandard health-related behaviours and practices.[30] A comprehensive understanding of the interplay between socioeconomic, clinical, and health-related quality of life (HRQOL) factors with medication adherence post-stroke is essential.[31]

FIGURE 1 PATIENT JOURNEY IN NEUROLOGY CLINIC.



Patient Journey in Neuro-clinic has always been challenging owing to a lack of education and awareness at large as shown in Figure 1. Observations completed during visits to neuro-clinics outlined this patient journey in Indian setting.

Epilepsy is a prevalent neurological disorder characterized by abnormal movements, which may occur with or without loss of consciousness. Globally, nearly 70 million people are affected by epilepsy. However, it is often underreported, with many cases going unrecognized, potentially affecting over 40 million individuals. In India, the prevalence rate of epilepsy is 5-10 per 1000 population. Epilepsy is presented in two major forms: generalized and/ or partial. [32,33]

Worldwide, misconceptions, fear, and negative public attitudes towards epilepsy lead to discrimination, isolation, and widespread social rejection of individuals with the disorder. [34] Despite its prevalence, epilepsy can be effectively prevented and treated at a manageable cost. Medication adherence is crucial for the effectiveness of antiepileptic therapy, as poor adherence is the primary cause of drug therapy failure in epilepsy. [30] Non-adherence leads to an increase in the frequency and severity of seizures, resulting in more hospitalizations. Consequently, non-adherence directly raises healthcare costs and diminishes the quality of life for patients. Adherence can be defined as the degree to which a patient's behaviour and daily activities align with their physician's recommendations. [35,36]

Stroke ranks as the fourth leading cause of mortality and a significant contributor to severe physical disability among adults in the United States. [37] Medications spanning various classes, including antiplatelet agents, antihypertensives, and statins, substantially mitigate the risk of both initial and recurrent strokes. However, adherence to these medications remains suboptimal among stroke survivors. [38,39]

ADHERENCE CHALLENGES:

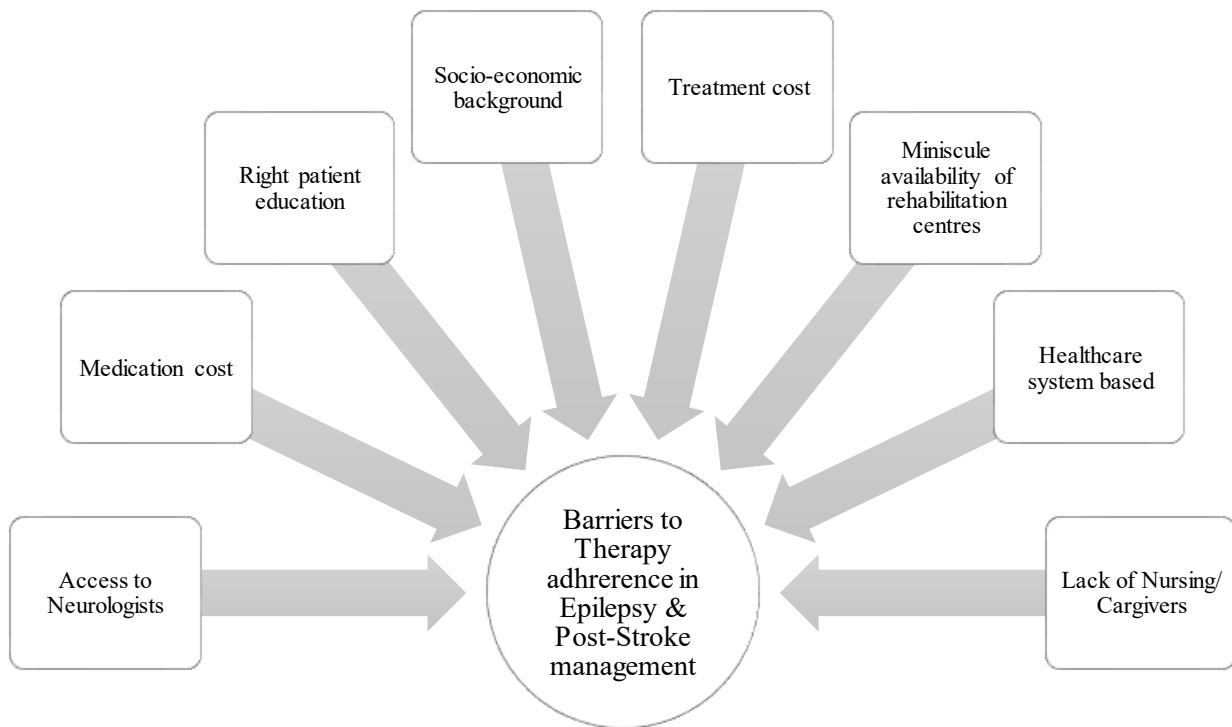
- In a study involving 2,598 patients discharged after stroke or transient ischemic attack (TIA), approximately one in four participants discontinued one or more stroke prevention medications within three months of discharge. [40]
- In India the discontinuation in epilepsy is more than in the US where 1/3rd didn't adhere to the medication.
- For stroke it was as high as 30%, which remains a big concern in patient care. [41,42]
- Another study of 3,571 stroke survivors revealed that roughly one-third of patients exhibited suboptimal adherence to antihypertensive medications during the year following their stroke. [43]

PREDICTORS AND BARRIERS:

- While researchers have identified predictors of non-adherence to cardiovascular medications, few have specifically assessed barriers to adherence in stroke survivors. [44,45]
- Predictors often relate to patient factors such as age, income, and education, which help identify those most in need of adherence interventions but may not be directly modifiable.

In contrast, adherence barriers involve potentially modifiable factors that healthcare providers and systems can address to reduce medication non-adherence. [46,47]

FIGURE 2 BARRIERS TO THERAPY ADHERENCE.



CLINICAL INERTIA:

Clinical inertia, which refers to the inability to adjust treatment in patients who do not achieve evidence-based care targets, plays a significant role in the inadequate management of chronic conditions such as epilepsy and post-stroke care.[48] It is a leading factor behind preventable negative outcomes, disabilities, fatalities, and increased healthcare expenditures. Gaining a comprehensive understanding of clinical inertia and creating specific strategies to address it could help lessen the passive errors that lead to hundreds of thousands of adverse incidents and tens of thousands of avoidable deaths each year in the United States.

Clinical inertia arises from various sources and is influenced by factors related to physicians, patients, and office systems. Physician-related factors include decision-making biases, overestimation of care provided, disagreement with evidence-based care goals, and "soft reasons" for avoiding treatment intensification. Patient-related factors encompass a lack of awareness about the need for therapy intensification, denial or overly optimistic perceptions of chronic disease risks, and reluctance to incur increased costs and side effects associated with more intensive treatments. Office system-related factors include insufficient data to monitor care quality and identify patients needing intensified care, lack of visit planning, inadequate proactive patient outreach, and failure to implement decision support strategies, especially those providing actionable information during office visits. [49]

Therapeutic non-adherence remains the biggest clinical challenge in today's era of disease management. Non-adherence to therapy as prescribed to patients is multifactorial in nature which results in poor quality of life:

- Prescription briefing to the patient during clinic visits
- Proper guidelines and understanding of dosage regimen
- Lack of patient education during the complete patient journey
- Lack of knowledge at the pharmacy level to educate the patient about the importance of medication adherence.

Hence, addressing clinical inertia remains the key to improving clinical outcomes. [50]

COST BURDEN ON PATIENTS:

Epilepsy presents a significant economic burden on individuals with epilepsy (PWE) and their families, particularly those from lower socioeconomic backgrounds, who are more susceptible to restricted access to quality healthcare. Beyond limited employment opportunities, PWE experience additional financial strain, including transportation costs and lost wages, exacerbated by disruptions in the availability of free antiepileptic drugs (AEDs) in publicly funded healthcare facilities.

The economic impact of epilepsy has not been extensively studied in the Indian context. The costs associated with epilepsy care can be broadly categorized into direct, indirect, and intangible costs. Direct costs include medical expenses related to prevention, diagnosis, treatment, and rehabilitation, as well as non-medical expenses such as travel and housekeeping. This encompasses outpatient treatment, diagnostic charges, radiological investigations, and the cost of AEDs, among other expenses. Indirect costs include the loss of time, productivity, and wages incurred by both the individual and their family. Intangible costs, which are difficult to measure, include psychosocial pain, stigma, and suffering. Due to the inherent difficulties in quantifying indirect costs such as caregiver time, lost productivity due to disability and premature mortality, and lost opportunities from premature cessation of schooling and employment, these factors are often excluded from many studies. Additionally, costs associated with pretreatment help-seeking, managing comorbid conditions, side effects of AEDs, and intangible costs are also frequently omitted from analyses. Consequently, the actual economic burden of epilepsy is likely significantly higher than current evidence suggests. [51]

Thomas et al. reported in their multicentred study that the annual indirect expenditure that patients incur in neurological conditions is INR ₹ 10,031 (\$USD 118.53). The annual economic burden of epilepsy was estimated to be 88.2% of the Gross National Product (GNP) per capita and 0.5% of the total GNP, amounting to INR ₹68.75 billion (US\$1.7 billion). [52]

On the other hand, Stroke patients incur a financial burden of up to INR ₹ 50,000 (\$USD 590.81), with a significant proportion experiencing disabilities related to comprehension and speech. The economic burden associated with stroke-related hospitalization is substantially high, underscoring the necessity for government-funded health insurance to cover stroke-related medications and reduce out-of-pocket expenses for patients receiving treatment in healthcare facilities. The study underscores the urgent need for improved schemes to address the escalating threat of strokes in the northeastern regions of India, to effectively tackle this public health challenge. [53]

IMPACT OF PATIENT EDUCATION:

Due to the significant impact of the condition and the growing evidence of a silent stroke epidemic in India, the rehabilitation needs for stroke survivors are expected to be considerable. Therefore, future investments in epidemiological research on stroke in India will likely contribute to the development of more effective preventive strategies against stroke and its associated mortality. Additionally, such research may improve the organization of cost-efficient stroke care services and rehabilitation programs, addressing the unmet needs of stroke survivors and their caregivers. [54]

It is crucial for patients and the community to be educated on the signs and symptoms of stroke. Promoting patient engagement in self-care to the fullest extent possible is essential. Assistive devices should be provided in accordance with current guidelines. An occupational therapist should conduct a home assessment and provide recommendations to enhance the patient's independence. Coordinated care involving multiple healthcare providers aids families in planning care strategies and informs them that the patient may experience fatigue, irritability, agitation from minor events, and decreased interest in daily activities. The therapist should recommend home-based speech therapy, encourage family involvement, and provide practical instructions to assist the family between speech therapy sessions. [60,61]

If necessary, consultation with a physician regarding potential antidepressant therapy for the patient should be considered. The therapist should encourage patient participation in community-based stroke support groups to foster a sense of belonging and companionship, as well as engagement in hobbies, recreational, and leisure activities.

Maintaining social connections to prevent isolation and encouraging family support with positive reinforcement is important. Additionally, families should be reminded to attend to their health and well-being. [55]

The knowledge of caregivers and emergency medical personnel regarding the identification of status epilepticus (SE) and the administration of rescue medications may result in improved patient outcomes and reduced adverse effects associated with SE. Currently, no prior interventional studies have assessed knowledge specifically related to SE. However, an Iranian study has examined educational interventions targeting febrile seizures.[56]

Health information delivery methods in educational interventions vary from traditional approaches (such as leaflets, brochures, or instructor-led programs) to advanced digital platforms (including podcasts, webinars, and health applications). The effectiveness of these methods is influenced by factors such as the demographic characteristics of the population, the design of the study, and the timing of interventions administered from initial assessments to follow-up evaluations. [57,58]

Patient Education empowers individuals with epilepsy by enhancing their self-confidence, proficiency in self-management, awareness of their specific needs, and ability to access necessary resources. Consequently, it facilitates their active participation in patient-centered care.[59,63]

CONCLUSIONS:

Patient education can significantly impact the comprehensive clinical outcome and can support evaluating health intervention decrees that can enhance patients' knowledge and competencies over the short term. However, comprehensive patient education's impact on confidence, attitudes, and behaviours remains uncertain in India. Improving the quality of studies, ensuring consistency in outcome measures, and evaluating long-term effects are essential steps to increase confidence in estimates of the impact of educational interventions aimed at enhancing understanding of key concepts for assessing health intervention claims. It is well-established that comprehensive patient education is critical for managing chronic conditions such as epilepsy and post-stroke recovery. This review drives a point on the importance of patient education in these conditions and requests that further large multicentred research studies are needed to be conducted in India to find the unmet needs in patient education for the larger good of our society.

ABBREVIATIONS:

TAT: Turnaround Time
 DALYs: Disability-Adjusted Life Years
 GDP: Gross Domestic Production
 TPE: Therapeutic Patient Education
 WHO: World Health Organisation
 NCD: Non-Communicable Disease
 QOL: Quality Of Life
 HRQOL: Health-Related Quality Of Life
 TIA: Transient Ischemic Attack
 AEDs: Antiepileptic Drugs
 GNP: Gross National Product
 SE: Status Epilepticus

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CORRUPTION IN HEALTHCARE PROCUREMENT DURING THE COVID-19 PANDEMIC: IDENTIFYING DETERMINANTS AND PROPOSING COMPREHENSIVE ANTI-CORRUPTION STRATEGIES

Robabeh Emrouzi¹, Fatemeh Sahebkar Feiz Abadi², Abbas Eshraghi³, Melika Ghassemi⁴, Khalil Kalavani⁵, Razieh Akhondzardaini^{*6}

1. School of Management and Medical Informatics, Tabriz University of Medical Sciences, Tabriz, Iran.
2. Faculty of Nursing and Midwifery, Islamic Azad University, Zahedan Branch, Zahedan, Iran
3. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran
4. Department of Health Services Management, Science and Research Branch, Islamic Azad University, Tehran, Iran
5. Department of Public Health, Khoy University of Medical Sciences, Khoy, Iran.
6. Faculty of Management and Medical Information Sciences, Kerman University of Medical Sciences, Kerman, Iran

Correspondence: rakhondzardaini@gmail.com

ABSTRACT

INTRODUCTION:

The COVID-19 pandemic has exposed and exacerbated existing vulnerabilities in global healthcare systems, particularly regarding corruption in supply chain management. This research aims to identify corruption's factors and effective counterstrategies.

METHODS:

In 2024, a comprehensive scoping review was conducted following Arksey and O'Malley's guidelines. The search involved major databases (Web of Science, PubMed and Scopus) as well as a manual search of literature and reports. A two-reviewer screening process applied inclusion and exclusion criteria to all citations. Data were extracted using a standardized form and presented in a tabular format before undergoing qualitative content analysis. This qualitative content analysis identified key factors contributing to corruption and proposed effective anti-corruption strategies

RESULTS:

Corruption in healthcare supply chains arises from various factors, including structural, political, governance, sociocultural, technological, and human resource factors. Suggested counterstrategies included Procurement and Supply Chain Measures, Transparency and Accountability Mechanisms, Regulatory and Legislative Measures, Capacity Building and Coordination, and Civic Engagement and Oversight.

CONCLUSION:

A multidimensional, comprehensive approach is needed across all health systems to fight corruption. Implementing suggested strategies will augment public trust in healthcare institutions and safeguard public health against future crises. Findings provide policymakers and managers with a roadmap.

KEYWORDS

supply chain management, transparency, public health, fraud, technology

INTRODUCTION

The COVID-19 pandemic is not only recognized as a global health crisis, but it has also led to deeper challenges related to economic and social aspects [1, 2]. One of these challenges is corruption in healthcare procurement, which has been clearly evident during this period [3]. While countries were striving to secure medical resources and equipment to combat this virus, misuse of this emergency situation and lack of transparency in procurement processes led to the formation of corruption in the healthcare supply chain [4].

Research indicates that the likelihood of corruption increases in crisis situations [5]. This is particularly observable in the procurement of medical equipment and drugs, which were rapidly changing and under intense demand pressure. From indirect contracts to inadequate allocation of resources, corruption not only affected the efficiency of the healthcare system but also led to a decrease in public trust in healthcare and governmental institutions [6, 7].

Furthermore, corruption in procurement and supplies has serious implications for public health. Delays in treating patients and increased mortality are consequences of improper allocation of medical resources and equipment [8-10]. Vulnerable groups are especially impacted [11]. Therefore, identifying and analyzing factors influencing corruption in healthcare procurement and strategies to combat it during a pandemic not only helps in better understanding the existing challenges but can also contribute to improving future policies and strengthening healthcare systems against similar crises [12, 13].

Various studies have provided evidence of multiple determinants of corruption in the health system, including embezzlement and theft of health budgets, corruption and collusion in reimbursement of service costs, illegal billing by insurance companies, fraud in the drug value chain, corruption in the provision of medical services, and bribery in decision-making [14, 15]. The United Nations Convention criminalizes instances of corruption, including embezzlement, bribery, collusion, abuse of public resources and position, and the creation of illegal monopolies [16, 17].

Despite numerous studies, there are still knowledge gaps regarding examining all the effective determinants and identifying strategies to combat corruption in the COVID-19 crisis, which further underscores the need for this research. Hence, the aim of this study is to identify effective factors of corruption and strategies to combat them. Despite numerous studies on health system corruption, significant knowledge gaps remain regarding: (1) the comprehensive identification of COVID-19-specific corruption determinants in healthcare procurement, and (2) evidence-based strategies to combat such corruption during pandemic emergencies. This study systematically addresses these gaps by analysing various aspects of corruption in the world. The findings will provide crucial empirical evidence to inform pandemic preparedness frameworks and health system governance models.

METHODOLOGY

This study has been designed as a comprehensive scoping review and was conducted following Arksey and O'Malley's guidelines [18] to identify and analyze various factors of corruption in healthcare procurement and effective strategies to combat it during the COVID-19 era. In addition, a bibliometric analysis was conducted to create scientific maps and reveal thematic connections.

SCOPING REVIEW

1. Defining the research question

The main research question was "What factors have led to corruption in healthcare procurement during COVID-19, and what strategies exist to combat it?"

2. Determining selection criteria

Studies were included if they met the following criteria: (1) published between 2019 and 2024, (2) corruption within healthcare procurement during the COVID-19 pandemic, and (3) provided empirical data on the factors involved. There was also no specific geographical focus, and grey literature was also peer reviewed.

Studies were excluded based on the following criteria: (1) not relevant to the context of the pandemic, (2) conference proceedings, and (3) lack of sufficient details about the factors of corruption and strategies to deal with it.

3. Systematic search

A systematic search was conducted of reputable databases including PubMed, Scopus, Web of Science. The search strategy was developed and revised through studying the relevant articles and reports on factors influencing corruption and proposed strategies to identify and cross-check the keywords, MeSH terms, and databases searched. Both peer-reviewed and grey literature studies were searched using certain keywords, synonyms, and their variations including "Corruption" AND "Emergency procurement" AND "Pharmaceutical products" AND "Medical equipment". The references in the selected studies were reviewed, and snowballing was conducted to identify other relevant studies. The search terms were structured in a way that included a combination of keywords and relevant phrases related to the study topic: "falsification" OR "kickbacks" OR "embezzlement" OR "misuse" OR "fraud" OR "theft" OR "corruption" AND "emergency procurement" OR "purchasing" OR "procurement processes" OR "purchasing goods" OR "purchasing services" OR "procurement" AND "pharmaceutical products" OR "products pharmaceutical" OR "drug*" OR "pharmaceutical" OR "pharmaceutic" OR "pharmacological" OR "medicine*" OR "medication" OR "medicament" AND "medical equipment" OR "medical supplies" OR "device*" OR "supplies and equipment" OR "apparatus and instruments" OR "instruments and apparatus" OR "medical devices" OR "device medical", OR "equipment"

The Search Query in PubMed was: "Corruption"[Mesh] OR "corruption"[Title/Abstract] OR "falsification"[Title/Abstract] OR "kickbacks"[Title/Abstract] OR "embezzlement"[Title/Abstract] OR "fraud"[Title/Abstract] OR "theft"[Title/Abstract] AND ("Emergency Procurement"[Mesh] OR "emergency procurement"[Title/Abstract] OR "purchasing"[Title/Abstract] OR "procurement processes"[Title/Abstract] AND "Pharmaceutical Preparations"[Mesh] OR "pharmaceutical products"[Title/Abstract] OR "drug*" [Title/Abstract] OR "medicine*" [Title/Abstract] AND "Equipment and Supplies"[Mesh] OR "medical equipment"[Title/Abstract] OR "medical devices"[Title/Abstract] AND "COVID-19"[Mesh] OR "COVID-19"[Title/Abstract] OR "pandemic"[Title/Abstract].

4. Article selection

The research studies that seemed relevant to the research question were chosen for review through a screening process involving evaluation based on title and abstract before delving into the full text content and subsequent elimination of irrelevant articles. After compiling the articles and eliminating duplicates, then from the selection pool two researchers conducted a review of the remaining articles by assessing their titles and abstracts to ensure alignment with the inclusion criteria. Articles that did not meet the specified criteria were excluded from consideration. A third researcher intervening in case of disagreements. The researchers then gathered the findings from the articles. We utilized EndNote X4 software to arrange the articles and review their titles and summaries while checking for any duplicated content. The outcomes of the selection and screening process were illustrated using the PRISMA flowchart (Figure 1).

5. Data collection and analysis

Extracted data included study characteristics, factors influencing corruption, and proposed strategies to reduce corruption. Data was extracted using a standard form and presented in a structured table. Data analysis was conducted using descriptive methods and qualitative content analysis. This analysis helped in identifying and categorizing corruption factors and effective strategies. The data analysis and coding were done through a series of steps including a) getting familiar with the article texts, b) identifying and extracting the primary themes, c) classifying the articles under the specified themes, d) reviewing the results of each study, and e) ensuring the reliability of the materials and the extracted results in each area. The findings through this procedure are presented in Tables 1 and 2.

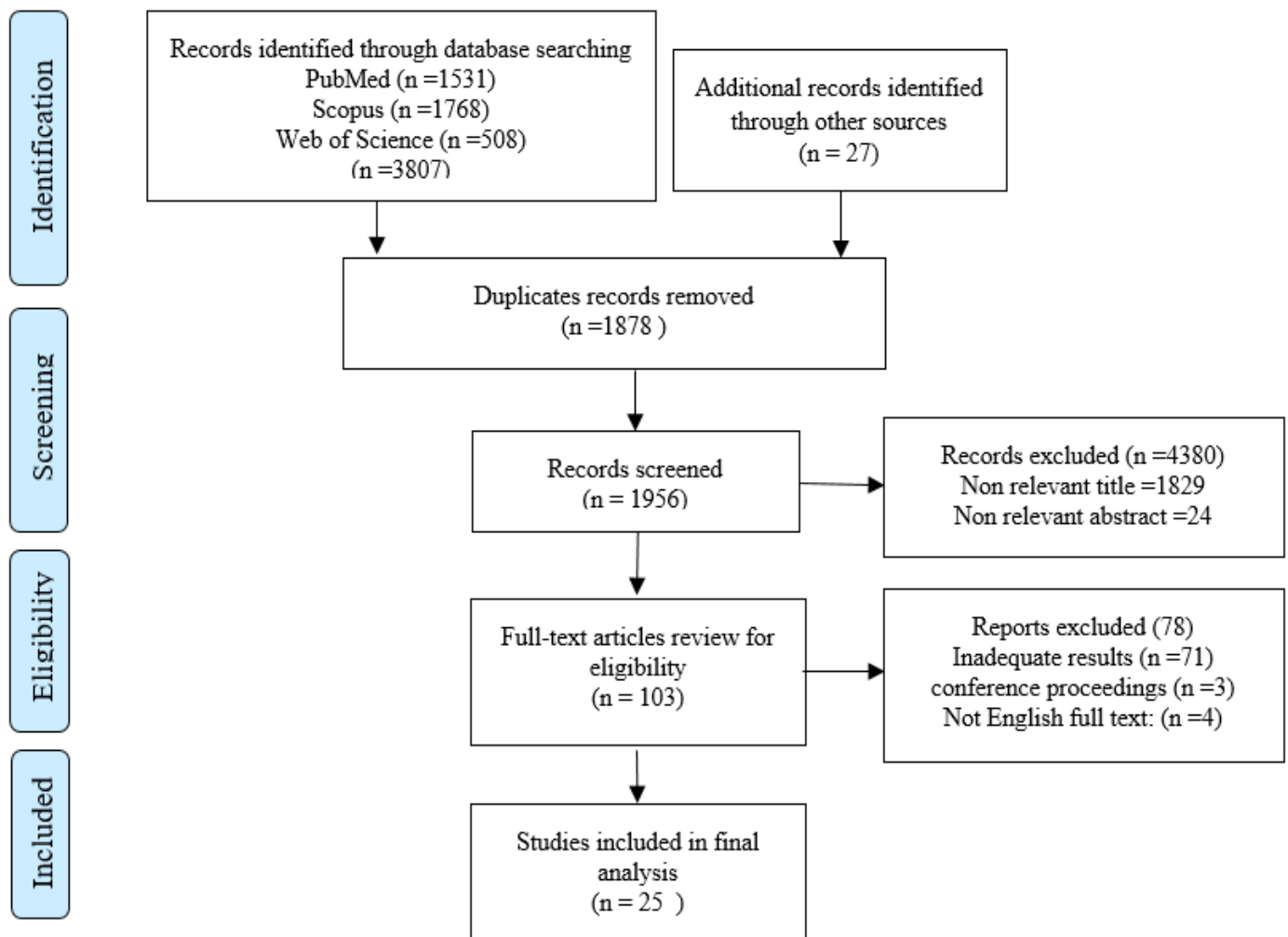
BIBLIOMETRIC ANALYSIS WITH VOS VIEWER

The data analysis utilized VOS viewer software to create scientific maps and reveal thematic connections. A total of 30 keywords were chosen based on a minimum repetition threshold of 4, and following the normalization process, 20 keywords were analyzed the key themes in the literature on corruption in public procurement during the COVID-19 crisis.

ETHICS APPROVAL

This study has been approved by the ethics committee of Kerman University of Medical Sciences. The ethical code of this study is IR.KMU.REC.1402.033.

FIGURE 1 PRISMA FLOW CHART OF THE STUDIES



RESULTS

Based on the key points and themes identified in the articles, the main factors and drivers of corruption in healthcare procurement during the COVID-19 pandemic were categorized into six general groups: Structural Factors, Political Factors, Procurement and Supply Chain Factors, Sociocultural Factors, Technological Factors, and Human Resources Factors (Table 1).

TABLE 1 FACTORS AND DRIVERS OF CORRUPTION IN HEALTHCARE PROCUREMENT DURING THE COVID -19 PANDEMIC

Number	Themes	Subthemes
1	Structural Factors	Decentralized structure healthcare system (19, 20)
		Insufficient government support, and accountability mechanisms(19)
		the absence of an effective regulatory framework(19) (21)
		lack of control over capital , Increased financing and limited absorption capacity(22-24)
		Structural Corruption and Lack of Transparency(19, 25, 26)
		Discretion, decision-making power(27)
		The pressure to spend donations quickly (28)
2	Political Factors	Corruption of politicians (partisanship, political interference (24, 29)
		Opportunities for rent-seeking due to administrative delays (30)
		lack of political freedom(23, 30)
		Underreporting of corruption due to fear of retaliation from corrupt government or individuals(31)
		small friendship networks in the political field(32)
		Inadequate protection for whistleblowers(29)
		Government Indifference in PPE Price Increases (19)
3	Procurement and Supply Chain Factors	Lack of transparency in procurement processes(20, 24)
		Use of non-open procedures (e.g. call for tender document not published)(23)
		Poor procurement practices for fast procurement (e.g. retrospective awarding of contracts)(33)
		Rapid procurement and Lack of competition (34) (35)
		Unequal treatment of suppliers(23, 33)
		Lack of documentation on how to identify particular suppliers(33) (23)
		lack manage conflict of interest(33) (24)
		Lack of integrity in contracts(29)
		Asymmetric distribution of information (32)
		Supplier without experience(23)
		Gross cost overruns(paying more than market prices for goods and services (34)
		Lack of competition in procurement (23)
		Size and location of contract(28)
		Higher complexity in technology or processes(28)
4	Sociocultural Factors	Greed and loss of ethical values(22, 24, 26)
		inadequate legal mechanisms and lack of a legal culture (24)
		Excessive Respect of Younger Healthcare Workers for Senior Staff (19)
		lack of personal protective equipment (PPE) and other vital supplies (34)
		Increased demand and limited supply(24)
5	Technological Factors	Increased cyber-attacks (21)
		Lack of information security and privacy(20, 24)
6	Human resources factors	Government Neglect of Employee Safety(19)
		Inappropriate Hiring Practices(19)
		Insufficient wages for individuals involved in the pandemic response(31)
		Diversion of relevant staff away from addressing medical product crime (21)
		Personal connections with officials in procurement (23, 34)

We also present a comprehensive categorization and grouping of various anti-corruption strategies and recommendations tailored to enhance transparency and accountability in healthcare procurement (Table 2).

TABLE 2 VARIOUS ANTI-CORRUPTION STRATEGIES AND RECOMMENDATIONS

Number	Themes	Subthemes
1	Procurement and Supply Chain Measures	Using block chain for controlling and managing the supply chain of PPE and vaccines (20, 36) (24)
		Reforming the system and processes of public procurement (29, 35)
		Strengthening the capacity of public procurement officials (29, 33)
		Enhancing transparency in the bidding process (27, 35)
		Publicizing tender criteria (35)
		Putting in place integrity pacts (35)
		Ensuring transparent and open bidding process through mechanisms such as electronic bidding (27, 37-39)
		Ensuring national public procurement agency monitors the implementation of procurement rules (35)
		Publicizing information about chosen bids and the rationale (35)
		Disclosing bids that did not win (35)
		Evaluating company performance (35)
		Conducting formal audits (35)
		Training procurement officers on policies, procedures, and detecting potential corruption (29)
		Giving all eligible bidders the opportunity to participate (35)
		Leveraging e-procurement platforms to record transactions and create easily accessible tools for public oversight (32)
2	Transparency and Accountability Mechanisms	Sharing data with the public to raise awareness about fraudulent activities (31) (34) (24)
		Promoting a free press (22)
		Ensuring transparency and accountability of the government and determining clear punishments for the corrupt (13, 22, 32, 40, 41) (27)
		Identifying or managing perceived or actual conflicts of interest and creating conflict of interest policies (33, 35)
3	Regulatory and Legislative Measures	Institutionalizing the rule of law to combat corruption (24, 29)
		Enhancing regulatory and legislative measures (29, 35, 42)
		Implementing punitive sanctions for those that sell or distribute falsified products (27)
		Creating legislation and systems in place prior to health emergencies (35)
		Identifying areas within the government susceptible to corruption (22)
		Establishing effective judicial systems with independent institutions (such as watchdog agencies) (32)
4	Capacity Building and Coordination	Implementing World Bank strategies to guide governments towards greater focus on institutional reforms and capacity-building initiatives (29)
		Promoting international cooperation (22)
		Providing clear policies and procedures for the national procurement regulatory agency (35)
		Establishing regular checks on procurement processes and outcomes by an outside watchdog agency (35)
		Coordinating between medical product regulatory authorities, police, customs, judicial authorities, and other stakeholders (35)
		Increasing expected costs and reducing motivation to engage in corrupt activities by raising public sector salaries compared to the private sector (29)

		Addressing the drivers of functional corruption, as well as petty corruption engendered by social norms (29)
		Implementing stringent procedures and regulations in the recruitment process (28)
5	Civic Engagement and Oversight	Leveraging the implicit power of civil society in fostering trust, satisfaction, transparency, and participation (40) (24, 34)
		Implementing citizen monitoring of contract execution and reporting mechanisms for corruption (41) (35)
		Conducting public awareness campaigns on the identification of substandard and falsified medical products (42)
		Protecting, encouraging, and caring for healthcare personnel (19)

For bibliometric analysis we used VOS viewer software to create a network diagram visualizing the relationships between keywords. The keywords are represented as nodes, with connections between them shown as lines or edges (Figure 2). The thickness and color of the connections indicate the strength and nature of the relationships between the concepts. The central concept is "corruption," which is connected to several other key terms such as "human," "fraud," "embezzlement," "public procurement," "organization and management," and "crime." This visual representation effectively illustrates the interconnected nature of the various themes related to corruption in healthcare procurement during the COVID-19 pandemic.

FIGURE 2 NETWORK DIAGRAM OF THE BETWEEN VARIOUS KEYWORDS RELATED TO CORRUPTION IN HEALTHCARE DURING THE COVID-19 PANDEMIC

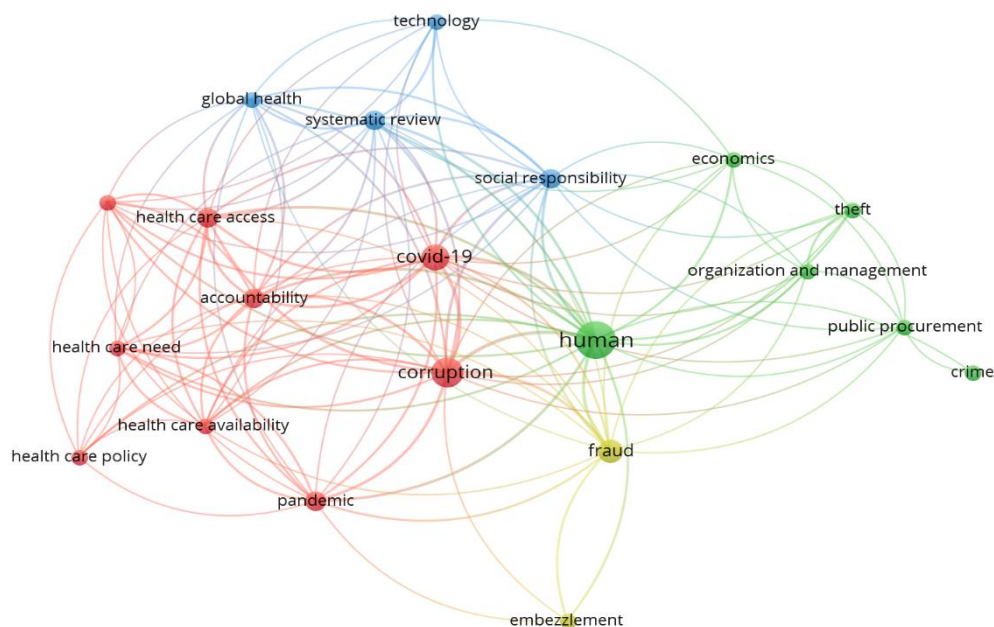


Table 3 outlines the identification of 20 common keywords associated with corruption in public procurement of medicines, medical supplies, and equipment during the COVID-19 crisis. The table is divided into three clusters, each highlighting different dimensions of the issue.

Cluster 1: Accountability and Healthcare Access

In the first cluster, the focus is on accountability and healthcare-related terms. The keywords "Corruption" (7 occurrences) and "Covid-19" (5 occurrences) are prominent, indicating a direct link between corruption and the pandemic context. Other significant terms such as "Health care access" and "Health care availability" (3 occurrences each) suggest that corruption may directly impact the accessibility and availability of healthcare services during the crisis. The total link count

of 129 with 218 occurrences within this cluster underscores the importance of these themes in understanding corruption in healthcare procurement.

Cluster 2: Economic and Organizational Factors

The second cluster emphasizes economic and organizational aspects, with "Human" appearing as a key term with 11 occurrences, suggesting a strong human element in addressing corruption. The presence of terms like "Public procurement" (2 occurrences) and "Theft" (2 occurrences) highlights the systemic vulnerabilities in the procurement processes. The total link count remains consistent at 129, indicating that these organizational and economic factors are critical to addressing corruption in the healthcare sector during emergencies.

Cluster 3: Broader Implications

The third cluster includes broader implications such as "Global Health" and "Social responsibility," each with 2-3 occurrences. These terms reflect the wider impact of corruption beyond immediate procurement issues, suggesting that addressing corruption is essential for global health outcomes and societal trust.

ADDITIONAL KEYWORDS

Additional keywords like "Fraud" (4 occurrences) and "Embezzlement" (2 occurrences) point to specific unethical practices within the procurement process, emphasizing the need for vigilance in financial oversight.

TABLE 3 IDENTIFICATION OF 20 COMMON KEYWORD IN CORRUPTION IN PROCUREMENT DURING THE COVID-19 PANDEMIC

Items	Link	Total Link	Occurrence
Accountability and Healthcare Access	129	218	
Accountability	14	29	3
Corruption	19	42	7
Covid-19	18	38	5
Health care access	14	29	3
Health care availability	13	20	2
Health care need	12	20	2
Health care policy	9	10	2
Pandemic	14	24	3
transparency	13	18	2
Economic and Organizational Factors	129	218	
crime	2	2	2
Economic	10	11	2
Human	20	50	11
Organization and management	8	10	2
Public procurement	9	9	2
Theft	8	10	2
Broader Implications	129	218	
Global Health	13	20	2
Social responsibility	17	28	3
Technology	10	12	2
Additional Keywords	129	218	
Fraud	16	25	4
Embezzlement	4	6	2

DISCUSSION

The findings of the first section of this study, which examined various factors influencing corruption in procurement during the COVID-19 pandemic, indicate that diverse factors such as structural, political, procurement and supply chain, Sociocultural, Technological, and human resources factors were influential.

Based on the study results, a significant portion of the causes of corruption were structural factors. Decentralized structure of the healthcare system, insufficient government support, and weaknesses in auditing mechanisms have reduced transparency in decision-making processes. On the other hand, ineffective decision-making due to the absence of an effective supervisory framework, inadequate financial resource control, and pressure to quickly disburse financial aid have been observed[43-45]. The COVID-19 emergency, by limiting time and resources, has strained surveillance systems and exposed existing structural weaknesses. On the other hand, integrating surveillance systems with real-time tracking technologies (such as block chain) can improve transparency.

Political factors play a crucial role in the occurrence of corruption. Various opportunities for large-scale rents have arisen due to party interventions and political influence, which have been exacerbated by long-term administrative delays. Additionally, the lack of political freedom and fear of retaliation after reporting corruption, along with concerns of whistleblowers, have led to various forms of concealment. The government's neglect of the rising prices of Personal Protective Equipment (PPE) also indicates weaknesses in oversight and accountability[46-49]. These findings clearly demonstrate how political interventions and ineffective institutional structures can create an environment conducive to systemic corruption.

Factors related to procurement and the supply chain have significantly exacerbated corruption. Lack of transparency in procurement processes, use of non-transparent methods, and non-disclosure of documents related to tenders have created a breeding ground for corruption and misuse of resources. The decrease in service quality and increase in unnecessary costs due to inappropriate procurement methods to expedite purchases, such as awarding return contracts, and lack of competition have occurred. Major weaknesses in the procurement process, including insufficient documentation to identify specific suppliers and conflict of interest management, have been observed. Additionally, unequal distribution of information and the presence of inexperienced suppliers have led to disparities in competition and additional costs[50-52]. This section clearly demonstrates how weaknesses in tendering and procurement processes can lead to structural corruption. Critical supply chain issues urgently require reform of public procurement systems and the establishment of stronger oversight mechanisms.

Another reason for the occurrence of corruption is related to social and cultural factors. Corrupt behaviors among some healthcare officials and staff have emerged due to work greed and a decrease in ethical values. Weak legal mechanisms and lack of legal culture in societies have led to inequality and exploitation of situations. The limited supply and shortage of Personal Protective Equipment (PPE) and other essential items, combined with increased demand, have created conditions that facilitate corruption and misuse of resources[53, 54]. Corruption is not only a structural problem, but also has its roots in socio-cultural factors. The decline in moral values, coupled with the weakness of legal mechanisms, creates an environment in which abuse of power and scarcity of resources become commonplace. This highlights the importance of strengthening organizational culture and ethical training alongside structural reforms.

The findings of this study indicate that technological factors have also influenced the occurrence of corruption. Some serious threats to healthcare systems have emerged due to increased cyber-attacks and weaknesses in information security and privacy. These vulnerabilities not only lead to the exposure of sensitive information but also contribute to the misuse of data and resources[55]. This finding emphasizes the need to invest in security infrastructure and train human resources to face cyber threats and highlights the importance of preventive approaches in the field of cybersecurity as an integral part of anti-corruption strategies.

The findings highlighted the role of human resource factors in the occurrence of corruption. Officials' disregard for employee safety, inappropriate recruitments, and inadequate wages have reduced their motivation and posed a serious challenge to workforce efficiency in crisis response. Inadequate handling of crimes and personal connections with procurement officials have also contributed to inequalities and corruption in aid procurement processes [56-58]. These findings point to ineffective human resource management as a catalyst for corruption and emphasize that there is a direct link between the quality of human resource management and organizational health.

The findings of the second part of this study have shown that actions such as procurement and supply chain measures, transparency and accountability mechanisms, regulatory and legislative measures, capacity building and coordination, civic engagement and oversight are among the most important steps to prevent corruption during health crises, especially during COVID-19.

Transparency and accountability in procurement processes can be enhanced through the implementation of effective measures, especially using blockchain to control, improve tracking, and validate processes, and enhance supply chain management. Additionally, key solutions include establishing a transparent and open bidding process through mechanisms such as electronic bidding to improve transparency in the bidding process and standardize tender criteria for the public. To create a responsive and transparent system in health procurement and provisioning systems, monitoring the enforcement of laws, disclosing information related to selected proposals, revealing unsuccessful proposals, evaluating company performance, and conducting formal audits can be utilized [59, 60]. Fighting corruption requires a comprehensive and multifaceted approach. Combining technological solutions and strengthening oversight mechanisms can create an effective framework for transparency and accountability. The key point here is that these solutions will be effective when implemented systematically and in a coordinated manner, and no single solution is sufficient on its own.

Key approaches to establishing strong mechanisms of transparency and accountability include active sharing of data with the public, promoting independent and free media for investigation and reporting, defining clear consequences for corrupt behaviors, and developing policies to identify and manage conflicts of interest. By doing so, governments can create clear frameworks for accountability and help enhance the coherence of healthcare systems [27, 57]. This section emphasizes the pivotal role of civil society and free media in creating effective accountability. Indeed, good governance requires constructive interaction between the three sides of government, the private sector, and civil society, and free media play a vital role in this ecosystem.

One of the key actions in combating corruption is to implement legal and regulatory measures, especially institutionalizing the rule of law, enforcing harsh penalties for the sale or distribution of counterfeit products, identifying corruption-prone areas within the government, and establishing effective judicial systems with independent institutions. These actions should be considered a priority to help reduce corrupt motivations and prevent corruption during these critical times [61]. An effective legal and judicial system is essential to creating an environment free from corruption, especially in times of crisis when normal oversight may be reduced. Identifying vulnerabilities in the government system and implementing fundamental, long-term reforms is also a proactive and smart approach.

Enhancing the capacity and coordination among institutions was a vital strategy. Implementing World Bank strategies, promoting international collaborations, and coordinating between responsible institutions overseeing medical products, the police, customs, and judicial authorities can assist governments in exchanging experiences, making informed decisions, and evidence-based performance [51, 62]. Given that corruption is a multidimensional challenge, its solutions also require multilateral cooperation at the national and international levels. Cooperation between regulatory, executive, and judicial institutions is useful to avoid duplication and regulatory gaps, and participation in international initiatives can help transfer knowledge and strengthen domestic capacities.

In the fight against corruption, a key element was civil participation and oversight. Harnessing the power of civil society can lead to strengthening trust, satisfaction, transparency, and public participation. Implementing citizen monitoring

systems on contract execution and creating reporting mechanisms for corruption, conducting public awareness campaigns to identify substandard and counterfeit medical products, as well as protecting, incentivizing, and attending to the needs of healthcare personnel, are of paramount importance. These measures can increase community awareness and protect public health. Overall, these actions can help create a transparent and accountable environment in healthcare financing, reduce corruption, and strengthen public trust in healthcare systems [63, 64]. Establishing grassroots reporting mechanisms and participatory monitoring systems not only increases transparency but also enables comprehensive monitoring of health system performance by strengthening a sense of social accountability. In other words, effectively combating corruption needs to become a "collective concern," not just a government responsibility.

Corruption in Africa appears to be often caused by poor governance, while in Europe, it is linked to non-transparent emergency contracts, so political intervention in low- and middle-income countries and cyber-fraud interventions in high-income settings seem necessary. Corruption in healthcare procurement has significantly increased during the COVID-19 pandemic, and identifying the factors influencing its occurrence is a fundamental necessity. To address this issue, it is essential to identify and implement diverse strategies. These strategies should be evidence-based [65, 66]. According to the framework of the United Nations Convention against Corruption, measures must be taken to protect whistleblowers. While anonymous reporting platforms can reduce risks of retaliation, they require legal safeguards to be effective.

The VOS viewer analysis elucidates critical relationships between corruption and healthcare during the pandemic. The centrality of "COVID-19" in the network visualization underscores its catalytic role in exacerbating corruption risks within healthcare systems. Notably, strong thematic connections emerge between "corruption" and healthcare delivery indicators ("health care access," "health care need," "health care availability," and "health care policy"), demonstrating how corrupt practices directly compromise essential health services. The analysis further reveals systemic vulnerabilities through the clustering of organizational terms ("organization and management," "public procurement") with core corruption nodes, reflecting institutional weaknesses in procurement governance. Economic dimensions are equally prominent, with "economics" and "theft" forming robust linkages to corruption, highlighting the financial motivations and consequences of these practices. While present in the network, broader concepts like "global health," "social responsibility," and "technology" occupy peripheral positions, suggesting their role as contextual or mediating factors rather than direct determinants. This structural mapping provides valuable insights for targeting anti-corruption interventions, emphasizing the need to address both immediate procurement vulnerabilities and underlying systemic failures exposed by the pandemic.

Our research, like other scoping reviews, faced certain limitations. One of these limitations was the diversity in the quality and credibility of the data that our research team encountered. In scoping reviews, data may vary in terms of quality and credibility, which can impact the final study results. Furthermore, the focus of this study was on the latest global health crisis, namely COVID-19, which did not allow us to investigate corruption in previous health crises. This is another constraint that may affect the comprehensiveness and generalizability of our findings, highlighting the need for further research in past crisis areas. We were not geographically restricted and reviewed a variety of reports and articles, however, the United Nations Office, the International Monetary Fund, Bangladesh, Indonesia, and Nigeria were among the countries and organizations that published these studies.

CONCLUSION

This study delves into a deep examination of corruption in healthcare procurement during the COVID-19 pandemic and demonstrates that this global issue stems from complex and multifaceted factors, often linked to structural, political, and social challenges. These challenges can lead to instability in procurement processes, necessitating a corruption-free healthcare system that requires a comprehensive and coordinated approach to ensure public health. To address corruption in health procurement, a combination of approaches is needed. These approaches should be implemented simultaneously and evidence-based to maintain the effectiveness of health systems in crises. Strategies such as transparency and technology, strengthening oversight, structural reforms, education and culture building, and

international coordination emphasize the need for a systematic, technological, and participatory approach that targets both the root causes and the aggravating factors of corruption. Not only does this study emphasize the need for structural reforms, but it also serves as a practical guide for policymakers and oversight bodies to improve healthcare systems. Future research should delve into similar experiences in past crises and develop effective approaches to prevent and manage corruption in emergency healthcare conditions.

JOURNALISM ETHICS CONSIDERATIONS

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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THE PREVALENCE AND FACTORS AFFECTING POST-TRAUMATIC STRESS DISORDER AMONGST HEALTHCARE PROFESSIONALS IN INDIA DURING THE COVID-19 PANDEMIC: NARRATIVE LITERATURE REVIEW

Piyusha Majumdar¹, Bhaskar Tiwary², Anita Kumari³, Abhishek Chaturvedi^{4*}, Priyaj Gandhi⁵

1. SD Gupta School of Public Health, IIHMR University, Jaipur, 302029, India
2. Centre for Research in Schemes and Policies, Hyderabad, 500032, India
3. Piramal Swasthya Management and Research Institute, Patna, 800013, India
4. Division of Biochemistry, Department of Basic Medical Sciences, Manipal Academy of Higher Education, Manipal, 576104, India
5. Healthcare Global Enterprises, Ltd, Bangalore, 560027, India

Correspondence: abhishek.chaturvedi@manipal.edu

ABSTRACT

BACKGROUND:

The COVID-19 pandemic resulted in a multitude of challenges for the healthcare fraternity which contributed to fatigue, burnout, stress, despair, anxiety, and psychological distress among healthcare professionals leading to Post Traumatic Stress Disorder (PTSD). This narrative review aims to determine the incidence of PTSD among healthcare professionals in India, identify its causes, and propose strategies to address this issue.

METHODS:

A comprehensive search of published and grey literature was conducted using search engines and databases, followed by the identification of relevant articles and a narrative synthesis of the gathered materials.

RESULTS:

The review reveals that healthcare professionals experienced significantly high levels of stress and were more likely to exhibit symptoms of probable or confirmed PTSD. Many healthcare professionals emphasized the urgent need for frequent counselling sessions during the pandemic.

CONCLUSION:

Our study emphasizes the importance of developing targeted educational interventions that include counselling services and treatment plans involving psychiatrists specifically focused on at-risk healthcare professionals.

KEYWORDS

Post Traumatic Stress Disorder (PTSD), Healthcare professional/worker, COVID-19, India, Mental Health

INTRODUCTION

The COVID-19 outbreak in December 2019 led to its rapid and exponential spread worldwide, prompting the World Health Organization (WHO) to declare it a global public health emergency. [1,2] In India, the first case of COVID-19 was reported on 30 January 2020, and by May 2020, the number of infections reached 100,000. [3] Health authorities around the world, including India, implemented precautionary measures such as social distancing, quarantine, and lockdowns. [4] These pandemic norms and measures, combined with the fear and uncertainty surrounding the unknown infection, have significantly impacted people's lifestyles and resulted in high levels of psychological distress, anxiety, and mood alterations. [1–5] While the entire population has been affected by this deadly infection, healthcare professionals (HCPs) have been particularly impacted as they face the unprecedented challenge of providing and restoring healthcare services.[6]

Reports indicate insufficient training on infection prevention and control, as well as widespread shortages of personal protective equipment (PPE), which resulted in high rates of COVID-19 infection among HCPs, especially in the early stages of the pandemic.[6,7] Fears for personal safety, heavy workloads, and a lack of personal time have contributed to fatigue, burnout, stress, depression, anxiety, and psychological distress among the healthcare fraternity.[2,3,6,8] These factors have triggered psychopathological conditions such as Post-Traumatic Stress Disorder (PTSD) and other mental disorders.[6] PTSD is a mental health condition that's caused by an extremely stressful or terrifying event-ether being part of it or witnessing it.[9]

Previous infectious disease outbreaks, such as severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and the 2009 new influenza A (H1N1) virus, have been linked to mental health difficulties among HCPs, particularly PTSD. [10,11] PTSD was triggered during the waves of COVID-19 as HCPs raced against time to save vital lives. [1,10] The majority of HCPs, including doctors, nurses, and paramedics in India, reported that they had never experienced such outbreaks before, making the situation particularly challenging. [6,12] The WHO estimates that approximately 3.6% of HCPs globally suffer from PTSD.[13] Previous studies have observed a clinical level of PTSD among 8-30% of emergency room HCPs, indicating the potential effects of pandemic-like situations on their mental health.[14] Clinical manifestations of PTSD include recurrent and intrusive memories, dreams or flashbacks of trauma, and avoidance of trauma-related cues. The presence of clinically significant PTSD symptoms, even without a full-threshold diagnosis, has been associated with a decline in the mental and physical health outcomes of HCPs, leading to a severe reduction in their quality of life .[15,16] While most individuals who have experienced traumatic events may have temporary difficulty adjusting and coping, with time and self-care, they usually improve. However, if symptoms worsen, it can last for months or even years, and the intensity of symptoms can vary over time.[15] Patients may experience PTSD symptoms when stressed in general or when they encounter reminders of the trauma they went through.[8,16]

Previous research on other pandemic-like situations has shown that a considerable number of HCPs experience significant emotional distress during the outbreak. [10,11,14] A study involving 1257 healthcare workers who treated SARS-infected patients found that feelings of uncertainty, threats to life, and significant vulnerability characterized by somatic and cognitive symptoms of anxiety were prevalent in the early stages of the epidemic.[17] Furthermore, even after the outbreak, symptoms including stress, anxiety, depression, traumatic stress, avoidance, and burnout resulted in a higher prevalence of PTSD. [10,14]

Major epidemic outbreaks place an increased demand on healthcare workers. [1,3,8] The constant increase in the number of infected cases, deaths, lack of specific medicines or vaccines, extensive media coverage, massive workload, and a sense of inadequate support can physically and mentally burden healthcare workers.[17] HCPs work long hours under overwhelming conditions, putting them at greater risk of infection while treating patients. In addition to their work environment, they are exposed to a considerable amount of fake news and rumors, which further escalate their stress levels. The restlessness of the general population in seeking medical help and the frustration caused by the pandemic itself have resulted in targeted violence towards doctors and other HCPs, contributing to PTSD among the healthcare fraternity. [8,13,14,17] During the COVID-19 pandemic, India has reported a high number of violent incidents against

doctors.[18] A study conducted by the Indian Medical Association (IMA) found that 75% of doctors experienced workplace violence during the pandemic, with most cases occurring in the emergency ward and ICU.[19]

While the exact number of such cases cannot be determined, there are several notable examples reported by the victims. [20,21] The assaults and violence occurred due to various reasons, including distrust in healthcare providers, refusal to admit COVID-19 patients to hospitals with limited beds, belief in conspiracy theories, patient deaths, and strict adherence to COVID-19 protocols by hospitals, among others.[19,21] Health care providers in India, as well as in many other countries, have always been subject to social stigma during the pandemic, which further contributes to the increased prevalence of PTSD.[22] Stigma has been highly prevalent in diseases such as Human Immunodeficiency Virus (HIV), Ebola Virus Disease (EVD), Tuberculosis (TB), and Severe Acute Respiratory Syndrome (SARS). [23]

People tend to fear the unknown, as was the case with COVID-19, a new disease with many uncertainties. The fear of infection, blame-game, stereotypes, social judgment, lack of awareness, fear of social ramifications, prejudice, fueled by the pandemic of misinformation and links to certain racial and ethnic groups, all contribute to the increase in social stigma.[1,22,23] Furthermore, inadequate and inconclusive research on COVID-19 transmission and preventive measures, along with the chaos resulting from sharing COVID-19 news and updates, have raised public apprehension and mistrust in healthcare services and workers. [24,25] The world has struggled to mitigate the impact of COVID-19 and its different variants, and will continue to do so if new variants emerge.

Therefore, preserving the mental health of the healthcare fraternity through early pharmacological and psychological interventions is vital to prevent the imminent collapse of the healthcare system during emergencies. [26] Although prior research and reviews have extensively focused on various mental health challenges and psychological distress, to the best of our knowledge, no study has comprehensively discussed PTSD. This narrative review aims to determine the prevalence of PTSD among HCPs in India during the COVID-19 pandemic, identify its determinants, and propose ways to address this challenge in such pandemics.

MATERIALS AND METHODS

LITERATURE SEARCH

Published Literature

A narrative literature review search was conducted on the electronic databases of Google Scholar and PubMed, covering the period from December 2019 to February 2022. The authors defined a set of keywords and refined them at various stages to achieve the desired number of articles. The final keywords used for the search included 'PTSD,' 'healthcare professionals,' 'healthcare worker,' 'COVID-19,' and 'India.'

Grey Literature

There was a lack of published literature on the topic, so we also included country-level grey literature in our review. The grey literature consisted of different categories such as newspaper articles, policy briefs, reports, blogs, etc. The aim of the grey literature review was to gather evidence and information on post-traumatic stress disorders during the COVID-19 pandemic. In studying PTSD during the COVID-19 pandemic, grey literature offered valuable insights and evidence from a national or regional level, filling in gaps left by peer-reviewed publications

INCLUSION AND EXCLUSION CRITERIA

We considered published articles and grey literature that evaluated PTSD or traumatic stress as an outcome measure in healthcare professionals and workers. This included doctors, nurses, paramedics, technicians, administrative task forces, frontline healthcare workers, and support staff deployed in hospitals or communities during the COVID-19 crisis. Inclusion criteria involved articles published in English, peer-reviewed journals that were freely available (open access) and had clearly defined objectives, methodology, and approach. We excluded systematic reviews and meta-analyses, narrative

reviews, umbrella reviews, scoping reviews, commentaries, and editorials. Articles or grey literature that did not include PTSD as an outcome or content, but instead evaluated other mental health outcomes, were also removed from the review, as there is a wide range of research already available on those topics in the healthcare fraternity.

DATA EXTRACTION AND ANALYSIS

Published Literature

After importing the articles into a Microsoft Excel spreadsheet, the authors, PG and AK, independently extracted data into an evidence table. This table included the serial number, title of the article, first name of the first author, year of publication, study design, study setting, sample size, PTSD outcome, any other mental health-related exposure, conclusion/future implications, limitations mentioned by authors, and remarks found during the review. PM and AC, the two senior authors, provided feedback on the final evidence table and critically edited the generated evidence. For research studies that met the inclusion criteria, a narrative synthesis of key findings was performed, organized into four themes.

Grey Literature

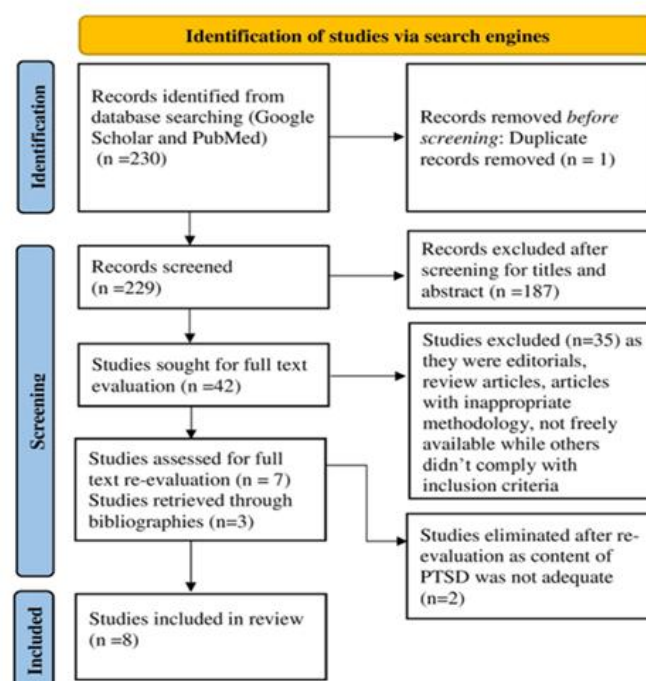
A spreadsheet was used to store the relevant links obtained through the electronic search for grey literature. AK and PG evaluated the title, source, and summary of the links to determine their eligibility for inclusion in the review. The senior authors, PM and AC, then conducted a critical evaluation of the selected links.

SELECTION OF STUDIES

Published Literature

The process of study selection is illustrated in Figure 1 using a PRISMA flow diagram.. Any disputes among the authors were resolved through a round table discussion led by the senior authors. All the selected articles were cross-sectional in nature, with sample sizes ranging from 50 to 2008 individuals. This narrative review included various healthcare professionals, such as doctors, nurses, paramedical staff, clinicians, hospital administrators, support staff, and medical interns. Two of the screened articles used the General Health Questionnaire-12 (GHQ-12) to measure the outcome indicators, while others utilized structured questionnaires. [27–34] A summary of the characteristics included in the review is presented in Table 1 (see Appendix).

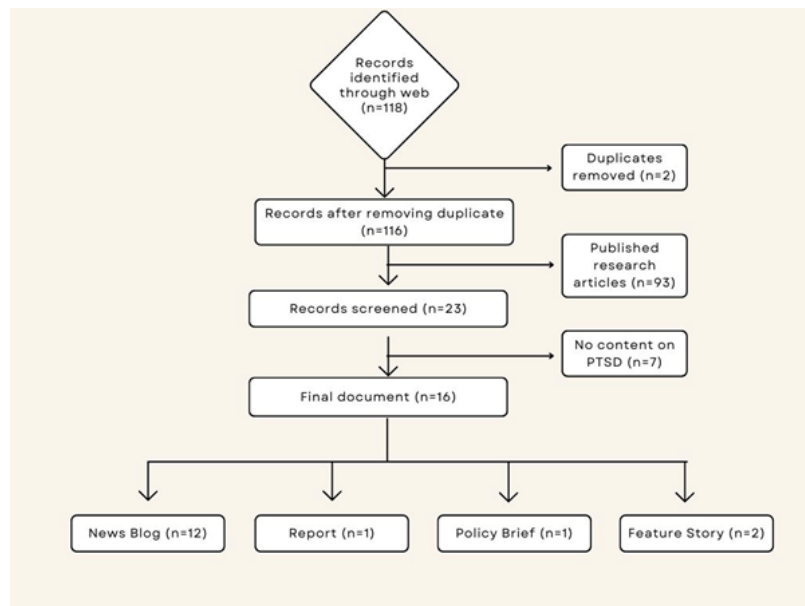
FIGURE 1: PRISMA FLOWCHART OF THE REVIEW



Grey Literature

A total of 18 links were retrieved, out of which two were rejected as they did not contain any content on PTSD. Sixteen titles were considered relevant, with 12 articles coming from news blogs, and the remaining four titles consisting of a policy brief, institutional report, feature stories, and research brief, respectively (Figure 2). The findings from the grey literature support the published literature and indicate the presence of chronic stress and poor mental health among healthcare professionals during the COVID-19 pandemic, along with an increased incidence of PTSD among them. These findings are summarized in Table 2 (see Appendix).

FIGURE 2. STRATEGY USED TO SELECT THE GREY LITERATURE



DISCUSSION

NARRATIVE

Prevalence of PTSD among HCPs

The prevalence of PTSD was found to be 2.1% (sample size = 384, mean age = 27.7 years, s.d. = 5.7), which was the lowest compared to other Asia-Pacific countries.[27] Conversely, Manohar et al. reported the highest prevalence at 77% (sample size = 2,008, mean age = 35.7 years, s.d. = 11.9). [31] The prevalence of PTSD varied across studies, influenced by factors such as sample size and the age of participants.

Gender Specific PTSD

We observed that female healthcare professionals, including doctors, female nurses, paramedics, and those working in the emergency unit, had a higher proportion of workplace anxiety (70.7% vs. 56%) and sleep disorders (52% vs. 39%) compared to males, thus increasing the burden of PTSD among female healthcare professionals. [28,32,34] It was evident that female participants had a higher fear of getting infected or spreading the infection to others compared to their male counterparts. [28,33,34] While younger female participants (21-30 years) had higher psychiatric morbidity, the studies did not report significant gender differences in psychiatric morbidity and post-traumatic stress. [34] However, female participants with higher psychiatric morbidity were more prone to experiencing higher levels of post-traumatic stress. [28] During the COVID-19 pandemic, as well as other pandemics, female healthcare workers have faced difficulties in managing their anxiety levels, particularly due to a lack of supply of personal protective equipment (PPE) and patient overload. Previous research on infectious disease outbreaks has indicated that female healthcare workers had significantly higher rates of severe anxiety (8%) compared to male healthcare workers ($p < 0.01$). [35,36]

Domain Specific PTSD

Pandemics like COVID-19 place a high demand on healthcare professionals (HCPs) to care for their patients, putting their own lives at risk. During such times, HCPs experience fear and guilt about transmitting the infectious disease to their family members and also face social stigma from the community. [21,28] Our findings reveal that doctors have the highest psychiatric morbidity and post-traumatic stress compared to other occupational groups. The PTSD scores in doctors increased from 23.42 to 26.32, indicating an increase in traumatic stress. The lowest levels of PTSD were observed in administrative and security staff. [30,33] Some studies also reported that pharmacists and technicians had the highest levels of PTSD, followed by nurses and housekeeping staff. [28,33]

A study conducted by Raj Rachna showed that anxiety levels among physicians, nursing staff, technicians, and the general population were 55.65%, 48.54%, 52.34%, and 56%, respectively. Depression was reported in 55.65%, 48.54%, 52.34%, and 56%, respectively, of the mentioned categories. Insomnia was found in 47%, 38.2%, 39.4%, and 43%, respectively. [14] Prior evidence suggests that frontline healthcare professionals experienced moral distress due to COVID-19, and it was their moral and social responsibility to deliver care, allocate resources, and fulfill their duties during the pandemic. [6,14] We found that acute stress reaction and PTSD were common among frontline healthcare professionals. [36] A study from China reported that among nurses working in SARS ICU or SARS regular care units, acute stress reaction and PTSD were observed in 33% and 29.5%, respectively. [37] We also found several studies reporting the highest prevalence of definitive PTSD among junior physicians and senior residents. [28,30,34] For nurses, predictors of PTSD severity included high anxiety levels, being diagnosed with COVID-19, working 24-hour shifts, high depression levels, low years of work experience, low monthly income, and the presence of other chronic diseases. [38]

PTSD among various areas of hospital

Our review found that among those suffering from absolute PTSD, 31.3% worked in the screening area, 27.7% in the isolation ward, 18.8% in the high-risk ward, and 4.5% in the ICU. [28,30,32–34] Previous studies report that before the pandemic, 28.50% $\pm$ 20.21 of all cases were emergencies, while during the pandemic, this figure increased to 57.91% $\pm$ 38.11.39 We found that healthcare workers who worked in medical or surgical units reported more severe mental health issues than those who worked in the ICU. [28,30]

In contrast, another study conducted in India reported that 21.6% of doctors and nurses had PTSD, 88.6% had a moderate to a high level of stress, 16.3% had anxiety, and 59.5% had poor sleep while working in an emergency room and ICU. [40] Doctors and nurses working in the emergency room experienced significantly higher stress compared to those working in an ICU. It was found that HCPs who came into direct contact with patients had more severe mental health issues compared to those who were not in direct contact with patients. [30,33] Nurses working in the emergency department during the pandemic, who previously worked in psychiatric units, showed significantly higher levels of distress. Approximately 63.3% of nurses who worked in the National Designated Isolation Unit (NDIU) ward, 30.2% of those who worked in the general ward, 39.6% of those who worked in the ICU, and 21.1% of those who worked in other departments experienced higher levels of panic and PTSD. [28,30,32–34]

Strategies to preserve the mental health of HCPs

The mental health of healthcare professionals (HCPs) has been a silent but widespread public health crisis even before the onset of COVID-19. This was primarily due to the lack of evidence-based treatments for sudden infectious diseases, which HCPs continued to fight against. Research from various parts of the world has reported the use of different coping strategies during COVID-19 to combat mental health issues and challenges. Individuals with moderate to severe depression used humor and emotional support, while those with somatic symptoms turned to acceptance and religion. [26] Policy makers and global health strategists have documented various approaches that HCPs have employed to address their mental health issues. [3,8,14,36]

Many hospitals provided dedicated spaces for rest, allowing HCPs to isolate themselves from their families. Additionally, arrangements were made for food and other necessary supplies, new staff members were trained to handle aggressive

patients and learn relaxation techniques, and written guidelines were established for the use of personal protective equipment. Moreover, counselors were embedded in the workplace to provide support. [26] In addition to these measures, HCPs adopted self-care strategies such as yoga and meditation to cope with distress and anxiety during the COVID-19 pandemic. [26]

Based on the available data, it is recommended to provide customized continuous education programs for various groups of HCPs to better equip them to handle outbreaks of infectious diseases and global health emergencies. Healthcare departments should also focus on investing in medical students so that they can become a valuable resource during crises when there is a shortage of healthcare professionals to meet the needs of the population. Sensitization and education of community members about various infectious and non-infectious diseases, including basic training in first-line management, would help alleviate the unnecessary burden on hospitals caused by preventable diseases.

Strength & Limitations

The presented review has several strengths. Firstly, it provides a comprehensive overview of PTSD and its various determinants, contributing to the existing body of literature across various domains. Secondly, the review includes content from grey literature sources, offering a wider and more inclusive perspective on the available articles. Thirdly, despite using a narrative approach, the review explicitly states the criteria used to select the studies and articles.

However, the study does have certain limitations. Firstly, it did not include a quality check for the included studies, which could impact the reliability of the findings. Secondly, the search strategy employed may have missed out on a few potential articles. Additionally, some studies may not fully specify the prevention and organization measures implemented in the workplace, making it challenging to analyze the correlation between these measures and the level of post-traumatic stress, which is also a limitation of the study.

The included studies may not fully represent the diversity of populations, interventions, or outcomes related to PTSD prevalence and associated factors, limiting the applicability of our conclusions to broader context. Also, some of the studies might have over presented prevalence or the strength of associations for certain risk factors given the design of cross-sectional design studies included in the review. This bias could have implications for decision making in clinical practice or policy development. By explicitly acknowledging these limitations and their implications we highlight areas for improvement in future research.

SUMMARY

COVID-19 has significantly increased the workload and reduced the recovery opportunities for healthcare professionals (HCPs) globally, including in India, affecting them both physically and psychologically. Our findings indicate that HCPs experienced a notable increase in perceived stress and a higher prevalence of probable and definite PTSD. Notably, the sub-symptom of avoidance emerged as a significant indicator of existing PTSD. Many HCPs expressed an urgent need for regular counseling sessions during the pandemic.

Based on our review, we strongly advocate the formulation of specific educational interventions that include counseling services and treatment strategies involving psychiatrists, with a focus on vulnerable HCPs. These interventions should be incorporated into healthcare planning to effectively address unforeseen pandemic situations in the country. A well-designed work roster and rationalization of HCPs are crucial considerations. Furthermore, there is an urgent need to augment human resources and physical infrastructure in the healthcare sector. Policymakers should also develop effective strategies that prioritize mental health issues and include resilience training for public health emergencies. Enhancing preparedness for foreseeable stressful circumstances among healthcare workers through regular psychological interventions can play a vital role in building resilience and positively impact the mental health and well-being of healthcare professionals.

KEY MESSAGE

The COVID-19 pandemic has had a significant impact on the mental health of healthcare professionals, leading to an increased prevalence of Post-Traumatic Stress Disorder (PTSD) among them. Safeguarding the mental well-being of the healthcare fraternity is crucial, as failure to do so could potentially result in the collapse of the healthcare system during emergency situations.

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APPENDIX

TABLE 1: CHARACTERISTICS OF THE SELECTED PUBLISHED LITERATURE

Sl. no	Title	Publication Year	First Author	Study Design and Setting	Sample Size	Study Population	Conclusion	Limitations
1	Postexposure psychological sequelae in frontline health workers to COVID-19 in Andhra Pradesh, India [27]	2021	Das Keya	Cross sectional observational study, Andhra Pradesh, India	321	Doctors, Interns, Nurses involved in Covid 19 duties	Psychological impact was significantly related to the place of posting.	Not able to describe the reasons for attrition rate in the middle of the study. Also, the authors could not reach frontline workers lacking internet facilities
2	Estimation of Prevalence and Comparing the Levels of Stress, Anxiety, Depression, and Psychological Impact Before and After COVID-19 Lockdown Among Front Line Health Care Workers [28]	2022	Latha Sri Lakshmi	Cross sectional, Hyderabad India	345	Health care employees - doctors, nurses, and other hospital staffs	There was a worsening of the psychological impact of the pandemic and an increase in PTSD, stress, anxiety, and depression among HCWs from lockdown to post lockdown. Females' pharmacists, and technicians were the most vulnerable group to develop psychiatric comorbidities.	Lack of longitudinal follow-up
3	Impact of Covid-19 Pandemic on Wellbeing of Doctors in Kashmir [29]	2021	Wasim Rafiq	Cross-sectional study	50	Allopathic doctors, Indian part of Kashmir	COVID 19 has increased the workload and decreased the recovery opportunities of the doctors across the globe which affected doctors physically and psychologically. The impact has been more severe on the doctors of Kashmir. The doctors expressed the urgent need of organizing regular counselling sessions for them during the pandemic. A well thought out work roster and rationalization of the	Lack of representative sample.

							healthcare practitioners was greatly felt during the study.	
4	Mental health outcome and professional quality of life among healthcare workers during COVID-19 pandemic: a frontline-COVID survey [30]	2020	TomarBalvies Singh	Cross-sectional study\	418	Nurse, doctor, paramedics, or non-clinicians	Female nurses, and doctors working in emergency unit had a greater proportion of psychological distress. Working as frontline was moral and social responsibility. The resilience and QoL were important predictors for negative mental health outcome	Self-reported format has lesser disparity than face-to-face interviews. Cross-sectional study. Need to manifest association of social support to mental health in future studies.
5	Psychological impact, coping strategies used and the effect of 'brief psychological intervention' on mental health of healthcare workers during the COVID-19 pandemic [31]	2021	Vasavanda Disha A	Interventional study	175	Healthcare workers	Fear of getting infected or spreading it to others was higher among females and nursing staff participants. Younger participants (21-30 years) had higher psychiatric morbidity, no significant gender differences in psychiatric morbidity and posttraumatic stress were found. Overall, doctors had the highest psychiatric morbidity and posttraumatic stress as compared to other occupational groups. Moreover, participants with higher psychiatric morbidity were prone to have higher posttraumatic stress. Use of approach coping strategies was the highest among supportive staff participants who also had the least PTSD, suggesting a positive role in stress reduction. The interventional module was effective in alleviating the psychological stress among healthcare workers due to the	There was lack of control group in the study and only one follows up after the interventional session. The interventional module did not include any debriefing or other one-to-one brief therapeutic sessions.

							unprecedented circumstances of the COVID-19 pandemic.	
6.	Asian-Pacific perspective on the psychological well-being of healthcare workers during the evolution of the COVID-19 pandemic [32]	2020	Nicholas W.S. Chew	Multi-Country Cross Sectional	277 (from India)	Healthcare workers	The prevalence of PTSD was 2.1 % which was lowest when compared with other Asian-Pacific countries. Non-medical trained person was independent predictors for stress and anxiety.	Assessment of casualty of various outcomes was not possible considering the cross-sectional design of study.
7.	Prevalence and severity of secondary traumatic stress and optimism in Indian healthcare professionals during COVID-19 lockdown [33]	2021	Manohar K.N.	Cross-Sectional Study	2008	Doctors, Nurses, and Allied Health Professionals	Post-traumatic stress was experienced by 77% of the healthcare professionals. The doctors and nurses showed more stress than other HCPs. Female staffs had more intrusive thoughts compared to male counterparts. Rampant spread, lack of preparedness, uncertain management guidelines beside risk for self and families were the risk factors for increased PTSD.	There was lack of homogeneity in the study at various levels and over representation of particular group among HCPs.
8.	Association of Sociodemographic parameters with depression, anxiety, stress, sleep quality, psychological trauma, mental well-being, and resilience during the second wave of COVID-19 pandemic: A cross-sectional survey from India [34]	2021	Tanveer Kaur	Cross-Sectional Study	1109 (n=299, healthcare workers)	General population including healthcare workers	Around 25.25% of the participants showed severe PTSD symptoms while 44.18% exhibited mild PTSD. Only one-third of the population were healthcare workers (frontline workers, paramedics, etc.).and 4.60% had clinically diagnosed psychiatric illnesses	No separate data of prevalence of PTSD in healthcare workers was available and therefore the prevalence cannot be extrapolated to healthcare workers in a similar proportion.

APPENDIX

TABLE 2: SUMMARY OF THE SELECTED GREY LITERATURE

Sl. No	Title	Source	Published Date	Author Name	Type of Grey Literature	Electronic Copies Availability	Article Summary
1.	Coronavirus lockdown, Rise in post-traumatic stress disorder: survey	https://www.thehindu.com/sci-tech/health/rise-in-post-traumatic-stress-disorder-survey/article61689652.ece	November, 2021	Bindu ShajanPerappadn	News Blog	The Hindu	Physicians should brace themselves for increased number of consultations for PTSD and should be able to manage them properly.
2.	Frontline health workers battle anxiety, burnout, PTSD, and other issues in pandemic	https://indianexpress.com/article/lifestyle/health/covid-healthcare-workers-mental-health-anxiety-stress-consultation-7358636/	June, 2021	Disha Roy Choudhary	News Blog	The Indian Express	Doctors reaching out for help for mental health concerns was much less owing to busy schedule, long working hours and stigma attached to seeking help and the expectation that physicians must be strong.
3.	PTSD, Emotional Burnout: One Year of COVID-19 has taken Toll on Minds of Frontline Health Workers	https://www.news18.com/news/buzz/ptsd-emotional-burnout-one-year-of-covid-19-has-taken-toll-on-minds-of-frontline-health-workers-3616862.html	April, 2021	Zirak Marker	News Blog	News 18	Frontline healthcare workers need to find healthy ways and coping mechanisms during distressful time like COVID like consulting a counsellor and find ways of "letting go" as they are human beings and not superhumans or gods.
4.	Mental Health & The Frontline: Healthcare Workers on COVID Trauma	https://www.thequint.com/fit/coronavirus/mental-health-healthcare-frontline-workers-doctors-on-covid-trauma#read-more	July, 2021	Abhishek Tandon et.al	News Blog	The Quint	The panic pandemic may have abated in urban areas, but the trauma of working in frontline triggers. The everyday losses and grief have become etched onto the memories of doctors.
5.	Covid 19: Burnout and depression spiral among traumatized doctors across India	https://timesofindia.indiatimes.com/india/covid-19-burnout-and-depression-spiral-among-traumatized-doctors-across-india/articleshow/82963237.cms	May, 2021	Institutional Report, Bloomberg	News Blog	The Times of India	Healthcare professionals were pushed into physical and mental exhaustion as they fought to keep their patients alive.
6.	Covid impact: PTSD, depression higher in non-medical staffers	https://www.newindianexpress.com/cities/hyderabad/2022/jan/27/covid-impact-ptsd-depression-higher-in-non-medical-staffers-2411784.html	January, 2022	Donita Jose	News Blog	The New Indian Express	More than 50% of the participants endorsed PTSD with worsening symptoms from lockdown to post lockdown. This was because of increased workload and constant

							contact with COVID-19 patients.
7.	Covid-19 pandemic had psychosocial impact on health workers: ICMR study	https://timesofindia.indiatimes.com/india/covid-19-pandemic-had-psychosocial-impact-on-healthcare-workers-icmr-study/articleshow/86284158.cms	September, 2021	Institutional Report, ICMR	News Blog	The Times of India	Different expressions of stigma that healthcare professionals face with experiences of verbal and physical abuse lead to increase in traumatic stress among them.
8.	Mental health and psychosocial considerations during the COVID-19 outbreak	https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf	March, 2020	Institutional Report, WHO	Report	WHO Official Website	Keeping staff protected from chronic stress and poor mental health during pandemics is vital to restore the better capacity of healthcare professionals. Basic emotional and psychological support should be made essential.
9.	Caring for Health Care Warriors: Mental Health Support During COVID-19	https://www.mohfw.gov.in/pdf/HCWmentalHealthSupportGuidanceJuly20201.pdf	July, 2020	Institutional, Department of Health & Family Welfare, Government of Karnataka	Policy Brief	MoHFW Website	Worries about getting infected, taking infection to others, to their families, adequacy to protection, and the widespread social and economic disruption had triggered PTSD in healthcare professionals. Conducting team meetings, promoting awareness about mental health, and having a clear protocol for treatment and procedures will enhance mental health status of healthcare professionals.
10.	The impact of COVID-19 on mental health cannot be made light of	https://www.who.int/news-room/feature-stories/detail/the-impact-of-covid-19-on-mental-health-cannot-be-made-light-of	June, 2022	Institutional, WHO	Feature stories	Newsroom, WHO Official Website	Applying a whole society approach to promote, protect, and care for mental health among healthcare professionals is vital among such pandemics to restore their mental health status.

11.	COVID-19 health workers at increased risk of mental health disorders such as anxiety, depression	https://www.timesnownews.com/health/article/covid-19-healthcare-workers-at-increased-risk-of-mental-health-disorders-such-as-anxiety-depression/707130	January, 2021	Anushree Gupta	News Blog	TIMESNOWNEWS.COM	Healthcare professionals involved in COVID care had multiple risk of mental health problems. Majority of them suffered from Insomnia and acute PTSD. The report suggested that studying resilient and pathological trajectories can build a scaffold for constructing evidenced based interventions for managing mental health status of healthcare professionals.
12.	How doctors are coping with the impact of Covid on their mental health	https://timesofindia.indiatimes.com/india/how-doctors-are-coping-with-the-impact-of-covid-on-their-mental-health/articleshow/77143311.cms	July, 2020	Shobita Dhar	News Blog	The Times of India	Doctors and nurses have been the last persons to be with patients on their death beds holding their hands as they gasp for the last few breaths remaining in them. These experiences provided acute and post-traumatic stress among the healthcare cadre.
13.	Absorbing the COVID-19 gloom like a sponge: Doctors on the trauma of second wave	https://www.thehindu.com/sci-tech/health/mental-health-of-doctors-with-covid-trauma/article34725866.ece	June, 2021	Kinshuk Gupta	News Blog	The Hindu	High levels of post-traumatic stress were revealed among the junior and young doctors as compared to older ones. Adequate rest hours and counselling should be incorporated in between duty hours to reduce the stress of clinicians saving lives of people in the frontline.
14.	COVID-19 impacting mental health of doctors, finds study	https://indianexpress.com/article/cities/chandigarh/chandigarh-frontline-doctors-dealing-with-anxiety-rising-mental-health-issues-amid-the-pandemic/	June, 2021	Times News Network	News Blog	The Times of India	Stress Management should be an integral curriculum of healthcare professionals so that they can serve humanity efficiently and effectively during the pandemic and in the future.
15.	Panchkula: Frontline doctors dealing with anxiety, rising mental health issues amid the pandemic	https://indianexpress.com/article/cities/chandigarh/chandigarh-frontline-doctors-dealing-with-anxiety-rising-mental-health-issues-amid-the-pandemic/	September, 2020	Pallavi Singhal	News Blog	The Indian Express	The severity of the pandemic accompanied by feeling of helplessness due to shrinking resources and less than required paramedical staff had left doctors impaired and led to high prevalence of PTSD among frontline healthcare fraternity.

16.	Impact of COVID-19 Pandemic on Medical Healthcare Workers in Mumbai City, India	https://sambodhi.co.in/	July, 2021		Research Brief	Sambodhi Website	The medical health workers were overburdened, and resource constrained during COVID-19 pandemic. Prevalence of PTSD and similar symptoms were common among the healthcare workers. Need for sensitization sessions within healthcare facilities should be formulated for staff during emergency response situations.