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Special Issue:
India: The future of healthcare Post Covid-19, learning from diversity

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JOURNAL ARTICLES

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IN THIS SPECIAL ISSUE

This issue is a special issue of the Journal based on the proceedings of a Health Management conference held earlier this year in India. Please read the editorial and the preface to discover how this eventuated. Most articles, 15 in total come from the proceedings of that conference but there are also a significant number of additional articles from our colleagues from India. Our thanks to Professor Prema Basargekar and his colleagues from K. J. Somaiya Institute of Management (K J SIM), Mumbai, India for working to make this issue significant

There are some 30 articles in total in the issue. This is a record issue for APJHM.

For that reason, I make a special mention and thanks to Yaping Liu the Journal Production Manager and to her counterpart at the Somaiya Institute of Management, Kritika Jain for coordination from India. Can I say thanks to both for a great example of an Indo-Pacific collaboration! We are working on an end of year issue for all our other authors who are waiting patiently for their articles to progress. All I can say is that we are a very small production team with a huge number of articles to progress.

Given the number of contributions we have for this issue we have done our best to order them in appearance. Our first contribution is from Rachh who presents a research article on future opportunities and challenges in the digital healthcare sector. Jha is the next author who provides us with a viewpoint article suggesting an integrated framework of leadership for health care organisations to navigate the Covid pandemic.

We next thank Basargeka, Priyadarshini, Seth and Ganjoo for a research article that examines the impact of socio-economic factors in reducing malnutrition among children through a comparative study of India, Bangladesh, and Shri Lanka. Dhyankumar, Arun and Rajmohan next provide a comparative study of graft survival prediction using machine learning using artificial neural networks Bayesian belief network approaches. Our next contribution is from Tajane, Jossy, Gupta and Jadhav, a research article describing the characteristics of falls among the elderly during the covid-19 pandemic lockdown. Ravadka and Goradia next present a research article that examines the satisfaction of older adults about online group exercise programs during Covid 19 and asks the question are they satisfied with the program? The response is positive.

Mathew and Wesarat next provide a review article that examines ethical standard setting within cultural values for healthcare professionals in India. An important issue of the moral and ethical challenge presented within many nation states in this pandemic period.

Singh and Chaddah provide a research article on a study on the application of blockchain technology to control counterfeit drugs, enhance data privacy and improve online pharmacy distribution. Kataria, Dag, Kaur, Singh and Gupta provide a research article that describes the use of a Tam model that examines the use of e-health in rural areas of Uttarakhand and examines ways for effective implementation and adoption for rural patients. RamPrakash and Arun provide a research article that examines gender inequity in utilisation of publicly funded health insurance schemes to determine if there is a difference in utilisation of state sponsored health insurance between men and women. Chauhan and Mendonica provide an analysis of management practice on the role of regulatory authorities on the working of contract research organisations and pharmaceutical clinical trials in India.

Next, we present articles that have some focus on mental health and covid. Tajane, Golwala, Nangia and Chavan provide a research article that describes the physical and mental health of children during Covid – 19 lockdowns from the parents' perspective. Puntambekar, Desai, Kanade and Pednekar continue with the mental health focus in a research article that addresses the dual impact of comorbidities and symptoms of Coronavirus on mental

health among males and females in an online cross sectional study during the pandemic. Phadnis, Sengupta and Chakraborty continue the mental health theme in a research article assessing mental health working from home in a pilot study of a selected information technology organisations in India. Our final article in this Special issue section of the Journal is provided by Sharma and Pednekar examine tobacco as a risk factor for the future spread of Covid – 19, based on adolescent tobacco use estimates from global youth tobacco survey, India.

We would like to thank all our authors and reviewers and their respective organisations in the special and general issue.

This issue and the editorial were compiled at a time when the national political leaders of India and Australia were meeting in the USA to develop further collaborations between our two countries. Health and education are obvious choices for collaboration. I have included the contact details of the two APJHM parent organisations to allow our authors, reviewers and readers to take the opportunity to be in touch with each other.

Australasian College of Health Services Management ACHSM for professional development, certification, networking for health service managers at https://www.achsm.org.au/

The Society for Health Administration Programs in Education SHAPE for education in health management, research, academic programs, doctoral students at shape.symposium@gmail.com

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COMMENTARY

MESSAGE FROM THE COLLEGE PRESIDENT – DR NEALE FONG

Dr. Neale Fong FCHSM

President of Australasian College of Health Service Management

I trust that you are well and as a leader or manager in the health sector wherever you are, you have taken time to ensure your own health and wellbeing in these extraordinary times. There is no more important time than now to ensure that you have the resilience and reserves to travel through these uncertainties.

In the last issue this column focussed on the ACHSM's Certification Program and the importance of a credential for health leaders and executives. As I noted then, certification in a profession is an employment currency within the health sector that has traditionally excluded the leaders and managers. Through the introduction of these credentials, the College supports members and future members to have their body of knowledge and skills recognised and provides the platform for continuing development.

Today let me focus on the importance of lifelong learning and intentionally managing a career that hopefully will span decades, providing you with personal satisfaction and success. Committing to lifelong learning, as we mandate within Certification, is a commitment to your own development, and your own sense of staying curious and active within the profession.

A quiet and consistent focus on staying current is at the foundation of confident and competent leadership and ACHSM sees this as being at the heart of our offerings to the College members.

A platform and pathway for a long satisfying career in health leadership

While it is not comprehensive of everything the College does, I commend you to consider the flyer available on this link (particularly page 2) which provides a list of the programs, activities and services the College provides to support our members - as seen through a lifelong career lens. We encourage members to consider their career journey from emerging leader through to more senior roles and how they can access services and programs to support those career journeys.
https://www.achsm.org.au/Portals/15/documents/membership/Certification-flyer-web.pdf

Many of our senior College members are dedicated to helping others and this is in line with our College's philosophy to be both by and for health leaders. You will see this embedded in many of our offerings from Mentoring to Facilitated Learning Groups to Certification right through to our capstone Fellowship Program – members supporting members. I must emphasize that careers, like anything in life, are not perfectly linear – for example, we encourage senior members to consider not just being a Mentor but from time to time, becoming a Mentee. Both support their personal career journey.

The Journal

The Journal is an integral component of lifelong learning through peer reviewed articles and the College is thankful for the dedication of our Chief Editor, David Briggs and our journal partner, SHAPE, in ensuring this excellent publication continues to expand your knowledge horizons. I know you will find this edition informative and interesting, particular as we learn from international colleagues.

Dr. Neale Fong FCHSM
President of Australasian College of Health Service Management

ACHSM Asia-Pacific Journal of Health Management

PREFACE: SPECIAL ISSUE OF THE 1ST INTERNATIONAL CONFERENCE IN HEALTHCARE MANAGEMENT 2021

We are very happy to present the special issue coming out of our 1st International Conference in Healthcare Management 2021in collaboration with Asia Pacific Journal of Healthcare Management. The theme of the conference was "Future of Healthcare Post COVID-19". The conference intended to cover the challenges and issues posed by COVID 19 on economies, and particularly healthcare sector. It also focused on identifying and capturing the changes brought out by new technologies and new business models which emerged in post COVID scenario. The papers presented covered diverse topics such as digital healthcare, mental health, public health and health economics as well as healthcare marketing and health caregiving. Few selected papers are getting published in this special issue.

We thank Editor in Chief DS Briggs AM and his entire editorial team for taking it forward and providing valuable support in reviewing the papers and editing. We hope the research scholars working in this area will gain new insights going through these papers.

We are proud to release this special issue in the 40th year of K J Somaiya Institute of Management.

Prof.(Dr.) Prema Basargekar (Program Coordinator MBA Healthcare Management, Conference Convener)

Prof.(Dr.)Monica Khanna (Director-K J Somaiya Institute of Management)

Dr. Pramod Prabhakaran (Course Director-Psychological Medicine, Imperial College School of Medicine; Advisor- 1st International Conference in Healthcare Management 2021)

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EDITORIAL

INDIA: THE FUTURE OF HEALTHCARE POST COVID – 19, LEARNING FROM DIVERSITY

DS Briggs AM

Editor in Chief,

This special issue has its focus on the nation state of India, its healthcare system and health services. You may well ask why a special issue on India and the simple response would be that our colleagues from the K. J. Somaiya Institute of Management (K J SIM), Mumbai, India approached the Journal to see if we would publish a special issue base on articles that were presented at the 3rd Annual Conference on Healthcare Management conducted earlier this year by them. [1]

We agreed to this request because India is part of our geographic area of interest of the Asia Pacific, and we already receive significant contributions from authors from India. Secondly, India and Australia have connections that go back to colonial times and as members of the Commonwealth countries. In addition, Australia is a multicultural country and people from India now represent more than 7 per cent of that population. Up until the Covid Pandemic India was also a source of international students to Australia. Importantly, in the Australian health system we increasingly depend on a workforce that has come from overseas, particularly in regional, rural, and remote parts of Australia.

In the current geo-political context, there is increasing recognition of the need for closer working relationships between these two countries couched in the term 'Indo-Pacific' relationships. The organisations that produce this Journal, the Australasian College of Health Services Management (ACHSM), the professional College for health managers and the Society for Health Administration Programs in Education, the representative group of health management programs in Australia universities welcome affiliation with likeminded organisations in other countries. Both organisations work together and have increasing affiliated members and organisations in New Zealand, Hong Kong, Thailand. Importantly, both organisations see the merit in increasing international relationships.

This Editor has always had the conviction that you can best learn health management from studying diversity amongst health systems, not just by studying what is taught as theory and not just from services and systems that are in front of you, that is from your own hospital or health system. As teachers, academics, and health professionals we should encourage diversity in learning contexts and experiences because that forces us to compare and that assists us in being more analytical and critical and to practice continuous learning as all true professionals should.

Not all health management learning is formal and much of what we learn is also experiential and, in my view, learning is enhanced when it occurs with and from others. This does not necessarily occur in formal contexts. Importantly, these days with the technology available we can do this remotely but in learning networks, often called communities of practice (COPs) or even in distributed networks of practice (DNOPs). With technology, we can now network effectively despite being geographically distant.

So why should our learning be global just not local? The Covid Pandemic in part provides the answer. That occurrence demonstrates ongoing global threats from communicable diseases, bioterrorism, violent crime, wars, human trafficking are examples of a few reasons why health systems and health knowledge needs to be viewed from global perspectives. Our rapid acquisition of new technologies and pharmaceuticals are themselves globalised and both require access to international markets by health systems to procure and utilize. Most importantly, nation states should be communicating their

experiences of the causes, effects, and outcomes of the pandemic so that lessons can be learned and that collaboratively we can improve our understanding of these types of challenges into the future. This 'post covid' issue of the Journal based on the Indian experience should be used by all readers as an important learning experience for the future.

At the time of writing this editorial I am also preparing a presentation for a Hong Kong based international conference, Hong Kong Polytech University, CPCE Health Conference 2021 on the post covid pandemic and implications for long term care. So, another learning opportunity where colleagues from the Asia Pacific will present perceptions and findings from their individual nation states experience of the Covid pandemic. It is encouraging that the Journal is an active participant in these important events.

It is important in our learning from these events is that most organisations and, health systems are slow to accept and implement change and health reform. A colleague of mine once said that we tend to procrastinate and resist change in health systems. [2] Others have gone further stating that 'a paradoxical pattern of policy development' is describe as 'reform without change and change without reform'. This author suggests that in highly centralised governance, health reform is difficult. [3]

The important message from this editorial is for readers to be strategic in reflecting on the lessons learned from the pandemic and to resist being reactive. It would help if you framed your reasoning by asking questions sch as 'what problem are we attempting to resolve and whose interests are being served?'

DS Briggs AM
Editor in Chief

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RESEARCH ARTICLE

A STUDY OF FUTURE OPPORTUNITIES AND CHALLENGES IN DIGITAL HEALTHCARE SECTOR: CYBER SECURITY VS. CRIMES IN DIGITAL HEALTHCARE SECTOR

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ABSTRACT

OBJECTIVE

The current study is to understand the opportunities for and challenges faced by digital healthcare sector. The aim of the study is to suggest measures for securing data and information collected by the sector plus have safer online transactions.

DESIGN AND SETTING

The secondary data was collected from reliable sources. The primary data was collected online. The quantitative and qualitative analysis was done on data. The data was statistically analysed for this research article.

RESULTS

Even though healthcare sector has spent on digital health and cybersecurity but still the number of cybercrime cases have increased. An attempt is made to understand the factors that can influence the number of cybercrime cases.

CONCLUSION

The healthcare sector has opportunities in digital healthcare field in the current pandemic situation. At the same time, it has challenges to reduce the cybercrime cases as hackers are stealing confidential data and to take stringent measures to reduce the same.

KEYWORDS

Healthcare Sector, Digital Healthcare Sector, Opportunities, Challenges

INTRODUCTION

Healthcare sector has helped humankind in present covid pandemic situation. People are working from home but some sectors have opened up. People have to travel from their home to work and are prone to be infected. In some countries, the number of cases has increased and governments were forced to announce lockdown again. The health of citizens is more important. More people have started using digital healthcare facilities like mobile applications to contact doctors and order medicines online. Due to current pandemic scenario, digital

healthcare sector has many opportunities and challenges like safeguarding online data.

Digital healthcare is an important part of healthcare system. It helps patients who are at home to connect with doctors. It reduces costs due to use of information, communication and technology. The medical records can be stored and accessed electronically known as Electronic Health Records (EHR). Mobile applications help to monitor health conditions. Digital healthcare has been used in the past also but now it has gained more importance than traditional healthcare systems, as it provides effective and ethical healthcare. [1]

Introduction of technology in everyday activities has provided many opportunities and challenges to data and information including infrastructure. [2] While in current and post Covid situations digital healthcare is most affected. The growth has increased multi-fold and will grow rapidly in the future. [3] Digital healthcare market is estimated to grow rapidly from USD $106 billion in 2019 to USD $640 billion in 2026. [4]

Healthcare sector has taken lot of burden in 2020 due to the Covid pandemic. It has given a boost to the digital healthcare sector and at the same time, new challenges are springing up. One of the main challenges is to safeguard data as we use digital platforms for health. [5] The other challenges are privacy, data breaches, data security, identity theft and cyber-attacks. [6]

The United States of America has dedicated acts for protecting health records and data privacy. Very few countries like United Kingdom, European Union, Australia, Canada, Singapore, Japan and New Zealand have specific rules, regulations, provisions or guidelines in their laws to safeguard personal information and data including electronic documents plus privacy. The authors have divided the health records in 3 groups based on sensitivity level. The first group is normal which can contain personal plus social data and identity theft can be the possible crime. The second group is called sensitive and includes financial information and has risk of frauds. The last cluster is named highly sensitive and comprises of data related to health risks plus clinical diagnoses. The possible crime for the third group could be extortion. Fifty-eight percentages of data breaches are done by insiders. With opportunities comes the threats like hacking, ransomware, phishing plus privilege abuse and challenges to Electronic Medical Records (EMR) infrastructure or system. [7]

The healthcare software developing companies have to take extra precautions to safeguard personal data collected by them. The issues elevated in such conditions are ethical, moral plus legal in nature. The companies have to follow confidential guidelines and deal with challenges like cyber privacy and security. [8]

CYBER CRIME CASES RELATED TO HEALTHCARE SECTOR

In 2019, among the top five Indian cybercrime cases the major one was a hacking attacks on Indian healthcare website. The hacker stole 68 lakh records of doctors and patients. [9] In September 2020, Chinese hackers stole Spanish Research Centre's information related to Covid-19 vaccine. [10] In September 2020, German hospital and Universal Health Services (UHS) health system at 400 locations faced ransomware attacks. The five healthcare organisations reported that their data was stolen and available on the dark web by different hacker groups. [11] Many cybercrime cases are reported in India.

METHODS

RESEARCH OBJECTIVES

- To find out current situation of digital healthcare sector.
- To analyse global healthcare plus healthcare cybersecurity fundings and global cybersecurity market.
- To analyse corporate funding for digital health.
- To find out number of cybercrime cases reported in India.
- To find out cybercrime cases relating to healthcare sector.
- To analyse factors affecting security measures or precautions.

RESEARCH METHODOLOGY

The quantitative and qualitative research analysis are done. Primary and secondary data are collected. Secondary data are collected from different sources. [12] [13] [14] The questionnaire method was used for primary data collection. The primary data was collected online using Google Form. The sample size of primary data is 111.

DATA ANALYSIS

Microsoft Excel and statistical analysis software like PSPP, JASP (R based) are used for data analysis like frequency distribution, charts, correlation and factor analysis. [15] The

Descriptive Analysis like Mean, Standard Deviation and Percentages were also computed.

HYPOTHESES

Independent Sample T-Test is used to analyse the primary data.

- H_o: To identify responses about willingness to provide information using mobile phone with respect to gender.
- H_o: To identify the responses about "There should be new laws to protect privacy on the Internet" with respect to gender.

Correlation is used to identify relationship between variables.

- H_o: The correlation between Annual Global Healthcare Funding and Annual Global Corporate Funding for Digital Health is not statistically significant.
- H_o: The correlation between Annual Global Healthcare Funding and Annual Global Healthcare CyberSecurity Funding is not statistically significant.
- H_o: The correlation between Annual Global Corporate Funding for Digital Health and Annual Global Healthcare CyberSecurity Funding is not statistically significant.
- H_o: The correlation between Annual Global Corporate Funding for Digital Health and Number of Cyber Crime Cases Reported in India is not statistically significant.
- H_o: The correlation between Annual Global Cybersecurity Market and Number of Cyber Crime Cases Reported in India is not statistically significant.

RESULTS

The annual global healthcare funding has increased from $34,361 million from 2016 to $80,612 million in 2020, while number of annual global healthcare deals have increased from 4,140 to 5,523 from 2016 to 2020. Seventy-eight percentage of males felt privacy is more important than convenience, while 91% of females felt the same.

The Null Hypothesis, to identify responses about willingness to provide information using mobile phone with respect to gender was accepted as significance (2-tailed) value is more than 0.05 at 95% Confidence Level. The Null Hypothesis, to identify the responses about "There should be new laws to protect privacy on the Internet" with respect to gender was accepted as significance (2-tailed) value is more than 0.05 at 95% Confidence Level.

The strong positive correlation was found at 95% level for all the hypotheses statements. Therefore, we can say that there is correlation between all the mentioned variables. It means that even after spending on security, the number of cyber crime cases in India are increasing. It is necessary to overcome these challenges.

FACTOR ANALYSIS

The Factor Analysis was done to understand the security measures or precautions taken by respondents to safeguard the data and information from cyber fraudsters, etc. The respondents were requested to provide their responses for the following statements relating to information security:

1) V1 = I respond to messages asking for urgent action due to security reasons.
2) V2 = I check padlock icon of the browser.
3) V3 = I click on links from any unknown person.
4) V4 = I share my financial or personal information by e-mail or text message.
5) V5 = I destroy the pin mailer after memorising the pin and/or change the pin after the first usage.
6) V6 = I keep my pin and ATM card /debit card /credit card together.
7) V7 = I disclose my internet banking password with anybody including my family members.
8) V8 = I respond to online offers that require me to provide my account details "for verification".
9) V9 = I always check the last log-in to my Internet Banking account.
10) V10 = I use the virtual keyboard/keypad to enter the user name/login and password for online banking.

a) Preliminary Analysis

As per Table 1, determinant value is .253, which is more than .00001. Hence, multicollinearity is not a problem for these data. So, no need to eliminate any questions. The Pearson's Correlation Heatmap (Figure 1) shows correlation between the variables in graphical way.

TABLE 1: PEARSON'S CORRELATION MATRIX

VARIABLE	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
1. V1	—									
2. V2	0.16	—								
3. V3	0.171	0.059	—							
4. V4	0.093	-0.1	0.352***	—						
5. V5	0.019	0.125	-0.01	0.09	—					
6. V6	0.067	0.188*	0.169	0.119	0.222*	—				
7. V7	-0.001	-0.083	0.29**	0.341***	0.052	0.306**	—			
8. V8	0.097	-0.037	0.38***	0.252**	0.008	0.322***	0.433***	—		
9. V9	0.12	0.284**	0.05	-0.17	0.18	0.141	0.09	0.105	—	
10. V10	0.07	0.271**	0.214*	-0.078	0.05	0.239*	0.127	0.143	0.292**	—

* p < .05, ** p < .01, *** p < .001 Determinant = 0.253

TABLE 4: COMPONENT LOADINGS

	PC1	PC2	PC3	PC4	UNIQUENESS
V1				0.856	0.256
V2		0.608			0.45
V3	0.633				0.407
V4	0.552	-0.455			0.332
V5			0.906		0.174
V6	0.478				0.47
V7	0.767				0.378
V8	0.76				0.41
V9		0.693			0.489
V10		0.718			0.406

Note: Applied rotation method is varimax.

FIGURE 1: PEARSON'S CORRELATION HEATMAP

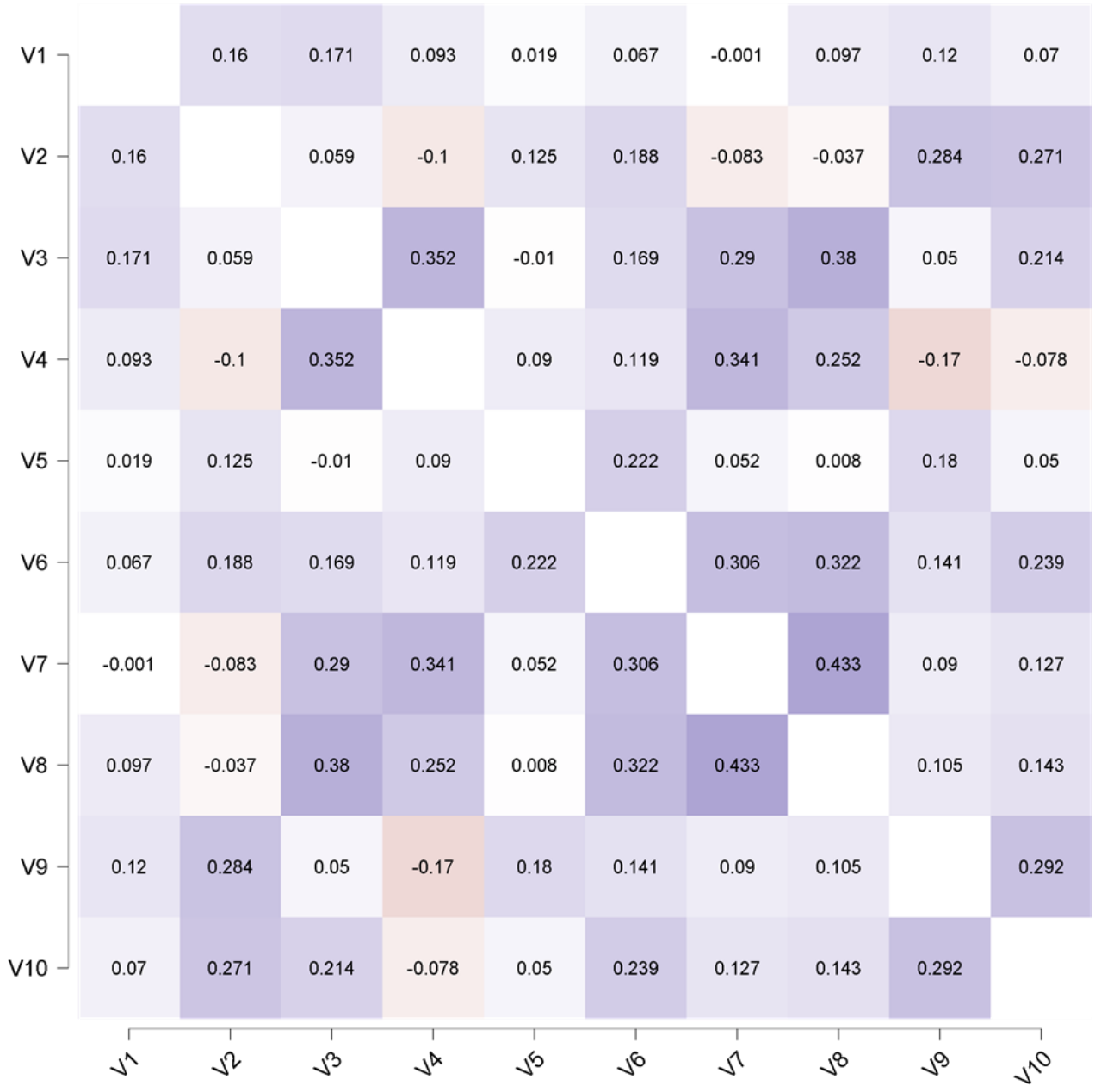


TABLE 2: KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin (KMO) Test (Overall)		.673
Bartlett's Test of Sphericity	**Chi-Square**	145.385
	Df	45
	Sig.	< .001

Kaiser-Meyer-Olkin (KMO) test value is .673 i.e. more than .5, so acceptable according to table 2. Therefore, factor analysis is possible for these variables. In the same way factor analysis is suitable as per table 2, as the mentioned Bartlett's test significance value is < .001.

b) Factor Extraction

There are 10 components in initial eigenvalues and 4 components after rotation. There is slight percentage difference between initial eigenvalues and after rotation as per table 3. Extraction Method used is Principal Component Analysis to get figures mentioned in the tables 3 and 4. At the initial stage, all components are treated equal and value 1 is given.

TABLE 3: TOTAL VARIANCE EXPLAINED

	INITIAL EIGENVALUES			ROTATION SUMS OF SQUARED LOADINGS		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.38	23.80%	23.80%	2.19	21.90%	21.90%
2	1.72	17.20%	41.00%	1.71	17.10%	39.00%
3	1.1	11.00%	52.00%	1.17	11.70%	50.70%
4	1.03	10.30%	62.30%	1.16	11.60%	62.30%
5	0.8	8.00%	70.30%			
6	0.76	7.60%	77.90%			
7	0.65	6.50%	84.40%			
8	0.6	6.00%	90.40%			
9	0.49	4.90%	95.30%			
10	0.47	4.70%	100.00%			

TABLE 5: COMPONENT CHARACTERISTICS

	EIGENVALUE	PROPORTION VAR.	CUMULATIVE
PC1	2.382	0.238	0.238
PC2	1.72	0.172	0.41
PC3	1.1	0.11	0.52
PC4	1.025	0.103	0.623

As per tables 4 and 5 as well as figures 2 plus 3, generated by the analysis software based on R has extracted 4 factors using varimax rotation method. The loadings less than .45 are suppressed in output. The four factors or component groups i.e. PC1/RC1 to PC4/RC4 are named below:

1) PC1/RC1 = Careless about security.
2) PC2/RC2 = Check and use online security features.
3) PC3/RC3 = Destroy mail after changing pin.
4) PC4/RC4 = Respond to messages for security purpose.

FIGURE 2: SCREEN PLOT

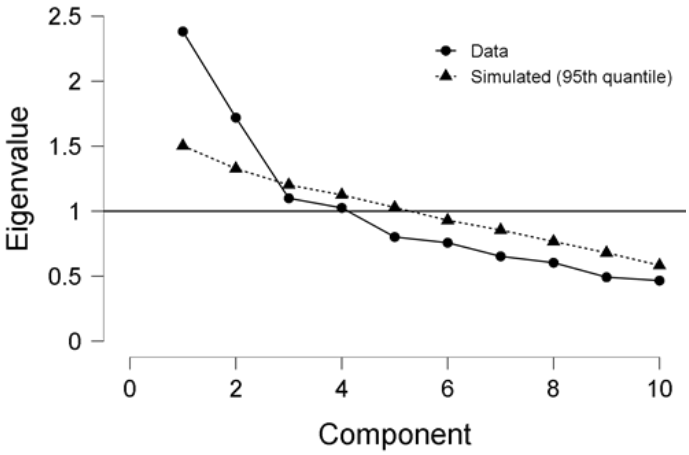
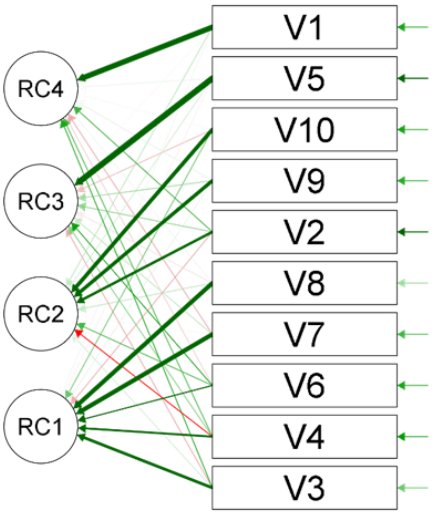


FIGURE 3: PATH DIAGRAM



DISCUSSION:

The aim of the current study is to research future opportunities and challenges faced by digital healthcare sector. The qualitative analysis was undertaken to understand the problems faced by the same sector. They have reported many cybercrime cases worldwide. In case of India, also the number of cybercrime cases have risen over the years.

The quantitative analysis was also done to find out the present scenario of digital healthcare sector. The questionnaire was developed and primary data was collected. As per the results, the respondents were willing to provide information using mobile phones. They also wanted new laws to protect privacy on the internet. The cyber-attacks will have negative impact on privacy of patients. [16]

The secondary data related to Annual Global Healthcare Funding, Annual Global Corporate Funding for Digital Health, Annual Global Healthcare CyberSecurity Funding, Annual Global Cybersecurity Market and Number of Cyber Crime Cases Reported in India was also collected for hypotheses testing. The aim was to test the correlations between them. It is generally assumed that with the increase in funding for healthcare sector plus more corporate funding for digital health including increase in cybersecurity funding globally would reduce the number of cybercrime cases, but that is not happening. The cyber-attacks have increased during the current pandemic period. [17] The question arises then what should be done to bring down the number of cybercrime cases? The answer would help to overcome the challenges in digital healthcare sector.

The factor analysis was conducted on the ten statements regarding information security mentioned in the questionnaire. The respondents provided data that helped to know the security measures or precautions taken by them to protect the data and information from different types of cybercrimes. The four factors were extracted namely careless about security, check and use online security features, destroy mail after changing pin plus respond to messages for security purpose. The further research can be done based on the four mentioned factors. The war is between cyber security and crimes in digital healthcare sector, where cyber security will win only when the number of cybercrime cases would reduce.

LIMITATIONS

The study is restricted to secondary and statistical data available up to 2020. The National Crime Records Bureau has provided data up to 2019 only. Sample size (111) of primary data is limited due to Covid pandemic, lack of time, resources and an on ongoing process.

IMPLICATIONS

The healthcare industry has to safeguard the data by regularly monitoring the systems. As we upload more records and detailed personal data of people in the online system, the attackers would like to steal or hack the data. The healthcare sector has to develop Alert Intelligent Systems (AIS) to know whenever an attacker tries to attack the digital resources, so that the system can automatically counter. [18] They have to develop a business continuity and recovery plan plus report the same to cybercrime cell for further investigation. If attackers feel that they will be punished with imprisonment and or fine then only it will be a deterrent and help in reducing the number of cybercrime cases.

CONCLUSION

The cybercrime cases have increased even after spending on cyber security measures. It is important to have security controls at all levels to protect personal information and medical records of people. It is important to create awareness among people about cyber security. Healthcare sector and government authorities have to do these on a consistent basis. It requires more research to be

done and create a crime mapping to understand plus overcome the challenges.

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VIEWPOINT ARTICLE

AN INTEGRATED FRAMEWORK OF LEADERSHIP FOR HEALTHCARE ORGANIZATIONS TO NAVIGATE THROUGH COVID-19 CRISIS

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ABSTRACT

COVID-19 crisis has strained healthcare systems immensely creating a multi-front challenge to overcome. Healthcare leaders face stressful situations like long arduous hours of work, isolation from their loved ones, immense mental health issues along with fighting false narratives and campaigns by social media. Hence, there is a dire need for leaders to embrace this uncertainty and evolve by adopting a strategic shift in their mindset.

To propose an effective functional leadership model of practice during crisis, author has undertaken a qualitative approach to understand the various literature published on crisis management, reviewed the literature on healthcare leadership, contextualized the papers about unique challenges posed by a crisis like COVID-19, and utilize the learnings to design an integrated framework for healthcare organizations to be applied during a crisis.

Author presents a systems-based view of leadership challenges in healthcare organizations during a crisis and proposes a unique framework of 3A- Acknowledge, Activate, and Agility which could serve a comprehensive tool of strategic leadership for healthcare leaders to adopt during a crisis. When healthcare organizations adopt the principles embedded within 3A model elements, it would help them realize better patient outcomes, develop compassionate organizational culture, and enhance professional satisfaction within their teams.

KEYWORDS

COVID-19, Crisis leadership, psychological safety, acknowledge, patient-centric care, agility, activate.

INTRODUCTION

The COVID-19 crisis has severely tested healthcare leaders across the globe on multiple fronts be it saving lives, sustaining essential medical supplies, caring for their own staff, engaging with customer, or enabling smooth business processes to sustain efficient operations. Healthcare leaders face stressful situations like long arduous hours of work, isolation from their loved ones, immense mental health issues, fighting false narratives and malicious campaigns by social media.[1] Such convoluted trajectory of pandemic has given rise to a spike in the sense of loss of control and has heightened emotional vulnerability due to the high amount of uncertainty. While pandemic has still

not subsided, it has exposed deep structural inefficiencies of health systems and has created an overshoot in need for leaders who can help us navigate through such tortuous times.

But, why is leadership in a crisis so different from normal times? Crisis like COVID-19 pose herculean challenges with crisis experts like Mitroff, Boin etc. highlighting the unique challenges of chaos, ambiguity, and stress in crisis. [2,3] Yukl and Zaleznik have emphasized the importance of leadership during any crisis.[4] Bernard Bass has explicitly studied crisis leadership in business context and recommended that a crisis demands flexible and adaptive leadership style.[5] Such an approach includes a mixture of being assertive, directive as well as trusting the team members through decentralized approach. Healthcare organizations often tend to be hindered by the authoritative and expert based leaders who hold onto authority and fail to decentralize the various sub-systems of organization. Arjen Boin and Paul t' Hart have addressed the issues associated with such a mindset and recommends that a crisis requires multi-agency coordination and collaboration among agencies which may not have worked together before and leader has to channel such coordination.[3] Demiroz et al.' identified unique traits of a leader to include "cooperation, adaptability, flexibility and communication" in crisis times.[6] R. Heifetz, in his famous book "Leadership without easy answers", has tabulated the "technical" and "'adaptive" problems that a physician needs to solve to navigate in times when it is tough to make decisions.[7] Despite the presence of a vast academic literature on leadership during crisis, they were mostly limited to emphasizing on just few limited parameters thereby lacking the integrative and comprehensive nature of leadership practices. This article attempts to provide novel integrated framework of healthcare leadership which shall serve as handy and easy to use guide for managing complexities during a crisis in healthcare settings.

It is important to look at leadership challenges as distinct from the case of routine emergency situations in healthcare settings. [8] Shingler-Nace had identified 5 ingredients for an effective leadership during crisis-calmness, communication, collaboration, coordination and providing support.[9] Physicians and administrators need to evolve these qualities within the new context of pandemic and ensure that they abide by their core duties with utmost integrity and dedication. Before proceeding with the model for crisis leadership, let us look at how COVID-19 highlighted the deficiencies in critical leadership skills. COVID-19 brought massive overload on the existing health infrastructure in terms of the scarcity of beds, ICUs, ventilators, oxygen cylinders and even basic medicines for day-to-day use. Healthcare workers were stretched to work for double shifts in many cases thereby straining their physical endurance and subjecting them to extreme physical stress. Emotional health of such workers was equally jeopardized by being isolated from their families and seeing exhausting number of deaths every day.[1] Managing emotionally volatile relatives of patients was an additional draining aspect for healthcare leaders.

A crisis of the scale and complexity of COVID-19 demands a transformational shift in the mindset of leaders. An effective healthcare leader in such crisis situations must encompass few major dimensions to his leadership arsenal:

SENSE OF SELF

i) **Patience and observation:** Leaders need to wait, refrain from impulsive action under stress, observe, have conversations to identify meaningful actionable themes to emerge.

ii) **Resilience:** A mindset that enables adoption of resilience and agility is critical to adapt quickly to new demands of pandemic. It also includes emotional resilience which provides a deeper "sense of purpose" to these healthcare leaders and stay motivated to persevere amidst recurring failures.

iii) **Shift from expert to an enabler:** Avoid "I know it all" approach and trust their teams for their ability to execute decisions. They will have to place trust in the on-the ground stakeholders and influencers who can act on the insights derived from patients, nurses, medical suppliers, and govt.

HONESTY LEADING TO INTEGRITY:

Healthcare organizations need to be honest in the cost they charge from patients for treatments recognizing that a vast majority of the patients' hail from poor socio-economic strata of society. Cost of test, hospitalization and ICU beds should be rationally charged and patients should be informed about the expenses and billings upfront to help them prepare better. Deeper commitment to honesty comforts patients that healthcare leaders are trustworthy and despite the common calamity, they are there for them through their thick and thin.

PSYCHOLOGICAL SAFETY:

Decentralized approach to leadership demands that leaders make every person feel valued and respected for their duties and welcome them to take part in active decision making. Leaders are under tremendous pressure from govt and international organizations and often pass on this stress to their team members failing to understand the concerns going on within their team internally. Team members, despite undergoing extreme anxiety, hesitate to freely expresses their emotions and as a result end up being more miserable. It is the job of leader that they let their team members not subjugate under pressure and foster a climate of psychological safety by enabling every member to feel included within their decisions.

Crisis demands that leaders recognize the crisis, acknowledge its severity, and plan a strategy for its short-term and long-term impact. It needs leaders, ideally with medical knowledge and experience in administration, to lead from the front. By encouraging shared and collaborative learning from all experienced medical professionals in teams, a leader who empowers his teammates shall be the one who synergizes a result driven healthcare organization.

An essential point to consider here is that many leaders may dive into "*dilemma thinking it is better not to act at all and observe till the pandemic resides*". This could be as disastrous as doing nothing and can put their teams under far more stress and anxiety. As per one of the landmark studies conducted in social psychology titled, "The Challenges of the Disengaged Mind," it was found that participants preferred to give themselves electric shocks instead of being left in isolation with their thoughts.[10] Leaders need to learn that when followers see them taking even minor actions like communicating frequently and asking for feedback, it can be more helpful and psychologically uplifting than just sitting idle.

After we have seen the critical dimensions of healthcare leader's principles, I propose below a model of 3A-Acknowledge, Activate and Agility which could serve as easy-to-use framework to categorize the various decisions leaders take and enhance their efficacy.

ACKNOWLEDGE

Resilient leaders zero in on the most pressing issues, amidst a flurry of urgent issues, and establish priority areas. Leaders have to embrace the uncertainty and publicly acknowledge that they may not have all the answers. Such a public acknowledgement enables employees to see the human side of their leaders and motivates others to step up in search for the right answer.

SUPPORT TALENT AND STRATEGY:

Organizations must see that all their "talents" align themselves with the purpose of the organisation by acknowledging the severity of crisis and step up to cater to the additional workload. When companies are centered on an authentic purpose, employees feel that their work has meaning. Research shows that employees who feel a greater sense of connection are far more likely to ride out volatility and be there to help companies recover and grow.

ENGAGE WITH YOUR BUSINESS ECOSYSTEM:

Employees at each level of the organization have to understand the concerns of the other departments and evolve their practices with the evolving business ecosystem. Acknowledging the integrated impact of one division's activities over the other can help break operational siloes and enable seamless integration for maximum effectiveness during a crisis.

STAY ENGAGED WITH CUSTOMERS:

Healthcare organizations need to focus on determining the actions to preserve their customers by developing a responsive patient support system. They should simultaneously look for new avenues for catering to patient's shifting needs by adopting innovative business models based on tele-health, home care etc.

ACTIVATE

Leaders will have to rapidly deploy a crisis command centre which would serve as the nodal centre to maintain consistency of information and efficiency in communicating decisions of leaders. A detailed risk analysis categorizing various actions related to process, people and structure which are essential to cater to the evolving needs of crisis must be initiated proactively.

SAFETY OF EMPLOYEES AS FIRST LINE OF DEFENCE:

Organizations must ensure that they lay down set of guidelines and precautionary measures to be followed strictly by the staff, compensate staff accordingly, plan for their safe transport and ensure safe living conditions for them. The employees need to be provided proper meals on time, allocated duties with adequate assurance that their health shall be the core priority of healthcare firm. Simultaneously, the employees shall also have to be trained properly to follow all precautionary measures and to take ownership of their own safety as well as that of the others.

STRENGTHEN DIGITAL CAPABILITIES & OPPORTUNITIES:

Digital infrastructure helps develop integrated user-experience, monitor condition of patients remotely help reduce the burden on healthcare infrastructure. It is vital to develop database of patient's care and enable more data-centric decision making.

SHORE UP THE SUPPLY CHAIN AND INVENTORY MANAGEMENT:

Healthcare leaders will have to be empathetic to their medical suppliers, dealers, partners and assist them in their transition to build a sense of trust and long-term loyalty. Crisis demands that health organizations collaborate and deepen the existing relationship through sound operations management practices.

AGILITY

Since expediency is essential, leaders need to adapt and change constantly to evolve to cater to the new demands of the crisis. In one analysis firms from 1955 to 2014, it was found that around 88% of companies which were in the Fortune 500 list in 1955 were gone by the time 2014 arrived.[11] It shows the importance of evolving with time and adopt change management principles within healthcare. Healthcare leaders often go into inertia with their "reputed past" and fail to recognize that "what brought them here, won't take them there". Organizations will have to adopt newer emerging business models like more day care, home care facilities, tele health services. Such models are essential for organizations to operate on a sustainable profit margin, cut cost while also delivering due patient care services. Agility does not refer to just organizational agility, but also emotional agility that leaders need to embrace. Leaders must become more collaborative within their teams, communicate frequently, be compassionate, learn from others and be willing to change their outlook towards healthcare reforms.

CONCLUSION AND WAY FORWARD

Healthcare leaders will have to imagine themselves as captain of a ship which has lost its way in the storm and does not have a compass to find out the right direction. It is only through utmost grit, deep conviction, and collaborative leadership that the captain can help crew sail through the storm. While leaders may still become skeptical of their own decisions, they must hold themselves accountable, take complete ownership and motivate their employees by practicing humility, emotional resilience, and soft-leadership principles to enable their teams develop a culture of "we all are in it together". No one knows how the pandemic will bring transformational changes in our lives but if organizations invest in developing values and behaviors that can support people and communities towards easing out their pain, it would certainly help us emerge stronger with a reformed relationship and rejuvenated "patient-care" model.

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RESEARCH ARTICLE

IMPACT OF SOCIO-ECONOMIC FACTORS IN REDUCING MALNUTRITION AMONG CHILDREN: A COMPARATIVE STUDY OF INDIA, BANGLADESH AND SRI LANKA

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ABSTRACT

OBJECTIVE

To assess the impact of economic and gender factors on malnutrition among children below 5 years of age by making a comparative study between India, Bangladesh and Sri Lanka

DESIGN AND SETTING

The study uses data and information on economic and gender status parameters taken from the secondary sources for three South Asian Countries between the years 2000 to 2018. The study uses ANOVA, Post Hoc test and Fixed Effects Panel Regression analysis to arrive at the conclusions.

RESULTS

Comparative analysis between the three countries shows that the extent of malnutrition among children is lowest in Sri Lanka and highest in India. The study finds that economic factors such as domestic government's expenditure of healthcare as percentage of total health expenditure and gender factors measured in terms of female labour force participation, and school enrolment of girls at secondary level significantly impact the level of malnutrition among children.

CONCLUSION

Malnutrition among children is a complex challenge which cannot be solved by emphasizing on only economic growth. Policies emphasising on gender parity and empowerment integrated in healthcare policies will positively impact nutritional level of children.

KEYWORDS

Malnutrition, Children, Socio-economic factors, Gender policies, South Asian countries

INTRODUCTION

Malnutrition among children is a consequence of socio-economic and gender construct such as lack of access to nutritious food, basic healthcare facilities, status of maternal health as well as maternal awareness related to the causes and implications of malnutrition in children. Malnutrition among children has higher socio-economic consequences such as high child mortality, high level of morbidity due to higher susceptibility to infections and illness which further leads to lower level of human capital and productivity implying lower economic growth. India is infamous for a very high prevalence of malnutrition among children up to 5 years old. According to National Family Health Survey IV for the year 2014-15, as many as 69.4 per cent of children below five years are anaemic. India lags behind many other developing countries which are closer and similar in socio-economic conditions such as Sri Lanka and Bangladesh. COVID 19 has worsened the situation due to reduced access of basic healthcare and nutritious food to the children. Few of the government programs such as Integrated Child Development Services (ICDS) could not get implemented at the grassroots level effectively due to overburden on overall health system and restrictions on mobility of health workers.

The World Health Organization (WHO) defines malnutrition as deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients. It can take various forms such as under nutrition (such as wasting, stunting, underweight, and deficiencies in vitamins and minerals), Micronutrient- related malnutrition (inadequate intake of vitamins and minerals), overweight and obesity and diet-related non-communicable diseases. The extent of malnutrition among children is very high across the globe. WHO has estimated that globally nearly 144 million children under the age of 5 years were stunted, 47 million were wasted and 38 million were overweight in 2019. It is one of the major causes of illness and death among children in developing economies. [1] Children are also be affected by micronutrient deficiencies, which also have an adverse effect on their growth and development. The most common and clinically significant micronutrient deficiencies in children and childbearing women throughout the world include deficiencies of iron, iodine, zinc, and vitamin A to name a few. They are estimated to affect as many as two billion people. It is seen that the impact of malnutrition usually falls mainly on the health status of children under five years of age. [2]

COVID-19 is likely to have a very high negative impact on nutritional level of children. [3] It has brought out various risk factors such as food insecurity and poor quality diet, reduced incomes and lack of access to financial resources, limited health services and interrupted education. These all are likely to lead higher level of malnutrition among children during and post COVID-19 period. As per the estimate of one of the study made by Lancet, the extent of malnutrition among children in low income countries is likely to increase by 14.3 % due to fall in per capita income during the pandemic.

The research shows that children malnutrition is highly related to the gender status in terms of women's access to healthcare, higher education and economic opportunities. National Family Health Survey, India report published in 2018 clearly mentions that children whose mothers have less education have lower nutritional levels than that of better educated mothers. [4] One study from Bangladesh also showed that prevalence of malnutrition among children has significantly reduced with higher level of maternal education. [5]. Women's education along with other precautionary measures such as vaccination, prompt treatment for diarrhoea and sanitation facilities have a positive impact on reducing malnutrition among children. [6] One study on maternal health services of 31 developing countries proves a positive linkage between economic and educational empowerment of women and use of maternal healthcare services. [7] Researchers suggest that gender disparities also need to be addressed at the early age by promoting girl's education and implementing nutrition sensitive interventions for them. [3,8]

The research till date shows a positive relationship between economic development and public health expenditure and children's health status. Economic inequity and lower economic growth leads to undernourishment of children. [9] Public health expenditure can reduce up to 4.4 child mortality in every 1000 live births and can enhance the life-expectancy at birth by 47 days in a year. [10] An increase of 10 % in public expenditure of social sector along with public health helps in reduction in mortality rates and morbidity rates among children. [11]

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[1] *http://rchiips.org/nfhs/pdf/NFHS4/India.pdf*
[2] *https://www.who.int/news-room/fact-sheets/detail/malnutrition*[1]
[3] *https://www.who.int/nutgrowthdb/jme-2019-key-findings.pdf*
[4] *https://globalnutritionreport.org/reports/global-nutrition-report-2018/*
[5]. *Published Online July 27, 2020 https://doi.org/10.1016/ S0140-6736(20)31647-*

The research shows the effectiveness of policy interventions at the country level on the nutritional level of children. One of the success factors of reduction in malnutrition among children in Bangladesh is the effective policy intervention in empowering women. [8] The evaluation study made by the World Bank in 2005 gives credit to well executed policy of providing key resources and personnel for executing 'The Bangladesh Integrated Nutrition Project', making vitamin A and iron supplements easily available and promoting better infant feeding practices. [12] Sri Lanka made a significant progress in the field of child health and nutrition by implementing sound health policies improving its public health care system and thereby reducing the disease burden. [13]

India lags behind Sri Lanka and Bangladesh in meeting the targets of reduction in malnutrition. Main reasons are found in its inadequate health infrastructure and healthcare personnel as well as inaccessibility and low level of utilization of health services. [14] One of the ICDS evaluation study shows that the efficacy of the programme is limited due to high level of inequality between urban and rural areas and between different regions which resulted into low services utilization and lack of continuum of care services from pregnant women to breast feeding practices till the child becomes 6 years old. [15]

The literature gap exists in terms of specifying succinctly how these economic and gender status factors impact the malnutrition status especially in developing economics like India. The present study attempts to fill this gap by making a comparative study of three South Asian countries – India, Sri Lanka and Bangladesh which are similar in socio-economic and cultural context but are significantly different in achieving the target of reducing malnutrition among children.

OBJECTIVES

The purpose of the study is to make a comparative analysis between India, Bangladesh and Sri Lanka to assess their progress in reducing the level of malnutrition among children and to assess the impact of socio-economic factors affecting the extent of malnutrition among children. The specific objectives are

- To make a comparative analysis of the status and the trends in reducing malnutrition among children in India, Sri Lanka and Bangladesh
- To assess the impact of economic and gender factors on the level of malnutrition among children

METHODOLOGY ADOPTED

The study uses secondary data pertaining to the period between the years 2000 and 2018. It uses following economic and gender indicators:

1. Prevalence of Anaemia - % children under 5 years – UNICEF
2. Economic status – GNI Per Capita, Atlas method (current US$) - The World Bank
3. Gender status – Female Labour force participation, School enrolment of girls at secondary level (%) – The World Bank
4. Status of public health system - Domestic government health expenditure (% of current health expenditure), Domestic government health expenditure (% of GDP), Domestic government health expenditure per capita (current US$) – The World Bank

The study presents the descriptive and inferential analysis. Inferential analysis of ANOVA, Post Hoc test and Fixed Effects Panel Regression is done with the use of SPSS package.

DATA ANALYSIS

A. DESCRIPTIVE ANALYSIS:

Descriptive analysis gives the summary of year-wise prevalence of anaemia in the three selected countries.

Table 1 reveals that the extent of anaemia among children is highest in India followed by Bangladesh and Sri Lanka. It also shows that the annual rate of fall between years 2000 and 2017 is higher in Bangladesh and in Sri Lanka as compared to India.

A. INFERENTIAL ANALYSIS:

Research question 1: What is the comparative status of malnutrition among children among three selected countries in comparison with their selected economic and gender parameters?

TABLE 1: PREVALENCE OF ANAEMIA AMONG CHILDREN IN THREE SELECTED COUNTRIES:

YEAR	INDIA	PER ANNUM CHANGE (% FALL)	BANGLADESH	PER ANNUM CHANGE (% FALL)	SRI LANKA	PER ANNUM CHANGE (% FALL)
2000	68.8		62.2		35.1	
2001	67.9	-1.31	60.9	-2.09	34	-3.13
2003	67	-1.33	59.6	-2.13	33.2	-2.35
2004	66.1	-1.34	58.2	-2.35	32.4	-2.41
2005	65.4	-1.06	56.8	-2.41	31.6	-2.47
2006	64.5	-1.38	55.5	-2.29	30.9	-2.22
2007	63.6	-1.40	54.1	-2.52	30.2	-2.27
2008	62.7	-1.42	52.7	-2.59	29.2	-3.31
2009	61.8	-1.44	51.2	-2.85	28.4	-2.74
2010	61	-1.29	49.6	-3.13	27.5	-3.17
2011	60.4	-0.98	48.1	-3.02	26.8	-2.55
2012	59.7	-1.16	46.5	-3.33	26.1	-2.61
2013	59.1	-1.01	44.9	-3.44	25.5	-2.30
2014	58.5	-1.02	43.5	-3.12	25.3	-0.78
2015	58	-0.85	42.3	-2.76	25.2	-0.40
2016	57.6	-0.69	41.2	-2.60	25.3	0.40
2017	57.3	-0.52	40.3	-2.18	25.6	1.19

TABLE 2: COMPARISON OF SELECTED COUNTRIES ON IMPORTANT PARAMETERS USING ANOVA

PARAMETER	COUNTRY	MEAN	STD. DEVIATION	STD. ERROR	SIG
Prevalence of Anaemia - % children under 5 years	Bangladesh	50.43	7.41	1.74	0.00
	India	62.03	3.85	.90	
	Sri Lanka	28.77	3.39	.79	
	Total	47.08	14.82	2.01	
GNI per capita, (current US$)	Bangladesh	796.11	340.81	80.33	0.00
	India	1070.00	476.28	112.26	
	Sri Lanka	2202.77	1189.64	280.40	
	Total	1356.29	970.42	132.05	

School enrolment of girls - secondary level - %	Bangladesh	57.07	8.90	2.09	0.00
	India	57.54	13.42	3.16	
	Sri Lanka	98.56	1.84	.43	
	Total	71.06	21.67	2.94	
Domestic government health expenditure (% of current health expenditure)	Bangladesh	21.48	3.10	.73	0.00
	India	22.97	3.63	.85	
	Sri Lanka	47.15	5.16	1.21	
	Total	30.53	12.52	1.70	
Domestic government health expenditure (% of GDP)	Bangladesh	.49	.056	.01	0.00
	India	.83	.08	.01	
	Sri Lanka	1.85	.27	.06	
	Total	1.06	.60	.08	
Domestic government health expenditure per capita (current US$)	Bangladesh	3.78	1.38	.32	0.00
	India	9.66	4.97	1.17	
	Sri Lanka	42.64	16.78	3.95	
	Total	18.69	19.92	2.71	0.00
Female Labour force participation (%)	Bangladesh	29.68	2.44	0.57	
	India	26.80	4.09	0.96	
	Sri Lanka	35.96	1.25	0.29	
	Total	30.82	4.76	0.64	

*. The mean difference is significant at the 0.05 level.

The above table reveals following things:

- The prevalence of anaemia among children up to 5 years is lowest in Sri Lanka followed by Bangladesh. It is highest (62 %) in India. The difference across the three countries is statistically significant as P < 0.5.
- The difference in other socio-economic parameters is also found out to be statistically significant (P < 0.5). It can be seen that Sri Lanka has lowest prevalence of malnutrition among children. On all the other economic and gender parameters it has significantly higher mean as compared with India and Bangladesh.
- It must be noted that Bangladesh has significantly lower prevalence of malnutrition among children than India irrespective of having lower per capita income and lower per capita public health expenditure. It is also observed that the percentage of females labour force participation is significantly higher in Bangladesh as compared to India.

TABLE 2: POST HOC TEST OF COMPARISON OF THREE SELECTED COUNTRIES ON PREVALENCE OF MALNUTRITION:

(I) COUNTRY CODE	(J) COUNTRY CODE	MEAN DIFFERENCE (I-J)	STD. ERROR	SIG.
Bangladesh	India	-11.60*	1.73	.000
	Sri Lanka	21.66*	1.73	.000
India	Bangladesh	11.60*	1.73	.000
	Sri Lanka	33.26*	1.73	.000
Sri Lanka	Bangladesh	-21.66*	1.73	.000
	India	-33.26*	1.73	.000

*. The mean difference is significant at the 0.05 level.

The post Hoc test shows that the extent of malnutrition between three countries is also statistically significant.

It can be concluded that India has significant high prevalence of malnutrition among children in comparison with Bangladesh and Sri Lanka.

Research question 2: What is the impact of economic and gender factors such as GNI per capita, gender status, and public healthcare expenditure on the extent of malnutrition among children?

The study has used Fixed Effects Panel Regression Model to analyse the panel data of longitudinal observations of three countries over the period of 17 years. The output of the model is given below:

TABLE 3: FIXED EFFECTS PANEL REGRESSION ANALYSIS:

FACTORS	UNSTANDARDIZED COEFFICIENTS	STANDARDIZED COEFFICIENTS	UNSTANDARDIZED COEFFICIENTS	T	SIG
(Constant)	95.309	7.839		12.158	.000
Dummy Variable Sri Lanka	-1.816	6.528	-.058	-.278	.782
Dummy Variable India	16.866	2.702	.541	6.243	.000
GNI per capita	-.007	.002	-.478	-3.093	.003
School enrolment girls - secondary level - %	-.337	.056	-.492	-5.988	.000
Female Labour force parti. (%)	-.413	.158	-.133	-2.610	.012
Domestic govt. health expen. PC	.308	.150	.413	2.051	.046
Domestic govt. health expen. (% of current health expen.)	.093	.128	.078	.725	.472
Current health expen. (% of GDP)	-4.617	1.745	-.233	-2.645	.011

a. Dependent Variable: Prevalence of Anaemia - % children under 5

MODEL SUMMARY:

MODEL	R	R SQUARE	ADJUSTED R SQUARE	STD. ERROR OF THE ESTIMATE
1	.992[a]	.983	.980	2.09089

FINDINGS FROM REGRESSION ANALYSIS

Prevalence of anaemia among children up to 5 years = 95.30 -0.007 PCI - 0.337 School enrolment of girls - secondary level - % - 0.413 Labour force participation of female (%) + 0.308 Domestic government health expenditure - 4.61 Domestic government health expenditure (% of GDP)

The regression analysis shows that:

1. Out of the six selected independent factors GNI Per Capita, School enrolment of girls at the secondary level (%), Female labour force participation (%), Domestic government health expenditure (% of GDP), and Domestic government health expenditure Per Capita and Domestic Government's Health Expenditure (% of GDP) (% of current health expenditure) are found to have statistically significant impact on prevalence of malnutrition among children.
2. One independent variables of Domestic government health expenditure as percentage of current health expenditure does not show statistically significant impact.
3. The analysis proves that gender status measured in terms of access to secondary level of education to girls and their labour force participation has statistically negative impact on prevalence of malnutrition among children. This result is justified in the theory.
4. It is observed that domestic government health expenditure as percentage of GDP is showing a positive impact with prevalence of malnutrition among children. Theoretically it cannot be justified. At the same time this finding might have come due to the fact that though India spends significantly higher proportion of GDP on health as compared to Bangladesh, Bangladesh has better results in reducing the prevalence of malnutrition.

CONCLUSIONS

Following conclusions can be drawn from the data analysis:

- Prevalence of malnutrition among three countries is significantly different with Sri Lanka having the lowest proportion followed by Bangladesh.
- The regression analysis shows that prevalence of malnutrition among children is affected by gender status measured in terms of school enrolment of girls at secondary level and female labour force participation as well as by PCI and the proportion of government expenditure in total health expenditure.
- It can be concluded that role of public health expenditure is very important in reducing the burden of out-of-pocket expenses on health and providing an easy and affordable access of healthcare which goes a long way in reducing the extent of malnutrition among children.
- It can also be concluded that gender development policies which empower women through education and their active role in the economic activities also play a significant role in taking better care of themselves and their children which will go long way to reduce malnutrition among children.
- The example of Bangladesh shows, special nutrition programmes focussing on children below 5 years and bringing out behavioural changes in pregnant women and young mothers in improving child feeding practices are important for reducing the prevalence of malnutrition among children. Bangladesh achieved this by integrating gender empowerment policies with health policies.

RECOMMENDATIONS:

The study recommends that integration of public healthcare policies and gender empowerment policies will be useful for reducing the extent of malnutrition among children.

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RESEARCH ARTICLE

PREDICTION OF GRAFT SURVIVAL USING ARTIFICIAL NEURAL NETWORK (ANN), AND BAYESIAN BELIEF NETWORK (BBN): A COMPARATIVE STUDY

---Graft Survival Prediction using Machine Learning: A Comparative Study

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ABSTRACT

OBJECTIVE:

The aim of this study was to predict graft survival using machine learning prediction techniques and the involved decision making.

DESIGN:

Prediction of graft survival post-transplant using machine learning algorithms like Artificial Neural Network (ANN) (Single and Multi-layer networks), and Bayesian Belief Network (BBN).

SETTING:

Recipient and donor with characteristics of age, sex and Glomerular Filtration Rate (GFR) and the follow-up of probability of survival one year after transplantation (n=40).

MAIN OUTCOME MEASURES:

The Data include simulation from donor, recipient characteristics of single centre with factors age, sex, GFR and probability of survival collected particularly with the follow-up after the first year of transplant.

RESULTS:

The ANN and BBN were modelled in Python. The probability of survival post-transplant is predicted, and accuracy measured using Root Mean Square Error (RMSE). The results for the methods were compared and efficacy and ease of use are discussed.

CONCLUSION:

The decision making in the organ transplantation involving the patients and doctors consists of mainly involve improving the graft survival and hence prediction becomes important. The developed models can be used to predict the transplant and aid as decision support system for decision regarding matching and allocation.

KEYWORDS

Organ Transplantation, Graft survival prediction, Artificial Neural Network (ANN), Bayesian Belief Network (BBN).

INTRODUCTION

Organ Transplantation is to place the functioning organ obtained from a live/ dead donor or grown in a lab and onto the patient whose organ function is either deteriorating or has completely stopped functioning and needs assistance from an external source. One of the reasons for long term graft survival after transplantation is to go for best match through blood group compatibility. There are reasons like age, medical condition and compliance degree of the patients that also contribute to the graft survival. The advancement of medical technology has provided a better solution for reducing the rejection of the graft, in the form of treatment with immunosuppressant drugs.

The literature on prediction of graft survival is available involving factors and characteristics of recipients and donors. The studies most relevant to our study especially with respect to the prediction techniques, Artificial Neural Network (ANN) and Bayesian Belief Networks (BBN) are explained briefly in this section.

Hariharan et al. [1] considered only pre-transplant data like sex, age and race which are demographic data and medical characteristics like HLA and diabetes of recipient and type and age of donor. Baskin-Bey et al. [2] considered type of donor and its effect on graft survival. Both the studies used the US renal data base for the analysis. Machiniki et al. [3] took notice on the effect of age and medical factors like hypertension, cause of the chronic kidney disease, life style factors like usage of tobacco, duration of the period of dialysis before transplant. Bertram et al. [4] considered around 38 recipient and donor characteristics most of them were related to post-transplant characteristics.

The work of Gumber et al. [5] was in deceased donor organ transplantation especially for a 4-year survival prediction and he found 77.5% patient survival and 89.3% graft survival. Sharma et al. [6] studied the delayed graft function considering factors like age and hypertension of the recipient. Osofisan et al. [7] predicted failure of kidney based on the traces of creatinine, chloride, potassium, urea and uric acid in urine. Brier et al. [8] used ANN to predict delayed graft function like sex, age, weight, height, body surface area and race for recipient and gender, age, HLA and cold ischemia time for donor. Shadabi and Sharma [9] compared the performance of their developed ANN model and Logistic regression model for predicting the survival of graft at the end of the second year after transplantation.

Topuz et al. [10] performed analysis of retrospective database, used sensitivity analyses and information fusion to evaluate and combine features from several machine learning approaches (Support vector machine (SVM), ANN and Bootstrap Forest). They used best performing sets in Bayesian belief network (BBN) algorithm to identify non-linear relationships and the interactions between explanatory factors and risk levels for kidney graft survival. An intelligent system for medical decision making for organ transplantation was initiated by Perris and Labib [11] by introducing two fuzzy logic models for improving the then prioritization system used in the UK and abroad. The first model converts an element of the current kidney transplant prioritization system used in the UK into fuzzy logic. The result is an improvement to the current system and a demonstration of the usage of fuzzy logic as an effective decision-making tool.

From the literature it is evident that ANN is used for prediction of delayed graft function and graft survival after 2 years, in a similar way we have developed a feed forward perceptron single and multi-layered model for a prediction of 1st year post-transplant for Indian scenario. Similarly, Bayesian Belief Network (BBN) was developed for the same data

The prediction of graft survival has been extensively studied but the proposed model compares the prediction using Artificial Neural Network andBayesian Belief Network. Section 3 deals with the methodology developed for the study. The results and discussion are explained in Section 4 followed by the conclusion in Section 5.

METHODOLOGY

The Prediction of graft survival using Artificial Neural Network (ANN) in single layer and multiple layer, Bayesian Belief Network (BNN) and Fuzzy logic are explained with respect to the problem in this section.

PREDICTION OF GRAFT SURVIVAL USING ARTIFICIAL NEURAL NETWORK (ANN)

The Artificial Neural Network (ANN) tries to imitate the biological neuron of the brain's pattern of learning. It basically consists of input, processing and output elements. There may be several layers in between the input and

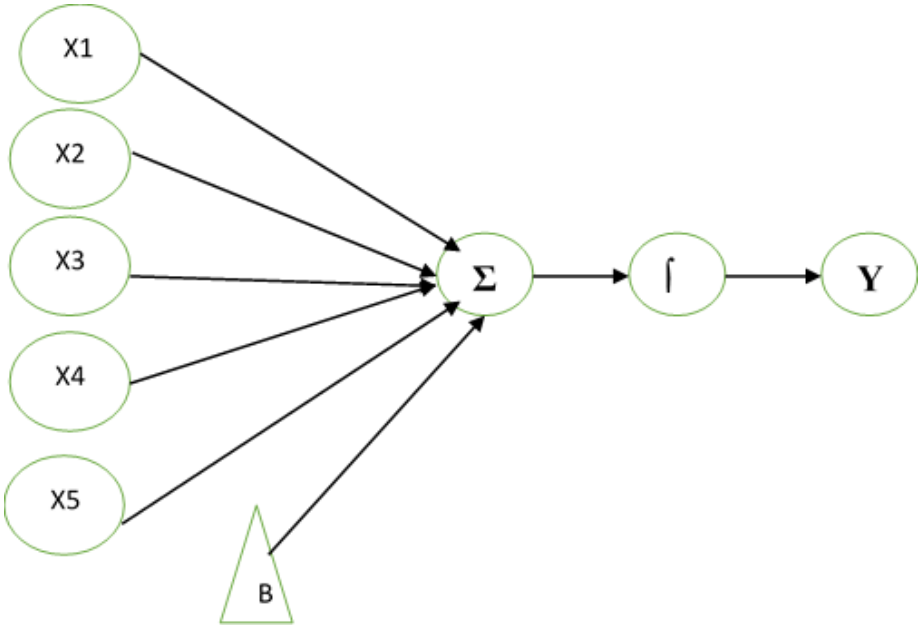
output layer too either open or hidden and it can be categorized based on that into single layer and multi layered network models.

In this work both single layered and multi layered feed forward back propagation perceptron neural network model has been developed for prediction of graft survival taking the criteria namely age and sex of both donor and recipient, and Glomerular Filtration Rate (GFR) calculated from the serum creatinine level and the probability of survival post-transplant of the recipient into account. The number of hidden layers and the units in each layer was determined based on the minimum sum of squares error. The same logic is used for modelling the ANN separately for the single as well as multi layered network.

SINGLE-LAYER PERCEPTRON (SLP)

A single-layer perceptron network consists of one or more artificial neurons in parallel. The neurons may be of the same type we've seen in the Artificial Neuron Applet. Each neuron in the layer provides one network output, and is usually connected to all of the external inputs. The network architecture and the pseudo code of the single layer perceptron network for the problem are also given.

FIGURE 1: SINGLE LAYERED PERCEPTRON ARCHITECTURE



The input variable, output variable, activation functions and their abbreviations are explained below:

X1 - Receptor Age
X2 - Donor Age
X3 - Receptor Sex
X4 - Donor Sex
X5 - Glomerulus Filtration Rate
B - Bias
Σ - Summation Function

Sigmoid Function

$$F(z) = 1/(1+e^{-Z}) \quad (1)$$

Y - Probability of Graft Survival

MULTI-LAYER PERCEPTRON (MLP)

A Multi-Layer Perceptron is a larger network of simple neurons called perceptrons. The perceptron calculates a single output from multiple inputs by summing up a linear combination of its input and weights and then applying it upon the output through some nonlinear activation function.

MATHEMATICALLY THIS CAN BE WRITTEN AS

$$y = \varphi\left(\sum_{i=1}^{N} w * x + b\right) \quad (2)$$

Where,

w - Vector of weights,
x - Vector of inputs,
b - Bias,
φ - Activation function.

A single perceptron has limited mapping ability, and hence not robust. A basic multilayer perceptron network consists of a set of nodes in the input layer, one or more hidden layers of computation nodes, and an output layer which may again be single or a number of nodes. The input signal is cascaded through the network one layer at a time.

PREDICTION OF GRAFT SURVIVAL USING BAYESIAN BELIEF NETWORKS (BBN)

Bayesian models are probabilistic graphical models used to build prediction models from the data as well as the opinions from the experts. The naive Bayes classification technique is used for classifying the recipients of the organs post-transplant of their survival after the first year of transplant. It is a supervised technique and is a simple model assuming independence between predictor variables and the target for learning the structure. According to Bayes rule the probability is calculated for each attribute variable using the following formula.

$$Posterior = \frac{prior * likelihood}{evidence} \quad (4)$$

The training data contains the donor age, recipient age, GFR all are assumed as continuous variables following Gaussian probability distribution. The block diagram consisting of the input variables, Bayesian equation and output in terms of the survival probability is shown in Figure 2.

FIGURE 2: BLOCK DIAGRAM OF BAYESIAN MODEL FOR PREDICTING PROBABILITY OF GRAFT SURVIVAL

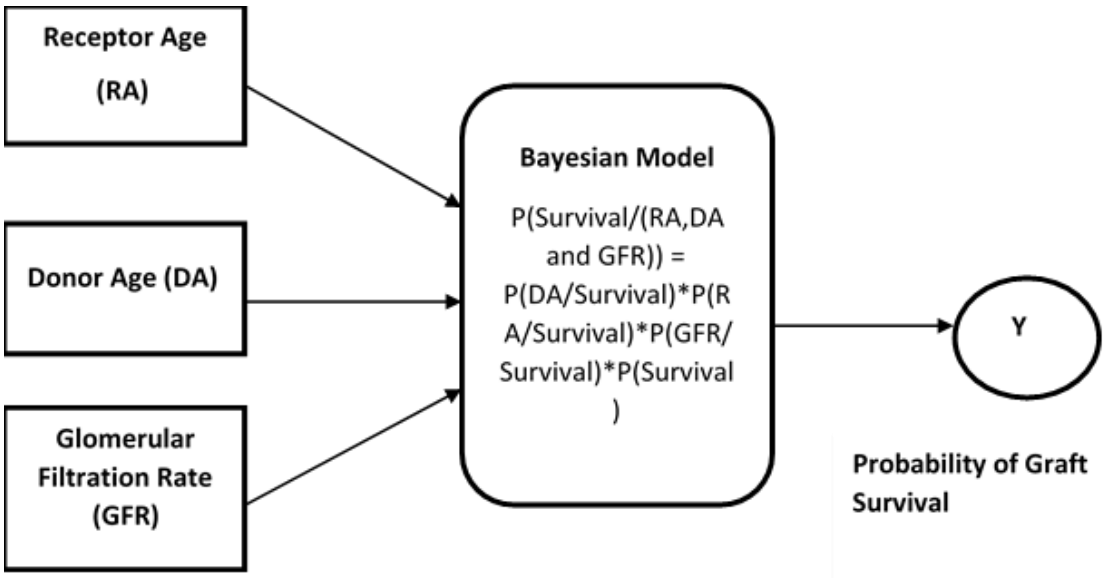
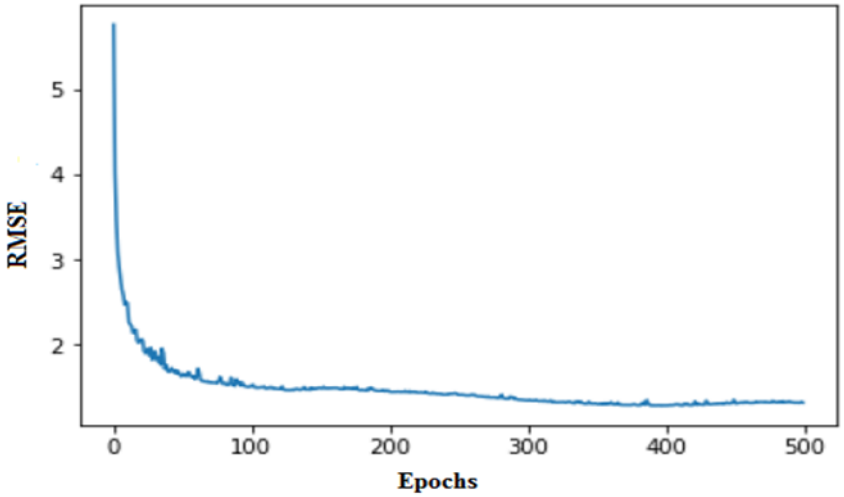


FIGURE 3: CONVERGENCE PLOT FOR SINGLE-LAYERED ANN MODEL



RESULTS AND DISCUSSION

The data used for prediction is generated for 40 recipients and 40 donors containing the factors like sex, age, Glomerular Filtration Rate (GFR) and probability of survival and is available. In the analysis of the graft survival, time is an important factor that needs to be taken into account. The function of the graft at the end of the 1st year given the characteristics of the recipient that is matched with the donor is considered in this work.

GRAFT SURVIVAL USING ARTIFICIAL NEURAL NETWORK (ANN)

The ANN was modelled in Python and the data of 40 recipients and donors is used for training. The number of hidden layers and the units in each layer was determined based on the minimum sum of squares error.

The code was run in Python and the results obtained were plotted in the form of graph in Figure 3 with number of epochs in x-axis and root mean squared error (RMSE) in the y-axis. The plot assesses convergence and stops the analysis when the solution is no longer changing. It can be seen that the error value decreases gradually as the number of iterations increase to a maximum of 500. However, single-layer perceptron networks cannot learn everything that is computationally incomplete. In order to overcome this disadvantage, the multilayer perceptron (MLP) has been developed.

The code was run in Python and results obtained are shown in graph. From the convergence plot in Figure 4, the Error vs. Epochs curve is steeply decreasing in the second iteration itself thus ensuring superior accuracy in comparison to single layer perceptron.

GRAFT SURVIVAL USING BAYESIAN BELIEF NETWORK (BBN)

The data obtained consists of the donor age, receptor age, GFR and probability of graft survival. Age is represented as continuous values by finding the mean and the standard deviation of the available data and also for the GFR. All of these are prepared based on the sample data created from the history of data and is shown separately for recipients and donors in Tables 1 and 2.

The data taken as continuous values for receptor age, donor age and GFR (Table 4) was used to predict the probability of graft survival based on the Bayesian Belief Network (BBN) and was executed using MATLAB.

The continuous values are obtained through normal probability function and the probability is calculated. Though outliers are obtained from the developed model it is only because of the randomness in the model, thus proving that it is neither over fit nor under fit.
A sample data was assumed and the results are compared with ANN and BBN in Table 4.

FIGURE 4: CONVERGENCE PLOT FOR MULTI-LAYERED ANN MODEL

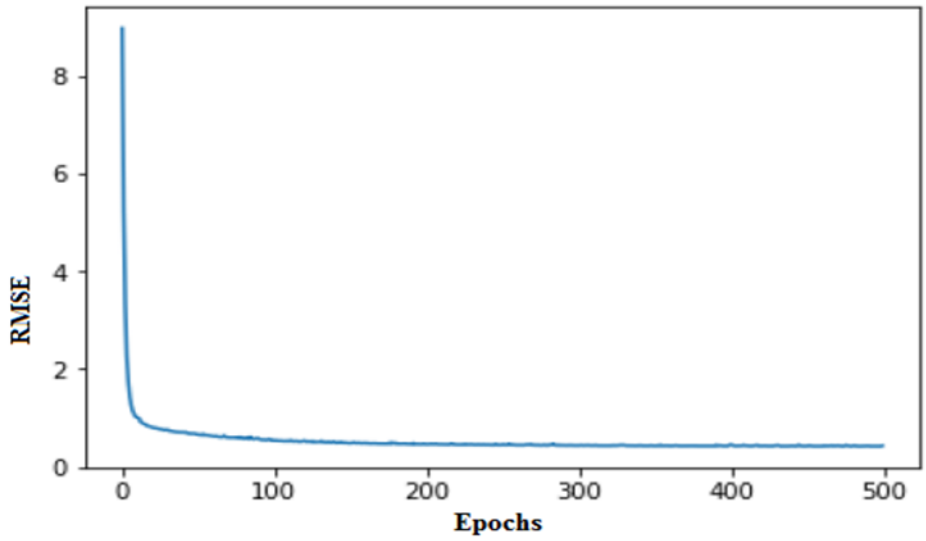


TABLE 1: RECEPTOR DATA

SL. NO.	DESCRIPTION	YES	NO	PROBABILITY OF M/F SURVIVES
1	Male	22	17	0.494974874
2	Female	28	13	0.505025126
3	All	50	30	-
4	Prob(Yes/Male)	0.44	0.566667	-
5	Prob(Yes/Female)	0.56	0.433333	-

TABLE 2: DONOR DATA

SL. NO.	DESCRIPTION	YES	NO	PROBABILITY M/F
1	Male	24	12	0.454774
2	Female	26	18	0.545226
3	All	50	30	-
4	Prob(Yes/Male)	0.48	0.4	-
5	Prob(Yes/Female)	0.52	0.6	-

TABLE 3: INPUT AND OUTPUT VALUES FOR GRAFT SURVIVAL

SL. NO.	RECEPTOR AGE (RA)	DONOR AGE (DA)	GFR	PROBABILITY OF GRAFT SURVIVAL (Y)
1	0.23	0.45	0.89	0.85
2	0.31	0.47	0.648	0.70
3	0.85	0.73	0.24	0.38
4	0.58	0.49	0.66	0.57
5	0.65	0.36	0.85	0.45

TABLE 4: COMPARISON OF ANN AND BBN MODELS

SL. NO.	MODEL	PROBABILITY OF GRAFT SURVIVAL
1	Single-layer perceptron	0.525
2	Multi-layer perceptron	0.609
3	Bayesian model	0.648

The convergence plot for both the single and multi-layered network model were developed. Thus multilayer perceptron neural network with the above architecture enables us to predict the probability of the graft survival with reduced error. The convergence of multi layered network happens to be more real compared to the single layered network. The comparison is also done between ANN and BBN model.

CONCLUSION

The prediction of graft survival post-transplant is an important area in making decision on the allocation of organs between the recipients and donors based on the data on follow up after transplantation. In this study prediction of the graft survival in organ transplantation using the techniques like Artificial Neural Network (ANN) (Single layer and multi-layer perceptron), and Bayesian Belief Network (BBN) and comparison for a small sample of data has been carried out. The accuracy of prediction of the methods is measured in terms of the probability of survival of graft value provided. Above all the application of the prediction techniques by the decision makers in making the decision of allocation in future is very important, depending on the graft survival probability of the allocated organ to the recipient. Ultimately the final decision is made by the doctors, who are the experts, as the solution aids them in making the decisions of allocation of the organ to the best matching patient.

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RESEARCH ARTICLE

CHARACTERISTICS OF FALLS AMONG THE ELDERLY DURING THE COVID-19 PANDEMIC LOCKDOWN: COVID-19 FALLS AMONG ELDERLY

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ABSTRACT

BACKGROUND:

Every year millions of older people experiences a fall. There are many reasons associated as to why a fall occurs in elderly: musculoskeletal weakness, balance issues etc. A fall can lead to a serious injury or mortality depending on the type and impact of the fall. As the environment for the elderly was restricted to their homes during the Covid-19 pandemic, this study aimed at assessing the characteristics of falls during the pandemic.

MATERIALS AND METHODS:

60 elderly individuals aging 60 years and above participated in the study. This included 36.7% males and 63.3% females. A pre-validated questionnaire was used to assess the characteristics of falls.

RESULT:

Fear of fall was not experienced or was same as before the lockdown however the fall percentage decreased by 7% during the lockdown.

CONCLUSION:

Falls among the elderly decreased during the Covid-19 pandemic lockdown.

KEYWORDS

balance issues, falls, fear of fall, geriatric, pandemic

INTRODUCTION

Throughout the Coronavirus (COVID-19) crisis, a growing concern has been the hidden "indirect" costs associated with living in a pandemic. Postponed medical appointments, suspended preventative healthcare, and increased mental health problems, can and have had a large impact on both individuals and society as a whole. One overlooked topic within these potential "indirect" costs is the risk of unreported fall accidents during or following lockdown restrictions.

A fall is a multifaceted phenomenon. A fall can be defined as "an unintentional loss of balance that leads to failure of

postural stability". [1] Fall accidents are the leading cause of injury-related death in adults aged 65+. According to World Health Organization (WHO) global report on falls prevention, people aged 65 years and above fall about 28%-35% in each year and this proportion increases as age and frailty level increase. [2] Approximately one in three adults aged 65+ fall each year and this increases to over half of adults aged 80+, or those with neurodegenerative diseases, such as Parkinson's disease. The prevalence of falls in India, above the age of 60 years is reported to be 14%-53%. [3]

A person's normal gait is an effect of various system like nervous, musculoskeletal, vestibular and sensory system that work in combination. [4] Along with this, concentration and coordination is required to have a proper gait without the risk of a fall. As age advances, it becomes challenging for the older people to carry out things independently, among which falls stand out. Falls in the elderly are common and lead to morbidity and mortality. [5] It can lead to injuries, fractures, decline in self-ability to do routine things, loss of confidence, disability and even death.[5] An episode of fall can lead to person to resort to activity restriction, which in long term may adversely impact both physical and mental health and further increase the risk of falls.[6] It is also a matter of concern as it increases the expenses for health care and affects the behavioural and psychological aspects due to restricted mobility. Falls are classified into accidental falls which are due to environment factors and pathological falls which may be due to an illness or disability and can cause frequent falls.

The biggest predictor of an injurious fall is a previous fall accident. As such, current ageing research emphasises the need to monitor fall risk and engage in early preventative behaviours to reduce known fall risk factors.

These fall risk factors may include balance or walking impairments, physical inactivity, cognitive impairment, certain conditions and medications, anxiety and depressive symptoms, fear of falling, social exclusion and isolation and alcohol use.

The problem is COVID-19 has confined many older and vulnerable adults to their homes for a long period of time and continues to do so as restrictions in certain areas get tighter. The elderly is not able to go for a walk which is important for a healthy state of body and mind. The much-reduced physical activity might have impacted the strength and endurance, confidence and cardiorespiratory sufficiency. Also, they are not much allowed to directly interact with people in fear of transmitting the virus, leading to feeling of loneliness and boredom among them as their social environment gets a drastic change. Prolonged inactivity and reduced musculoskeletal strength might have increased the fear of fall even with the help of assistive devices. This as well as restricted access to healthcare resources during the COVID-19 pandemic, could mean that ongoing fall accidents are not reported and the continued lockdown restrictions may have exposed many older adults to more fall risk factors, such as, inactivity, social isolation, and anxiety.

However, it is currently unclear how restrictions to daily life during the pandemic may affect falls in older adults. On one hand, fall accidents could reduce during this time due to less time spent doing activities outside of the home. However, it is also likely that future fall risk may increase due to less opportunities to exercise, prolonged social isolation, delayed diagnosis of related medical conditions and increased risk of anxiety and depressive symptoms. Due to various psychosocial changes which have occurred during this unprecedented situation, it is of utmost importance to know the prevalence rate and characteristics of falls which could have been different during such circumstances. Considering this gap in current knowledge, through this study we aim to study the falls occurring during the lockdown.

MATERIALS AND METHODS

It is a cross-sectional descriptive study conducted during COVID-19 lockdown period. The sociodemographic variables used were gender and age which included males and females above 60 years of age who were invited to participate in an online survey. Participation in the study was voluntary and electronic consent was obtained from the participants.

Participants were excluded if (a) they refused to participate in the study (b) were unable to understand English language, (c) had severe functional impairment and mobility restrictions, and d) were unable to comprehend due to cognitive impairment e) severe stroke sequelae or unstable Parkinson's. Sample size was not estimated prior to study. However, a maximum number of participants was desirable and anticipated.

A questionnaire was developed as part of the study. The questionnaire included demographic details, medical evaluation, physical activity evaluation, details of falls. Participants were asked to fill in their responses in accordance with relevance to their current scenario during lockdown period. A fall was considered as "an unexpected event in which subject finds themselves on a lower level or on the ground. For the characteristics and circumstance of falls, the elderly were asked about the way they experience before a fall, consequences, need and availability of medical attention. The data collected was analysed using descriptive analysis.

RESULTS

A total number of 87 individuals responded to this online survey. After screening for accuracy and completeness of the responses, a total number of 60 filled forms were included in the analysis. Further analysis was done for these 60 participants using descriptive analysis. Figure 1 shows age-wise distribution of participants. The mean (± SD) age of the participants was 56.95± 19.89– and included 36.7 % males and 63.3% females.

FIGURE 1. AGE-WISE DISTRIBUTION OF THE PARTICIPANTS

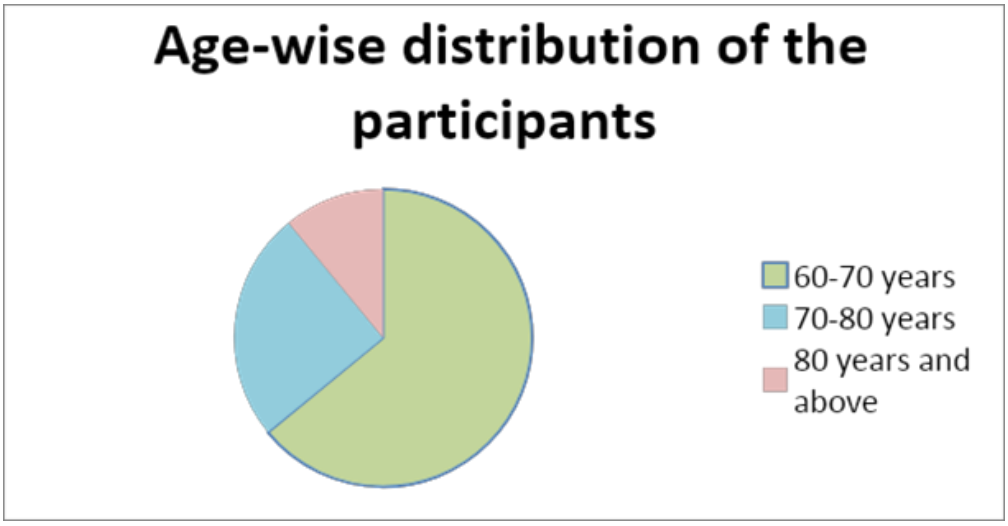


TABLE 1. COMPARATIVE ANALYSIS OF FALL-RELATED CHARACTERISTICS PRE-AND DURING THE LOCKDOWN.

SR. NO.	PRE- LOCKDOWN	DURING LOCKDOWN
1	35% of people had a fear of fall.	17% of people had fear of fall same as before the lockdown while 10% of people started experiencing it during the lockdown.
2	32% of people experienced a fall.	The percentage of falls among people was 25%.
3	The number of falls people experienced ranged from once to more than two times.	The number of falls experienced was once or twice.
4	Information is not available	5% people had injuries post fall for which medical treatment was required.
5	Information is not available	2% people required hospitalization post fall which was easily available.

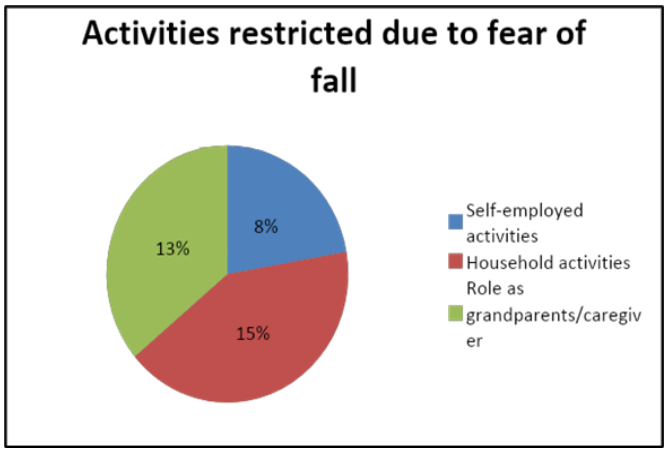
TABLE 2. THE REASONS REPORTED FOR FALL EXPERIENCE DURING LOCKDOWN

SR. NO.	REASON	PERCENTAGE OF PARTICIPANTS
1	Legs giving away	40
2	Tripping	30
3	Dizziness	20
4	Blackouts	10
5	Accidents and fear of fall	5

TABLE 3. THE REASONS FOR HAVING FEAR OF FALL

SR. NO.	REASON	PERCENTAGE OF PARTICIPANTS
1	Low confidence level	18%
2	Balance issues	23%
3	Environmental factors like slippery and uneven surfaces	3%
4	Poor eyesight	3%
5	Musculoskeletal weakness	20%

Activities restricted due to fear of fall:
1. Self-employed activities (8%)
2. Household activities (15%)
3. Role as caregiver/grandparents (13%)



DISCUSSION

Falls among elderly individuals and the resultant injuries are a major concern from both the financial perspective of health care costs and the psychological and behavioural manifestations associated with restricted functional mobility, physical dependence, and potential life-style changes. Majority of falls are multifactorial and results from a complex interplay of predisposing and precipitating factors. Previous research into the causes of falls among the elderly has been based on a disease-oriented approach that focused on the intrinsic characteristics of the individual [7] or the extrinsic environmental hazards present at the time of the fall. Present study aimed to analyse the falls occurred during the home-confinement period which may reflect the changed intrinsic and extrinsic factors in relation to fall. During this study period, all the falls experienced by the elderly occurred in the home environment. In studies conducted prior to lockdown, falls were most frequently linked to external events. Outdoor falls were more than indoor falls.[8] Most of the studies report the prevalence of falls without specifying the environment in which it occurred. The frequency of falls experienced during the Covid-19 pandemic lockdown was lesser than that before the lockdown. This is consistent with the findings reported by Matthew Hampton et al. in a study on the effects of

Covid-19 lockdown on the orthopaedic admissions and surgical cases reported across large multi care centres across the UK during this period.[9] The reduction in number of falls after imposition of a lockdown could be attributed to lesser outdoor activities, lesser engagement in sports and outdoor recreation, and lesser mobility on unfamiliar surfaces.[10]

Some other probable reasons for this could be that the elderly were proactive and aware about home modifications and had family support. Moving on reasonably familiar surfaces at home, availability of external support in the form of family members and supportive devices are known to reduce the risk of falls across all age groups.[7] In environments that are well designed or improved with home modifications to support changes in physical abilities, the functioning of older adults can be maximized to facilitate physical health, a sense of security, and continued social engagement with others in the community. [11,12] Fall risk factors are either extrinsic or intrinsic in origin. [11,13-16] Extrinsic factors are environmentally oriented. They include slippery surfaces; inadequate lighting; loose pile, or worn carpets and rugs; staircases without railings; unsupportive or badly arranged furniture; poorly designed tubs, toilets, and fixtures in the bathroom; clutter; and pets underfoot.[11,17-19] Intrinsic factors include health conditions like chronic disease, balance issues, musculoskeletal weakness, impaired cognition, gait disorders, interaction of drugs.[18,20] The home modifications made by the elderly included: staircase railings, bed rails, carpet in washroom to avoid slipping, safety door with stopper, furniture arranged for support. The presence of home hazards could interact with the physical abilities of older adults. This is supported by evidence that there is a greater reduction in the number of falls with modifications to the homes of more vigorous older adults than of those who are frail. [21] The home modifications work in combination with intrinsic and behavioural risk factors. Behavioural risk factors include performing behaviours that could increase fall risk (e.g., reaching out to an object kept on a high shelf while standing on an unstable surface).

In the current study, family support during the lockdown could have also reduced the incidence of falls. Carers' fall concern plays an important role in the prevention of falls. It influences understanding of fall risk among carers and elders; and determine motivate them to continuously adopt preventive behaviours. [22] Being at home with the family gives them a sense of security. Also, 17% individuals started with online physiotherapy sessions during the lockdown. Exercise and balance training help to reduce the negative effects of the intrinsic factors. [11] Thus with these results, it can be further emphasized that it is very important to further educate the people for need of modifications at home, to improve awareness among elderly and caregivers regarding falls, education regarding fall prevention strategies, training using virtual platforms, importance of proper exercises and diet. We collected data using an electronic media to avoid face-to-face or physical interaction.

This is an important limitation of this study as it could not include the elders who are not acquainted with English language and social media. Owing to the methodological limitation of the online survey, falls cannot be further analysed as that of accidental or pathological category. Also, we attempted to probe into the causative factors of falls, however this information could be subjected to reporter bias in terms of perception and memory bias too. Nonetheless, this study reinforces the findings from previous studies related to causative factors. This study sample of elderly is representative of community-dwelling elderly free from major illness. We suggest further studies involving institutionalized elderly; rural population; and among elderly having neurological disorders or diagnosed with mental health issues. This preliminary report provides a starting point for large population-based studies, especially incorporating a longitudinal design. Considering the recency of the pandemic situation, further discussions to these threads will be interesting to follow.

CONCLUSION

On the contrary to our presumption that falls and fear of fall might have increased during the lockdown, results of this study show that the incidences of falls and fear of fall have significantly reduced during the Covid-19 pandemic lockdown in community-living elderly. Through this study some protective aspects of home environment in terms of social support are highlighted. Also, elderly individuals' awareness of fall prevention strategies; and importance of physical activities and mental health should be further emphasized.

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RESEARCH ARTICLE

THE SATISFACTION OF OLDER ADULTS ABOUT ONLINE GROUP EXERCISE PROGRAM: AN ALTERNATIVE OPTION TO MAINTAIN PHYSICAL AND MENTAL WELLBEING DURING COVID 19 PANDEMIC

---Are older adults satisfied with online group exercise program?

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ABSTRACT

BACKGROUND:

Considering the impact of lockdown on older adults, there is a need for some online option to maintain the physical and mental well-being of this vulnerable population in the current pandemic situation. Generally, In the Indian context, elderly are not well acquainted with online platforms for different purposes of shopping, health or for being socially active. However with adequate training they are willing to learn new technologies and adapt to online platforms.

OBJECTIVES:

To find the satisfaction of Online group exercise program for older adult's population to maintain their physical and mental well-being.

METHODOLOGY:

It was a web-based intervention study where 40 participants were invited to fill the patient satisfaction questionnaire and feedback form using Google Forms. Participants who have attended the online group exercise class at least for a period of 1 month (20 Sessions) were included in the study. Out of 40, 34 participants responded to the questionnaire.

RESULTS:

As per descriptive statistical analysis, results showed that 100% of study population was satisfied in all aspects of online exercise program.

CONCLUSION:

With adequate training and constant technical support; elderly population can be encouraged to participate in online group exercise program which is well appreciated by this population as an alternative option in changing health care delivery models.

KEYWORDS

Older adults, COVID 19 pandemic, Online Exercise.

INTRODUCTION

The world had to face a biological crisis in the form of COVID 19 pandemic; leading to major changes in delivering health care services which were shifted from offline to online mode. It has affected the older adults differently than the younger generation. Lockdown has put restrictions on everyone's social life and especially the older adults being a vulnerable population are significantly affected. It has reduced their outside physical activity and they are more dependent on their family members. It affected their mental health too. [1]

Reduced physical activity is associated with increased rate of mortality, developing chronic health conditions in older adult populations. [2] Therefore it is important to create some opportunities for their healthy ageing considering the impact of the COVID 19 pandemic on their physical and mental health.

Dr. Martin from the University of Aberdeen stated that prolonged home confinement and reduced physical activity can increase the frailty in the older adults population; thus increasing their morbidity and mortality rate. [3]

To overcome geographical barriers and increase access to healthcare services; Telemedicine is used as a key which incorporates information and communication technologies (ICT's). It has been in practice in different parts of the world since 1990; but COVID 19 pandemic has led to emergence of telemedicine in almost all parts of the globe. Telerehabilitation is considered as a branch of telemedicine. [4,5]

Considering the impact of lockdown on older adults, there is a need for some online option to maintain the physical and mental well-being of this vulnerable population in the current pandemic situation. Generally, In the Indian context, older adults are not well acquainted with online platforms for different purposes of shopping, health or for being socially active. However with adequate training they are able to learn new technologies and adapt to online platforms. [6,7,8]

Studies have shown that telemedicine is feasible and allows medical professionals to continue providing outpatient services with a high level of patient satisfaction. During the current pandemic, this experience can provide a viable alternative for many outpatient services while reducing the need for travel and face-to-face contact to a minimum. [9,10] The key barrier identified for telemedicine was technical issues. [11]

A systematic review revealed that there is high patient satisfaction with telerehabilitation services. The success of telehealth as a service delivery model was attributed to quality of care, safety, reduced cost and no travelling. [12] In the current suboptimal pandemic climate, virtual geriatric clinics may allow Geriatricians to continue to provide an outpatient service, despite the encountered inherent challenges. [13]

Leif Bob et al concluded that the Client Satisfaction Questionnaire having an overall good psychometric property can be used as an outcome measure for evaluating the effectiveness of telemedicine interventions. [14] As the healthcare industry is growing; its focus is moving on client satisfaction. Hospital administrators are focusing on patient satisfaction about all aspects of health care delivery and it's one of the quality benchmarks.[15]

Therefore, we devised the structured online exercise program for our senior citizens (SAFE Class – Senior Adult Fitness E Class) which focused on physiological changes of ageing happening in their bodies and their needs. It becomes challenging to consider the performance-based outcome measures for evaluating the efficacy of such interventions in online mode, and patient-reported outcomes measures such as patient satisfaction surveys which has shown good reliability and validity for evaluating web-based interventions. [3] Therefore, the present study focuses on promoting health of an older adults using telerehabilitation and finding users satisfaction of structured online exercise program by using the patient satisfaction survey and structured feedback form.

OBJECTIVES: To find the efficacy of the Online Exercise Program for the older adult's population to maintain their physical and mental well-being using the Patient Satisfaction Questionnaire and Structured Feedback form.

OPERATIONAL DEFINITION: Older Adult: Anyone whose age is more than 50 years on the day of participation. [16]

METHODOLOGY: It was a web-based intervention study where 40 participants were invited to fill the patient satisfaction questionnaire and feedback form using

Google Forms. Participants who have attended the online group exercise class at least for a period of 1 month (20 Sessions) were included in the study. Out of 40, 34 participants responded to the questionnaire.

The structured Online Exercise Program was as follow:

1. Participants were provided with zoom details for an online class, and they were also provided with technical assistance if any to join the exercise program on the zoom platform.
2. The exercise program was planned for five days a week for 45 minutes duration. Each session is preceded by a warm-up and concluded with a cool down.
3. Exercises were planned based on the review of literature which includes aerobic exercises, strengthening exercises, Balance training, Mat Exercises with frequency and intensity comfortable to the older adults population at large.
4. Over and above this, Participants were encouraged to participate in Small Group Meetings (SGM) and Individualized sessions for any specific health issues which can be addressed by physical therapy interventions, so as to increase the functional independence of participants. SGM was conducted twice a month and Individualized sessions were conducted four times a month.
5. The Patient Satisfaction Questionnaire was formulated based on our intervention program and a review of the literature.
6. Also, all participants were asked to fill up one structured feedback form for a qualitative assessment of the exercise program.

DEVELOPMENT OF THE QUESTIONNAIRE

Patient satisfaction is one the important indicators of success of any health care intervention. It helps to deliver patient centered care and can be an indicator for improving the quality of the program. A systematic review done for validated patient satisfaction measurement instruments showed that patient satisfaction is a multidimensional construct and it shall essentially include aspects such as patient and professional interaction, physical environment and internal management processes. While designing the online group exercise program, patient centered care was kept at focus and older adults person's preferences about decision making in their care were taken into consideration. [3]

A rheumatism research unit of the University of Leeds developed a patient satisfaction questionnaire to assess the care received in the rheumatology outpatient clinic (1992, Hill J et al). The present study has used the framework of this questionnaire to formulate the patient satisfaction questionnaire in the current study. [17]

The patient satisfaction questionnaire was developed to measure the satisfaction of online exercise programmes amongst patients attending SAFE Class. It was a self-administered questionnaire with patients answering their level of agreement with a series of 45 statements. Possible responses were recorded on a scale ranging from 1 to 5; where 1 stands for strongly agree and 5 stands for strongly disagree. The questionnaire included statements with different aspects of online exercise program, such as:

A. General Satisfaction
B. Giving of Information
C. Empathy with Patient
D. Technical Quality and Competence
E. Attitude towards patient
F. Access and Continuity

In order to minimize bias, statements were expressed in both positive and negative sentiments and were presented in random order. Also, a total score was taken into consideration to provide a measure of overall satisfaction.

ANALYSIS OF THE QUESTIONNAIRE INVOLVED THE FOLLOWING STEPS

A. As the questions were put in random order, they were initially sorted into different aspects of care such as Group A: General Satisfaction, Group B: Giving information and so on.
B. Also, questions were framed with positive and negative sentiments; therefore for analysis recording was done so that all scores are in the same "sense" i.e. a high score always indicates a level of satisfaction. All positive statements were recoded as 6 minus the actual score.
C. Further, scores for all questions under one group were combined and an average was taken to arrive at a normalized score for a particular group.
D. Lastly, all scores were combined to arrive at a figure for overall satisfaction.

The analysis provided a score out of 5 for each aspect of care. Scores above 3 indicate satisfaction & below 3 indicates dis-satisfaction.

The questionnaire was developed in the English language and later translated into Hindi for participants who were not comprehensive towards English. Face validity was done for both questionnaires.

RESULTS

As per descriptive statistical analysis, results showed that 100% of the study population was satisfied in all aspects of the online exercise program (Mean Score more than 3). All participants opined that this online exercise program has helped them to improve their physical and mental fitness.

TABLE 1: DEMOGRAPHIC TABLE

Demographic Table		
Details	**Mean**	**SD**
Age (in years)	61	6.82
Gender	Males: 1 Females: 33	

GRAPH 1: OVERALL SATISFACTION

GRAPH 2: DIFFERENT ASPECTS OF PATIENT SATISFACTION

TABLE 2: STRUCTURED FEEDBACK FORM ANALYSIS:

	YES	NO	NOT SURE
Do you feel physically fit after participating in a structured online group exercise program?	85%	6%	9%
Do you feel mentally fit after participating in a structured online group exercise program?	82%	12%	6%
Between the two, what would be your preferred option for participating in a physical fitness exercise program? (Online: Exercising via Video Call under the supervision of Physiotherapist; Offline: Visiting a particular physiotherapy or health center in person)	Online: 88% Offline: 12%		

DISCUSSION

Present study evaluated effectiveness of an online group exercise program for older adult's population using a patient satisfaction questionnaire and structured feedback form. It was observed that all patients were satisfied with the conduction of an online group exercise program, and they perceived it helped them to maintain physical and mental fitness.

Indian older adults are accustomed to do physical exercises under supervision in groups at fitness centers in offline mode; however, the current pandemic situation made them home confined. This affected their physical activity and social interactions; indirectly affecting mental health. Therefore, we thought of providing an online group exercise program as an alternative to remain physically active.

Patient satisfaction can be considered as one of the measures of quality of health care delivery system. Also, patient satisfaction can be directly related with his/her compliance towards therapy. We assessed satisfaction of patients about different aspects of online group exercise programs using 5 points likert scale. The questionnaire included statements with different aspects of online exercise program, such as: General Satisfaction, Giving of Information, Empathy with Patient, Technical Quality and Competence, Attitude towards patient, Access and Continuity

We attribute the success of this online program to below points.

1. Before joining the exercise program, participants' history and health related information was noted using Google form and they were screened for eligibility to join the group exercise program.
2. A WhatsApp group was formed for ease of communication with all participants. Participants were provided with adequate training if needed to use the zoom platform to access the online exercise program.
3. Adequate and appropriate information was given to the participants about the exercise program; benefits of various exercises, do's and don'ts of exercise.
4. We trained a team of therapists to execute this online group exercise program. They were also responsible for individual assessment of respective patients and addressing their individual needs.
5. Participants were requested to keep their video on for the supervision of exercises and they were instructed to correct the form of exercise if need be.
6. Over and above Group exercise we also conducted small group meetings twice a month; where, participants could address their health issues to us and they were provided with appropriate advice or home exercise program during their individual sessions which was conducted once a week

Current study findings are consistent with systematic review done in 2019. They proposed that telehealth appears to enhance communication and engagement between health care providers and patients and their caregivers, especially through real-time videoconferencing. Irrespective of information and communication technologies, consumer focus remains a critical aspect of how a service was delivered. [18, 19]

Online mode of exercises or telerehabilitation can be beneficial to the one who is confined to the home and does not have assistance or health care services are not easily accessible. It also saves travel time and cost. However; there can be some barriers as not being able to evaluate the patients physically and absenteeism of physical supervision can lead to injuries. As a future scope of study, efficacy of online exercise programs in terms of outcome measures such as pain, function etc can be studied.

CONCLUSION

With adequate training and constant technical support; older adult population can be encouraged to participate in an online exercise program which is well appreciated by this population as an alternative option in changing health care delivery models. Patient Reported Outcome measures can be included by Healthcare Managers to evaluate the success and Quality of health care.

Present study suggest that online group exercise program for older adults can also be satisfactory mode of exercise prescription and it should focus on various aspects of care such as Technical Quality and Competence, giving appropriate information and empathy towards older adults.

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REVIEW ARTICLE

LINKING ETHICAL STANDARDS FOR HEALTHCARE PROFESSIONALS WITH INDIAN CULTURAL VALUES

---Ethical standard-setting rooted in cultural values for healthcare professionals in India.

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ABSTRACT

Ethical standards of healthcare sector are important to the lives of people because healthcare is a profession that impacts the lives of people, their families and society. Healthcare professionals are inevitably involved in ethical decision-making in their working lives and address a conflict regarding competing values such as personal, organizational, professional, and community values. India is a country in South Asia where people are diverse in ethnicity, religion, and culture. So, revealing commonly accepted ethical standards for resolving ethical conflicts for healthcare professionals becomes more relevant for India. However, the research on this issue is limited. Therefore, the purpose of this paper is to reveal the link between ethical standards for healthcare professionals in general and Indian cultural values such as Dharma, Nishkama Karma and Jnana.

This paper used a scoping review to screen the relevant articles which were selected from the Scopus and Google Scholar databases. The keywords used for searching the research articles were "ethical standard", "ethics", "healthcare ethics", and "Indian cultural values". Then, the constructs of healthcare ethics were identified and the relevant ethical standards for each construct were not only evaluated based on the two key theoretical viewpoints namely deontology and teleology, but also justified by Indian cultural values.

KEYWORDS

Ethical Standard, Ethics, Healthcare Ethics, Healthcare Professional, Indian Cultural Values

INTRODUCTION

Healthcare organizations should provide patients with reasonable care and serve their interests [1] and this can be possible only if healthcare professionals serve selflessly. However, in practice, they may be confused with "right" and "wrong" behavior, and examples of healthcare professionals' difficulties in ethical decision-making exist in many regions. [2] Attack of Ebola virus disease (EVD) in the West African countries in 2016 and Nipah Virus outbreak in South India in 2019 emphasized the need for preparedness

and readiness on the part of healthcare professionals for incident management regardless of types of contingencies. [3] Moreover, healthcare professionals seemed to face frustration on ethical considerations as maintaining positive outcomes (e.g., intensive patient care) pester them despite limited staffing and inadequate equipment. [2]

In India, there is the code of medical ethics regulations 2002 that is also called the Indian Medical Council (Professional conduct, Etiquette and Ethics) Regulations 2002. [4] But ethical standards sometimes are neglected by medical practitioners. Recently, there has been an increasing concern of healthcare ethics, especially during the Covid-19 pandemic. Though the case fatality rate has come down to 1.43 % as of February 2021, [5] ethical questions such as distributing limited medical resources among patients with Covid-19 and allocating limited medical resources among patients with Covid-19 and non-Covid patients subsist. [6] Moreover, in spite of having government policies on the healthcare system, inequality does exist as in the case of unorganized laborers. Yet, government policies can influence healthcare professionals' ethical decision-making and ethical behavior.

To avoid healthcare professionals' frustration on ethical decision-making, specific ethical standards are required. Though ethical standards that are acceptable to all Indian citizens are rarely found in the related literature, Okpara, 2014 stated that culture significantly impacted managers' ethical attitudes, affecting their ethical behavior [7] and a study conducted by Chao, Li & Chen, 2016 has emphasized individuals' ethical decision-making influenced by local cultural norms. [8] This paper aims to reveal the link between ethical standards for healthcare professionals in general (i.e., international/universal ethical standards) and Indian cultural values including dharma (the belief in responsibility towards others, e.g., sharing resources with as many people as possible is viewed as the noble ideal of human life), [9] jnana (knowledge is a basis for human being), [10] and nishkama karma (an individual's selfless action without fear of the results). [11] The congruence of ethical standards for healthcare professionals and Indian cultural values may have a positive impact on their ethical decision-making and ethical behavior.

A SCOPING REVIEW

This paper adopted a scoping review as it is used to "describe an existing evidence base and to provide the first step towards conducting a systematic review." [12] The relevant studies from the Scopus and Google Scholar have been revealed. Ethics refers to "a systematic approach to moral judgments based on reason, analysis, synthesis, and reflection of one's environment." [13] Principles of ethics are used to judge what is right (good) and wrong (bad) conduct. [14] During the Covid-19 pandemic, many hospitals stopped their non-Covid service, and they paid more attention to serve Covid-19 patients. [15] The inability to equally respond to the needs of all groups of patients resulted in frustration among healthcare professionals.

Whereas there are various theoretical viewpoints of ethics, this paper focused on two key theoretical perspectives of ethics comprising deontological theory and teleological theory that have been widely discussed by prior studies. [14] Deontological theory focuses on the means, while teleological theory emphasizes the ends. [16] Both deontological and teleological theories can be applied for developing the ethical decision-making (EDM) framework. In this paper these two theoretical perspectives are used to justify ethical standards for healthcare professionals in India.

DEONTOLOGICAL THEORY

According to deontological theory, the right action must comply with moral duties or rules. [17] From a motivational perspective, the right action means the action that has been derived from a person's motivation to do his or her duty. [18] It can be said that the right action is judged by the action itself and a person's intention to morally act. [19] Therefore, individuals are required to act in line with the rule or code of conduct without considering the impact of their actions. [20] Likewise, healthcare professionals are also expected to perform the duty that is at the heart of healthcare ethics.

TELEOLOGICAL THEORY

Teleological theory focuses on the result of an action. [14] According to this school, the right action is judged by its outcome (e.g., the greatest good to the greatest number of people who are affected by the action). [19] Accordingly, healthcare professionals should be able to effectively assess the outcome of their conduct. [19] So

teleological theory is useful to enhance the healthcare system to accomplish healthcare equality in India where citizens are varied in many respects.

Basically, healthcare knowledge is used to evaluate the outcome of a specific action. [21] To evaluate ethical behavior, healthcare knowledge as well as ethical standard should be considered. The assessment of healthcare professionals' ethical behavior needs to explore how well they provide a good service to the maximum number of citizens. [19]

HEALTHCARE VALUES

Ethical standards for healthcare professionals are derived from healthcare values. Since the goal of the healthcare sector is to promote the healthy lives of people, healthcare professionals must work for helping others and serving the benefit of society. [22] Healthcare professionals, to decide and act ethically, need to be involved in two conditions; firstly, perceive what the core values of their profession are and secondly, to have the ability to act in accordance with the profession's values. [23]

In the healthcare sector, the goals of the physicians and managers may be conflicting. Physician's goal to treat individual patients with the best method [24] is consistent with deontological theory, which focuses on moral duties. [17] On the other hand, a manager's goal to maximize the quality of healthcare services with a minimal cost to the population demonstrates congruence with teleological theory. [24][14] Even though healthcare ethical values in India seem to be adopted from the Western society, ethical issues in healthcare in the context of India have been published by the journals such as Indian Journal of Medical Sciences [15], and Indian Journal of Medical Ethics. [25]

CULTURAL DIMENSION OF ETHICS

The cultural dimension of ethics should be considered to build trust among people in a specific area [14] and culture is viewed as an important determinant of ethical attitude and behavior among people in society. [13] Based on Hofstede's categorization, India is labelled as a collectivistic society where people put a high value on collective gain instead of individual interest. [26] Indian value perceives an individual's commitment to one's group as ethical behavior. [26] Therefore, Indian tradition emphasized holistic view by balancing between individual and societal interests. [26] The root of ethics is associated with Indian cultural values: dharma (obligation of moral duty and responsibility towards others), nishkama karma (motivation to work without fear of the results), and jnana (knowledge orientation or wisdom). [27]

The survival of human society, its stability and growth depend upon the right conduct of individuals and the Vedas and Dharmasastras [27], which are meant to regulate the life of the community command that every individual must perform certain deeds in conformity with divine laws. [28] Accordingly, the Indian tradition of dharma refers to all the duties one should perform and all the virtues one should practice. Karma refers to action [29] and nishkama karma is duty without desire. So, no one should be motivated by the results of one's actions. [30] The practice of jnana (wisdom) helps one to realize the temporary nature of maya (world). [31] Thus, the Indian cultural values aim at improving human conditions to a higher level of being.

ETHICAL STANDARDS FOR HEALTHCARE PROFESSIONALS AND INDIAN CULTURAL VALUES

This section begins with the operational definitions and discusses the link between healthcare professionals and Indian cultural values. Definitions used in this paper are as below.

"Healthcare professional" refers to the worker who works for healthcare services, including health professional (e.g., nurse and physician), allied health professional (e.g., social worker), and healthcare manager. [32]

"Ethics" is defined as the principles and moral judgments of what is right and wrong. [33]

"Ethical standard" is defined as a set of acceptable actions derived from moral philosophies. [33]

"Ethical decision-making" is the way in which a decision-maker considers ethical criteria for choosing the right choice over other alternative choices. [34]

"Cultural values" refers to a set of values or beliefs shared by a group's members that distinguish one group from another. [35]

This paper categorized the constructs of healthcare ethics and identified ethical standards for each construct. The ethical standards for each construct were not only

evaluated based on two key theoretical viewpoints, namely deontology and teleology, but they were also justified by Indian cultural values.

Ethical decision-making is derived from certain ethical standards that are good for all people regardless of ethnicity, religion, or class of the people. [36] Ethical standards for healthcare professionals could be developed based on a combination of professional values, moral philosophies, religions, and cultural values. [36]. In line with multicultural medical ethics, all groups of Indian citizens should be treated based on a core principle of ethics that values diversity and respects humaneness. [23] There are several principles of ethics that are applicable to healthcare professionals in India. Considering the demographic diversity in the country, India requires ethical standards which are acceptable to all groups of people. This paper, however, presented preliminary review on ethical standards and Indian cultural values. India is predominantly a Hindu country with 80% of its population [13]. Therefore, this paper discussed mainly based on predominant cultural values of India. They may not be generalizable to the population of the whole country.

In this paper, healthcare ethics emphasizes four constructs that are autonomy, non-maleficence, beneficence, and justice, as follows.

1) Autonomy; protecting the rights and dignity of patients. [37]
2) Non-maleficence; avoidance and precaution of harm to human beings. [38]
3) Beneficence; acting with the intention of benefitting others. [38]
4) Justice; maintaining fair decision-making procedures and outcomes. [39]

Based on four constructs of healthcare ethics, ethical standards for healthcare professionals were identified. Then, checked whether the identified ethical standards were consistent with theoretical viewpoints (deontological theory and teleological theory) and Indian cultural values.

Table 1 below establishes a link between the construct of healthcare ethics, ethical standard, theoretical viewpoints, and Indian cultural values.

TABLE 1

CONSTRUCT OF HEALTHCARE ETHICS	ETHICAL STANDARD	RESEARCHER	THEORETICAL VIEWPOINTS		INDIAN CULTURAL VALUES
			DEONTOLOGICAL THEORY	TELEOLOGICAL THEORY	
Autonomy	Protection of patients' privacy (e.g., considering privacy in personal health monitoring)	Loi, Christen, Kleine and Weber (2019) [40] Nordgren (2013) [41] Palm (2013) [42]	√		*dharma*
	Refusing to use unethical medical procedures	Zydziunaite et al. (2015) [1]	√		*dharma*
	Sustaining psychological contract with patients (e.g.,	Chang, Wu and Du (2020) [43]	√		*dharma*

CONSTRUCT OF HEALTHCARE ETHICS	ETHICAL STANDARD	RESEARCHER	THEORETICAL VIEWPOINTS		INDIAN CULTURAL VALUES
			DEONTOLOGICAL THEORY	TELEOLOGICAL THEORY	
	building good communication between healthcare professional and patient)	Van Zaalen, McDonnell, Mikołajczyk, Buttigieg, Requena and Holtkamp (2018) [44]			
	Making patients to fully understand both the benefits and risks resulted from medical care	Mackert, Guadagno, Mabry and Chilek (2013) [45]	√		*dharma*
	Informing patients about costs and benefits of a treatment	Fornaciari and Callens (2012) [46]	√		*dharma*
	Informing patients about the options available	Bowden and Smits (2012) [47]	√		*dharma*
	Protecting the rights of patients to choose between expensive or lower cost treatments	Kantabutra (2011) [48]	√		*dharma*
	Giving healthcare services to everyone regardless of age and severity of disease	Hosseini (2018) [49]	√		*dharma*
Non-maleficence	Minimizing risks to patients	Loi et al. (2019) [40]		√	*jnana*
	Serving patients whose condition	Geale (2012) [33]	√		*nishkama karma*

CONSTRUCT OF HEALTHCARE ETHICS	ETHICAL STANDARD	RESEARCHER	THEORETICAL VIEWPOINTS		INDIAN CULTURAL VALUES
			DEONTOLOGICAL THEORY	TELEOLOGICAL THEORY	
	requires immediate attention first				
Beneficence	Acting for the best interest of individual patients	Loi et al. (2019) [40]		√	*jnana*
	Considering cost-benefit analysis in providing healthcare services	Parhizgar et al. (2009) [22]		√	*jnana*
	Considering cost-effectiveness analysis in providing healthcare services	Parhizgar et al. (2009) [22] Clarke and Weale (2012) [50]		√	*jnana*
	Concerning the quality-of-care delivery	Carney (2011) [51] Agnihothri and Agnihothri (2018) [52]		√	*jnana*
	Providing patients with healthcare services that are consistent with current medical knowledge	Medhekar, Wong and Hall (2020) [53]		√	*jnana*
Justice	Allocation of the resources to the greatest number of patients	Loi et al. (2019) [41] Geale (2012) [33]		√	*jnana*
	Assessment of a comparative	Simonen, Viitanen and		√	*jnana*

CONSTRUCT OF HEALTHCARE ETHICS	ETHICAL STANDARD	RESEARCHER	THEORETICAL VIEWPOINTS		INDIAN CULTURAL VALUES
			DEONTOLOGICAL THEORY	TELEOLOGICAL THEORY	
	effectiveness data to compromise the rights of a single patient and the needs of society as a whole	Blom (2012) [54]			

The table 1 showed the congruence between ethical standards for healthcare professionals and Indian cultural values. The ethical standards for healthcare professionals, in general, are more likely to be associated with Indian cultural values, namely "dharma" and "jnana", compared to "nishkama karma".

The term "dharma" focuses on an individual's duty and responsibility towards others. It can be said that it is consistent with deontological theory since it focuses on a person's duty to perform rather than the result of a person's action. [20] Therefore, international ethical standards for healthcare professionals based on the principles of the deontological theory apply to healthcare professionals in India too. Additionally, "jnana" i.e., knowledge orientation emphasizes the essence of the teleological theory and encourages individuals to realize the result of an action to make the best ethical decision possible. [27] [31] However, nishkama karma concerned with duty without desire [30] has received less attention from the theoretical viewpoints of ethics.

Whereas the table 1 showed only four constructs of healthcare ethics (such as autonomy, non-maleficence, beneficence, and justice), its limitation is that these constructs consider only few factors when making an ethical decision. Henceforth, future research should develop a comprehensive model that will be more useful for healthcare professionals.

Additionally, although this paper found that link between ethical standards and Indian cultural values, the extent to which individuals are able to practically carry out ethical standards may depend on their educational level. The past study argues that the level of education affects an individual's ethical decision-making. [55] As educational level is the determinant of a person's moral reasoning [55], educational institutions in India should include ethics in the healthcare curriculum. They probably promote healthcare ethics through teaching and learning process in order to produce graduates with the capabilities to understand and interpret ethical standards into practices.

CONCLUSION AND IMPLICATIONS

On the one hand, lack of resources in the healthcare sector seems to be problematic for healthcare professionals in their ethical decision and behavior making. [2] On the other hand, cultural values influence healthcare professionals' ethical behavior. Individuals seemed to accept ethical standards that are not only based on universal moral values but also concerned with values shared among people in the society (e.g., social, cultural, religious, and occupational features). [50] By reviewing the literature, it has been found that there is harmony between ethical standards for healthcare professionals and Indian cultural values. This means healthcare professionals in India might confidently follow international ethical standards if they are consistent with Indian cultural values.

Future research on ethical standards for healthcare professionals in India should investigate the priority-setting of ethical standards to establish structured ethical decision-making procedures that will enable healthcare professionals to behave ethically because the degree to which cultural values influence ethical standards differs among countries. However, this paper is based on a scoping review in preparation for further study. It may lack a potential to be generalizable.

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RESEARCH ARTICLE

A STUDY ON APPLICATION OF BLOCKCHAIN TECHNOLOGY TO CONTROL COUNTERFEIT DRUGS, ENHANCE DATA PRIVACY AND IMPROVE DISTRIBUTION IN ONLINE PHARMACY

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ABSTRACT

Technology has always emerged to embolden the existing working process. On the one hand, it encourages transparency, accessibility and robustness in the system and on the other hand, it begets mitigation of the risks and allows us to detect, evaluate and eliminate vulnerability in the system. The most prominent technologies in todays' world like Artificial Intelligence, Virtual/Augmented Reality, Automation, Cloud Computing are thriving to solve society's problems and ensure the expedition in the process from its previous generation.

Blockchain technology is no exception in providing the solution to eliminate the counterfeit markets across the globe and building trust among parties to do business without the fear of indulging or facing any unscrupulous business.

Blockchain technology can ensure data privacy while improving supply chain transparency and reducing fraud. It can provide all stakeholders within a certain supply chain with access to the same information, potentially reducing errors. A decentralised application can pave the way to promulgate online pharmaceutical business where health information and each stakeholders' data is not compromised. Against this backdrop the research conducted throws light on the challenges in the online medical drug and devices' distribution and proposes a solution, an architectural design for blockchain technology in an online pharmaceutical platform to mitigate the counterfeit market while bringing efficiency to the ecosystem.

KEYWORDS

Blockchain, Counterfeit Drugs, Decentralised, Permissioned Consensus Algorithm

INTRODUCTION

Blockchain technology is successful in offering a formidable solution to curb the counterfeit markets across the globe. It is simultaneously building confidence among stakeholders to do business without the fear of any devious business transactions.

Today, the penetration of online pharmacies is supported by easy availability of the internet, the rapid shift towards self-assessment due to improved doctor-patient relations and medical technologies, improved consumer experience in online purchases, sales across the length and breadth of India are among many important factors.

The access-supply-reach of medicines is thriving due to different successful and unique business models across India in particular and the world in general.

Against this backdrop, this study throws light on the challenges in the online medical drug and devices' distribution and proposes a solution to mitigate the counterfeit market while bringing efficiency to the environment.

Further, the survey is conducted among consumers in Maharashtra because of high internet penetration, affordable smart devices, dense population and better reachability. It is proven that blockchain technology can ensure data privacy without compromising on supply chain transparency and reducing fraud. It is helpful in reducing errors while providing stakeholders in a certain network access to the same real time information.

According to the data [1] India stands at 3rd Rank in the global pharmaceutical industry by capacity and 14th rank in terms of value. This makes India among the nations to ensure equity and inclusion for all in the supply and distribution of medical devices and drugs across the globe. However, these unprecedented times have unearthed the need for advanced technological incorporation in the healthcare sector. India with 3000 drug companies and nearly 10,500 manufacturing units positions itself in leading its scientific approach to ensure 5As namely availability, accessibility, affordability, awareness and accountability.

Also, the burgeoning pharmaceutical sector is projected to grow at US$ 100 Billion and the medical devices business is pegged at US$25 Billion by 2025. The Government of India's progressive policy also acts as an impetus to attracting Foreign Direct Investment (FDI) in the pharmaceutical sector with US$ 16.45 Billion (April 2000 & June 2020) and there is an increase in Govt. expenditure in this sector (1.6% of GDP) in 2020.

Still, major impediments in the healthcare sector are the growth of the counterfeit drugs market; Where 75% of counterfeit drugs supplied to the world over have origins in India, which emerge as a hurdle to the global supply chain of drugs.

PURPOSE OF STUDY

This work is an attempt to design and envisage blockchain technology in the online pharmaceutical industry by designing a proof of concept to conceptualise the working and its supply chain distribution across different channels.

METHODOLOGY

A survey has been conducted using Google Forms to study the consumer perception and experience in purchasing online drugs and medical devices. Data analysis (Correlation) has been performed on the responses collected from 3 cities i.e., Mumbai, Nagpur and Pune using IBM Statistical Package for the Social Sciences. Descriptive exploratory research has been conducted.

The researcher while accessing the secondary data excluded the data which was not relevant to the objective and questionnaire. The appropriateness of data was judged in light of the nature and scope of the topic investigated. The researcher evaluated the reliability of the data. Dochartaigh [2] refers to evaluating the reputation of the source. Gupta [3] emphasized that sample selection and data collection are interwoven, and one has an impact on the other.

Invariably financial growth, education and IT grow parallel. This explains the reason why Cities in Maharashtra were chosen for study because in it nests the financial capital of India i.e., Mumbai Further Pune which is also known as Oxford of the East has a growing industrial hinterland, with IT, Engineering and allied companies sprouting. And Nagpur is the third-largest city in Maharashtra. Therefore, respondents residing in these cities are well versed with online purchase of pharmaceuticals drugs and devices.

THE OBJECTIVE OF THE STUDY:

To Determine ways to counter counterfeit products, distribution plan and the concerns of data privacy in the online Pharmacy domain.

This study aims to consider the customer's preferences regarding purchasing medical drugs online and incorporating blockchain technology as the solution to mitigate the cumbersome process while bringing transparency to the overall ecosystem. The researcher is proposing a comprehensive plan that can add an extra layer of security for the online transaction of pharmacy purchases.

LITERATURE REVIEW:

Blockchain [4] has demonstrated its ability to transform the outmoded supply chain network into a safe, automated and decentralized supply chain. In blockchain technology the entire transaction can be observed with more clarity. [5] The key to success is data privacy, distribution and ensuring genuine drugs reach the customers.

Risks in the supply chain of pharmaceutical companies have been documented. [6] Some of the challenges faced by online pharmaceutical platforms included data security and secure financial transactions. [7]

The issue of counterfeit drugs and emphasised the importance of addressing it to safeguard patient's faith in the benefits of pharmaceuticals have been highlighted. [8]

There is an increase in counterfeit drug supply and availability in India. There is a high demand for counterfeit products in the Indian market which needs to be curtailed. [9]

Another aspect covered by Chakraborty and Satsangi [10] is that the factors leading to the demand for e-Pharmacy in India are mainly because of unsatisfied medical needs due to the larger population and increased usage of the Internet. As consumer behaviour in India is fast changing, there is a huge demand to access a wide range of products at the click of a computer, and competitive prices. Attitude emerges as an important predictor of counterfeit product.[11]

Pharmaceutical companies should have a novel approach to reduce counterfeiting of pharmaceutical products. [12] Here blockchain and other relevant technologies can be utilised. Consumer engagement and education is important to curb counterfeiting and dispelling incorrect information regarding data privacy.

The importance of consumer awareness regarding identification of genuine sites is stressed [13] is in addition to the desire to curb fraudulent practices like data privacy and supply chain issues. [14]

Guidelines for standardizing smartphone-based healthcare applications to integrate with hospital information system such as electronic medical record and patient monitoring systems to maximize the power of mobile applications are emphasised. [15] adding that counterfeiting brings new challenges to brand management.

Others have proposed a mobile healthcare system based on Android and Web applications. [16] The system offers medical assistance to patients and saves time and mobility. The applications allow patients to make appointments with doctors and assigns reminders for the prescribed medications and vaccinations.

EMPIRICAL AND THEORETICAL RESULTS:

Reliability test has been conducted on the survey questionnaire using IBM SPSS which resulted in 78%. Therefore, the extracted value is higher than the standard value which concludes that the questionnaire is reliable [Table 1].

TABLE 1: RELIABILITY STATISTICS

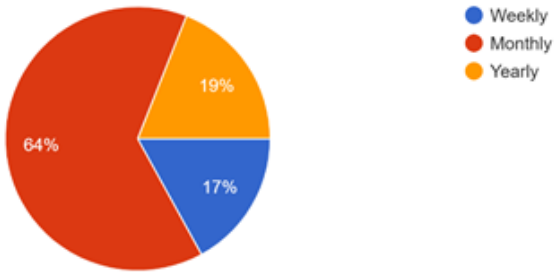
Reliability Statistics

Cronbach's Alpha[a]	N of Items
.780	14

Responses were collected from 3 cities i.e., 72% from Mumbai, 16% from Nagpur and 12% from Pune [Fig. 1]. Male participants contributed 59%and the female contribution to the study was 41% (28[Fig.2] with the majority of respondents being a student (73%) and the rest were an employee (27%) [Fig.3]. The major reason for the active participation of female respondents can be the increase in literacy ratio, awareness among the female population, access to smartphones and the digital world.

PURCHASING BEHAVIOUR

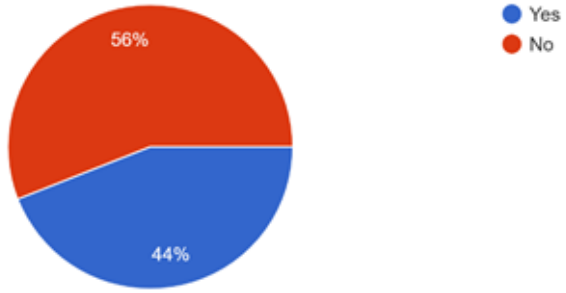
FIG.4 PURCHASING BEHAVIOUR



The majority of the participants mostly ordered medicines every month 64% while 17% were weekly visitors and 19% were annual visitors. Buyers tend to prefer to purchase their medicines in advance for a month to avoid visiting the store or website often.

MEDICAL DRUGS/DEVICES BOUGHT ONLINE

FIG.5 PLATFORM SELECTION

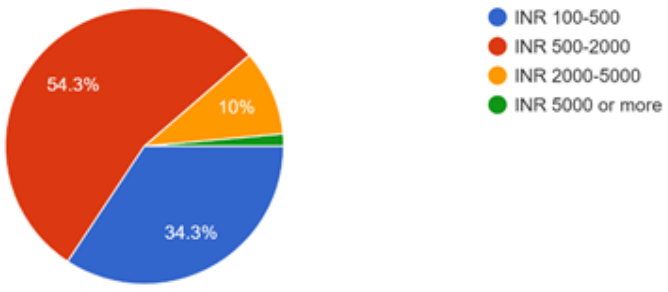


Almost half (56%) of the total participants used an online platform to buy medical drugs/devices online and the rest (44%) never bought medical drugs/devices online [Fig. 5].

FIG.6 BUDGET

What is the budget that you prefer while buying medical drugs/devices online?

70 responses

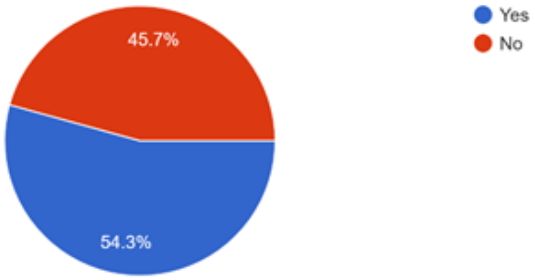


The budget at which the participants purchased online products were INR 100-500 (34%), INR 500-2000 (54%) & INR 2000-5000 (10%) [Fig. 6].

FIG.7 DATA PRIVACY

Do you feel threatened about data privacy while shopping online?

70 responses



Concerns regarding data privacy still being the impediments for the customers while purchasing medical drugs/devices online (54.3%) [Fig. 7]

FIG.8 COUNTERFEIT PRODUCTS DELIVERY

Do you feel concerned about the counterfeit goods being delivered?

70 responses

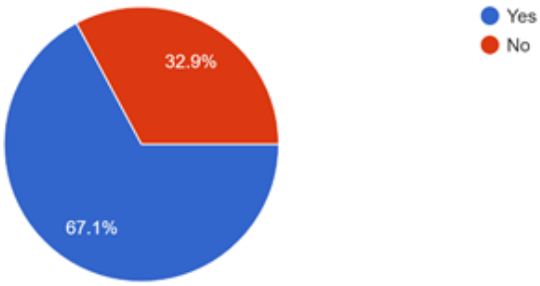


FIG.9 AFFORDABLE HEALTHCARE SERVICES

Do you feel online health services can help in providing affordable healthcare in India?

70 responses

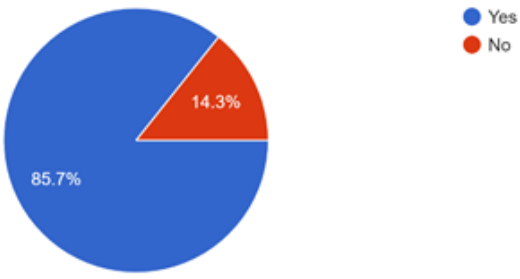
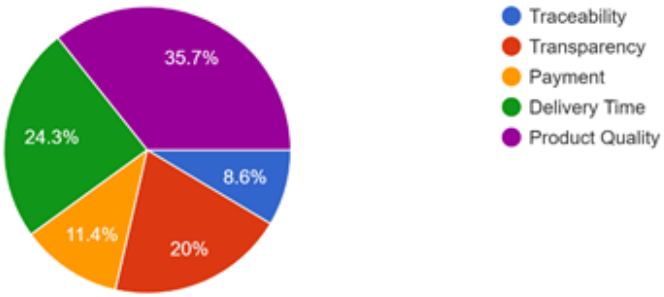


FIG.10 CONSTRAINTS OF PURCHASING MEDICAL DRUG&/DEVICES ONLINE

Which are the major consitraints that you feel while shopping for medical products online?

70 responses



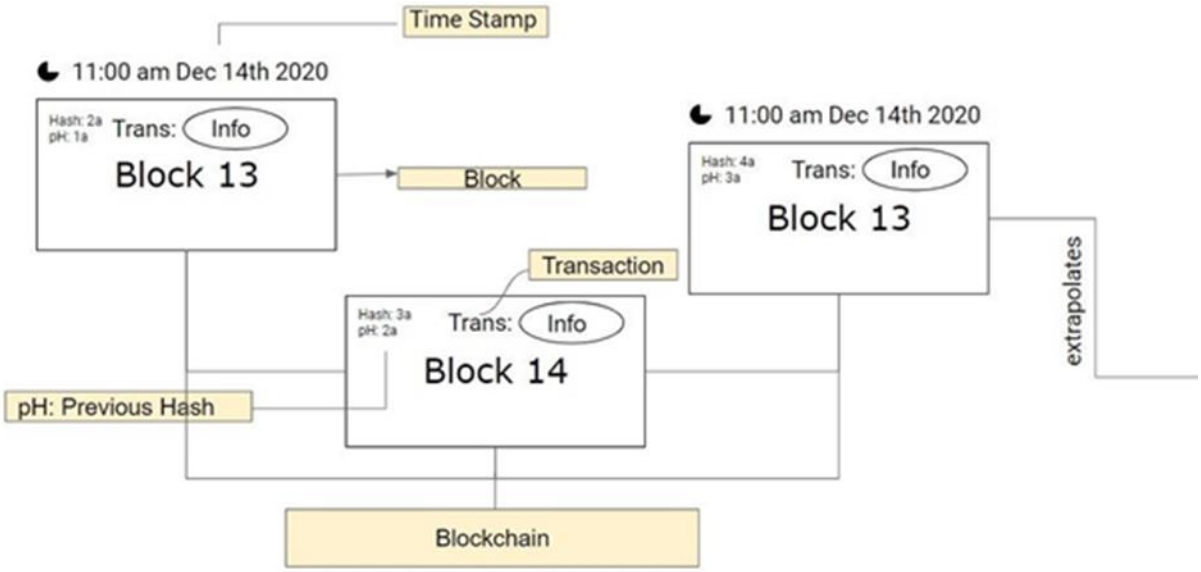
Pearson Correlation test helped in understanding the relationships between online customers, counterfeit products being delivered, online health services for affordable healthcare, customer satisfaction with the services provided by the online pharmaceutical delivery platforms. Customer satisfaction from online delivery services was more strongly related to the online consumers, r (99) = .73, p < 0.01, affordable healthcare through online health services were also strongly related to the online consumers, r (99) = .53, p < 0.01 and counterfeit products delivery experiences also showed strong relation to the online consumers, r (99) = .29, p < 0.01 [Table 2].

TABLE 2: CORRELATION: ONLINE MEDICAL DRUGS/DEVICES DELIVERY EXPERIENCES

	Online Consumers	Counterfeit Products Experiences	Affordable Healthcare through Online Health Services	Customer Satisfaction towards the Online Health Services
Pearson Correlation	1	.295**	.533**	.738**
Sig. (2-tailed)		.003	.000	.000

- Following is the Architectural design for blockchain technology as presented by the Researcher

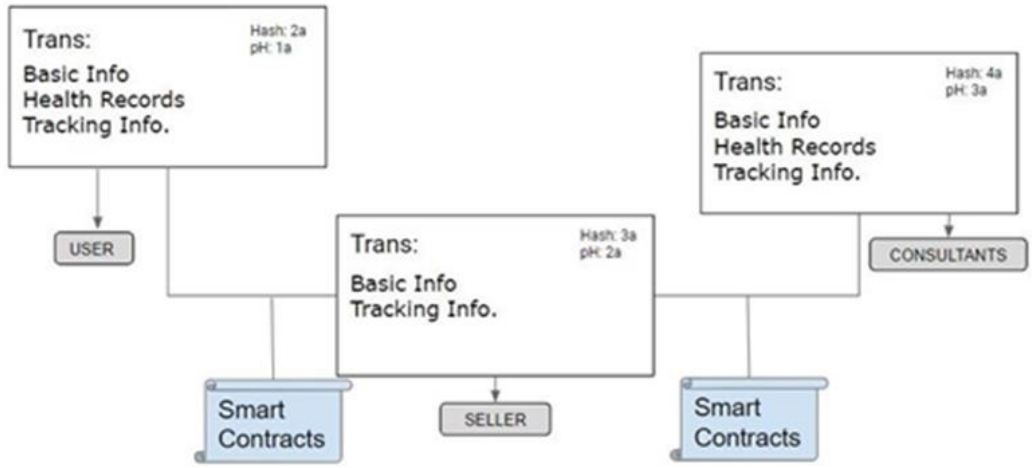
FIG.11 WORKING ARCHITECTURE OF BLOCKCHAIN TECHNOLOGY



Set of blocks are tied with each other sharing a network which are decentralized in nature. A series of numbers and letters in a block are converted into an encrypted code also known as Hash which is followed by Previous Hash (pH) observed on the subsequent block. Any activity performed in a block result into a transaction which contains protected information. As the activity are observed in any block, a timeline info is stamped to that block that makes this technology unalterable.

- Following is the proposed architectural design for Blockchain Technology (Permissioned) in Online Pharmaceutical platform:

FIG.12 WORKING ARCHITECTURE OF PERMISSIONED BLOCKCHAIN IN ONLINE PHARMACEUTICAL PLATFORM



Permissioned Blockchain can be successfully used in any scenario where two or more parties are involved in an agreement to streamline the workflow of their businesses. These agreements are shared among the user, drug distributor and physician for a conclusive outcome and ensuring their shared interests. Once the agreement has been made, these can be formulated into codes that helps in building Smart Contract among the parties to avoid any discrepancies.

The above diagram illustrates the smart contracts been made between user, seller and the consultant which limits the access of information for seller and consultants. As the user's basic and tracking info are being shared with the seller but the seller does not have the access to user's electronic medical records (EMR). Although the EMR can be accessed by consultant as the contract has been established accordingly.

- Following is the proposed supply-chain distribution of online pharmacy application using blockchain technology (Permissioned);

FIG.13 DRUG & MEDICAL DEVICES SUPPLY CHAIN DISTRIBUTION USING BLOCKCHAIN TECHNOLOGY

COMPONENTS OF SUPPLY CHAIN DISTRIBUTION

1. Manufacturing
2. Inspection
3. Shipping
4. Seller
5. Warehouse
6. Shipping
7. Billing
8. User

The comprehensive supply chain distribution displayed in Fig.13 shows the interrelationship among every stage of the supply which ensures an efficient and reliable approach at end-to-end delivery of medical products. All the nodes in the supply chain network have the ability to timely track the progress of each process through which every party in the transaction is aware and that puts the onus of the decisions on the party itself. Blockchain technology also enables the distributed ledger which mitigates the chances of any unscrupulous or delayed payment for any particular transaction. All the parties had entered into a smart contract, thus avoiding delays and allowing smooth business transactions. The end-user can track every transaction and hence enables him to know the origin of the product that ultimately avoids any chances of getting counterfeit goods.

MANAGERIAL IMPLICATIONS

The application designed on blockchain architecture requires miners to run the application efficiently. Some unique features such as application interoperability, robustness, intuitive and customizable will produce the best application in the market.

With the public-private partnership, this application can strengthen data privacy, mitigate the drug counterfeit market and bring efficiency in overall supply chain distribution of medical supplies. Here, the start-up can play a vital role in publishing such applications on the internet which will create a large-scale implementation in the area of innovation.

DISCUSSIONS

The platform must ensure to improve its efficiency and focus on bringing transparency to its processes. Thus, demand for such technology can be generated in the market resulting in higher acceptance among its users. Payment Transactions can be incorporated to this platform that will streamline the entire process in the application. Such payments made through this platform are a best way to reduce the loading time and accelerate the efficiency in the back-end operations.

CONCLUSION

Concerns over counterfeit products need to be addressed as this impacts the trust among users for purchasing medicines and medical devices online. Increasing impediments for the growth of an online business can be mitigated with the help of blockchain technology. Data privacy is a critical issue for the user, and this must be ensured by protecting the data from unauthorized parties.

Online purchases have been able to provide convenient and satisfactory services to consumers. Online healthcare services can be a panacea to India's major issues about providing affordable healthcare services to every citizen. Product quality and delivery time needs to be taken into consideration for improving the standard of online delivery of medical products.

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RESEARCH ARTICLE

TAM MODEL FOR E-HEALTH IMPLEMENTATION IN RURAL AREAS OF UTTARAKHAND, POST COVID-19 PANDEMIC

---TAM Model for E-Health Implementation: A Study of Rural Areas of Uttarakhand During Post Covid

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ABSTRACT

OBJECTIVE:

The present study aim to find out the factors that has an influence and impacts the actual use of e-Health during post COVID-19 pandemic on the lines of TAM (technology acceptance model) and further suggest ways for effective implementation and adoption of e-Health by the rural patients.

DESIGN & SETTING:

The study was conducted on a total of 243 rural patients who had experienced e-Health services. Structural Equation Modeling has been used for analysis of data.

RESULTS:

The analysis revealed that 'perceived usefulness', 'perceived ease of use', 'privacy' and 'trust', all had considerable impact on the 'intention to use' which further significantly impacts the 'actual use'.

CONCLUSION:

Using in-depth interviews, both patients and physicians, practice of evidence-based e-Health interventions was identified for effective implementation and adoption of e-Health, which further helps to provides an equitable healthcare services to both urban and rural population.

KEYWORDS

e-Health, Uttarakhand, rural population, evidence-based e-Health.

INTRODUCTION

The holistic development of an economy majorly depends on a healthy and skilled and productive workforce [1]. The advent of technology in health has substantially transformed the health system in the country. E-Health has played a significant role in reaching to human aid including those who cannot afford basic healthcare services [30]. A lot of research work has been conducted in health sector for delivering a seamless experience with e-Health facilities. [25] For effective utilization of e-Health, it is important to study factors that affect the acceptance and adoption of e-Health services by both the patients and the medical practitioners. [5] [17] [25] Researches in this field have explored numerous models to deliver effective e-Health services in the rural and interior areas as a social measure. [5] [22] Uttarakhand being a hilly state, provision of e-Health services to the entire state sometime poses a major challenge. Hence the 'Technology Acceptance Model' has been explored to determine factors influencing the adoption of the e-Health model for rural and interior areas of Uttarakhand in creation of trust and comfort level among the patients.

THEORETICAL BACKGROUND AND HYPOTHESES FORMULATION

The study aims to find out the vital factors that influence the adoption of e-Health in the rural areas of Uttarakhand by utilizing the TAM during the post Covid-19 pandemic. The Technology Acceptance Model (TAM) is a popular model to understand and recognize "why users/customers accepts or rejects a technology and also how user/customer acceptance can be enhanced through technology." The *TAM* was originally developed by Fred D. Davis in 1980s. [12] Further the basic TAM has been added other extensions to reduce the limitations with the traditional model. [11] [14]

The basic TAM model includes 'Perceived Usefulness' and 'Perceived Ease of use' that the users have experienced with the technology which contributes to their 'intention to use' e-Health services. [25] Perceived usefulness is defined as the "degree by which a person considers that by using a specific technology leads to enhancement ones performance" while perceived ease of use is believed as the extent to which a person understands that by using a particular system will result in free of efforts or less effort". Thus, TAM has provided a framework to understand that the patient's 'intention to use' get converted into actual use of e-Health.[29] In addition to factors 'Perceived Usefulness' and 'Perceived Ease, other factors in TAM that the study has investigated to study were 'privacy' and 'trust'. [2] Researchers highlighted few other factors in addition to the ones included in basic TAM model - acceptance of users, attitude of the doctors, adoption by doctors, social and cultural factors, technological infrastructure, supporting healthcare structure, etc. [15][16] The patients, especially those residing in rural areas hesitated to use e-Health services with the viewpoint that using technology can expose their private information in jeopardy leading to lack of trust in e-Health. [26-28] Patients were comfortable to share their medical history and information with only the doctors or medical associates. [15-16] Further the relationship between trust and the acceptance of technology by the user was realized. [7] The trust on technology is based on the experience and the probable threat that it entails. Therefore, it has been found that during post Covid-19 situation, acceptance of technology significantly impacted the trust and vice versa. Sharing medical information through digitalized process created discomforts among patients due fear of information leak.

Hypothesis

H_{01}=There is no significant impact of perceived usefulness on intention to use

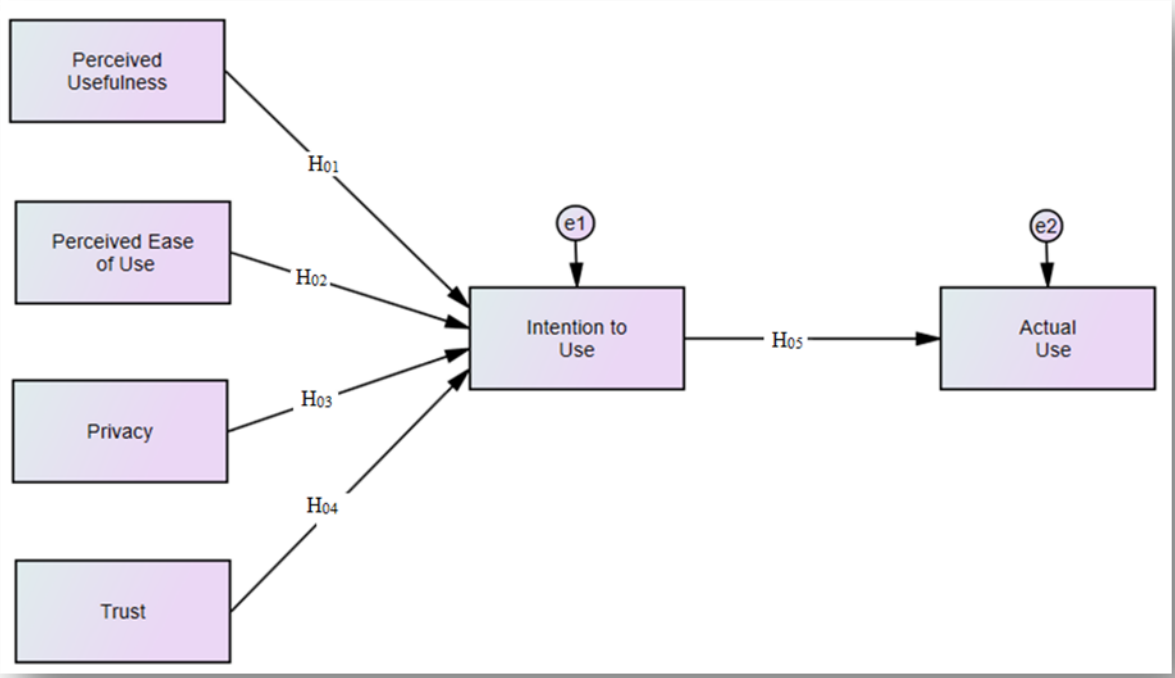
H_{02}= There is no significant impact of perceived ease of use on intention to use

H_{03}= There is no significant impact of privacy on intention to use

H_{04}= There is no significant impact of trust on intention to use

H_{05}= There is no significant impact of intention to use on the actual use

FIGURE 1: THEORETICAL MODEL FOR ADOPTION OF E-HEALTH



RESEARCH METHODOLOGY

RESEARCH SETTING

The present research intended to study significant factors that affects the 'intention to use' and 'actual use' of the e-Health services during post pandemic situation and to design a suitable model for optimum utilization of e-health services among rural patients in Uttarakhand; for which positivist approach proved appropriate.[17] The TAM model in the present study included privacy and trust in addition to perceived usefulness and perceived ease of use.

MEASURES

The variables used in the model were adapted as per the need of the study. The traditional f TAM model included perceived usefulness, perceived ease of use, intention to use and actual use which were extracted from Davis [10], Venkatesh and Davis, [27] Taylor and Todd. [24] The additions of trust and privacy were adapted from Featherman and Pavlou [9], Giovanis et al. [11] Chellappa and Pavlou [4] and Korgonkar andWolin [19] respectively.

DATA COLLECTION

Primary data has been collected using a structured questionnaire from respondents which primarily consisted patients/ patients' attendant group. The data has been collected from district hospital at Tehri Garhwal and from community health centers (CHCs) each at Beleshwar and Devprayag, Srinagar in Garhwal and Almora & Rudrapur districts of Kumaun regions. A total 350 respondents were contacted out of which 243 responses were chosen for analysis due to completeness and error free feedback. Further factors of e-health were first reviewed and verified through both internal checks and delphi technique. The secondary data has been collected from statistics and literature available with the government and non-government bodies.

STATISTICAL TOOLS & DATA ANALYSIS

The data collected was analyzed using AMOSS- SEM using TAM (Technology Acceptance Model) model. Multiple Regression Analysis tool has been explored in the study. Data analysis is covered in two sections: Measurement model and structural model.

MEASUREMENT MODEL

The measurement model has been run to check the construct validity which included both discriminant as well as convergent validity along with checking the model fit as well. The factors along with their variables were run to

check for model fit and construct validity which provided the following results. The model fit indices included CMIN/df=1.526; GFI= 0.913; NFI=0.966; CFI=0.988; TLI=0.985 and RMSEA=0.047 which were all according to the recommended guidelines. [3],[11]

TABLE 1: MODEL FIT INDICES

MODEL FIT INDICES	VALUES	RECOMMENDED GUIDELINES
GFI	0.913	≥ 0.90
X^2 /DF	1.526	< 5
RMSEA	0.047	< 0.08
NFI	0.966	≥ 0.90
CFI	0.988	≥ 0.90
TLI	0.985	≥ 0.90

TABLE 2: MEASUREMENT MODEL

CONSTRUCTS	ITEMS	LOADINGS	CR	CRONBACH ALPHA	AVE
Perceived Usefulness (PU)	PU1 PU2 PU3 PU4	.940 .948 .888 .946	0.963	0.87	0.866
Perceived Ease of Use (PEU)	PEU1 PEU2 PEU3 PEU4	.956 .953 .969 .956	0.984	0.89	0.940
Privacy (PRI)	PRI1 PRI2 PRI3	.951 .972 .968	0.927	0.91	0.810
Trust (TRU)	TRU1 TRU2 TRU3	.959 .959 .966	0.970	0.91	0.916
Intention to Use (INT)	INT1 INT2 INT3	.921 .840 .939	0.974	0.81	0.925
Actual Use (ACT)	ACT1 ACT2 ACT3	.963 .970 .926	0.966	0.84	0.904

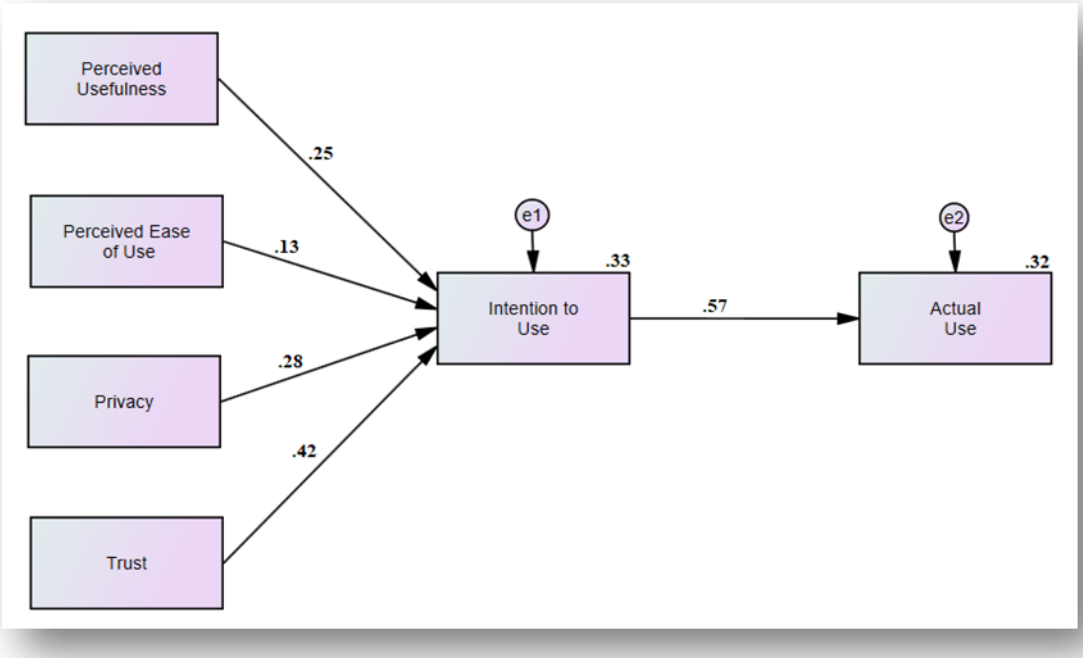
Table 2 below shows items under each factor along with their corresponding factor loadings. The variables under each factor had a factor loading above 0.70 indicating a strong convergence with their respective factors. To examine the internal reliability, Cronbach alpha and composite reliability were calculated, Values obtained were above 0.70 mark, proving it to be acceptable indicator of internal reliability.

The construct validity was calculated with the help of Dr.Gaskin's stats tool package, which provided us with the table 2 and Table 3. The criteria for convergent validity was met as the AVE values so obtained were more than 0.05 (Perceived Usefulness=0.866; Perceived Ease of Use =0.940; Privacy =0.810; Trust =0.916; Intention to Use=0.925 and Actual Use= 0.904).

TABLE 3: CORRELATION MATRIX AND SQUARE ROOT OF AVE

	PEU	INT	PU	TRU	PRI	ACT
PEU	0.970					
INT	0.014	0.962				
PU	0.325	0.041	0.931			
TRU	-0.055	-0.165	-0.038	0.957		
PRI	0.266	0.122	0.321	-0.045	0.900	
ACT	-0.013	-0.229	-0.051	-0.155	0.077	0.951

FIGURE 2: STRUCTURAL MODEL



The above table depicts the correlation matrix and square root of AVE. The discriminant validity of the variables in each factor is established as the values of square root of AVE for each factor is more than the correlation value that exists between them.

STRUCTURAL MODEL

To test the hypotheses so framed, the theoretical model was explored as to examine the impact of each independent factor on 'intention to use' and further analyses the impact of intention to use on actual use (Given in Fig 2- Structural Model).

Hypothesis one intended to examine whether 'perceived usefulness' has any significant impact on 'intention to use' in the present study. The result obtained a C.R. value of 4.651 with corresponding p-value to be less than 0.05, indicating that there is a significant impact of perceived usefulness on intention to use. Hence it proved that patients residing in rural areas of Uttarakhand found e-Health useful for them in influencing intention to use such e-health services.

Hypothesis two has been used to analyze the impact of 'perceived ease of use' on 'intention to use'. The analysis result provided a C.R. value of 2.488 and a p-value of 0.013 (less than 0.05) indicating a significant impact of the former on the latter. After having an experience with the e-Health services it became plausible for the rural patients to adopt these facilities with ease. Hence proving perceived use of e-Health services significantly impacts the intention to use e-health services in the state.

Hypotheses three and four (privacy and trust) were additions to the TAM model, which was taken as the base for measuring the impact of various factors on the intention to use and actual use of e-Health. The results obtained showed a C.R of 5.175 and 7.856 respectively, with their corresponding p-values less than 0.05. Both privacy and trust had a significant impact on the intention to use of e-Health services. The rural patients were established to be reluctant while using e-Health services due to the privacy of their health data. While existing users of e-Health services had no issues with the privacy and trust factors. Hence the combined impact of all the four independent factors shown a variance of 33% in 'intention to use'

Hypothesis five examined the impact of 'intention to use' on 'actual use'. The final result showed a C.R. value of 10.617 and p-value found to be less than 0.05, indicating a significant impact. The R square value 0.323, depicting that actual use had a variance of 32.3% due to intention to use. The value of R square has been significant, but the variance brought about was not very high, as the respondents belonged to the rural regions of Uttarakhand, who had little exposure to e-Health facilities.

CONCLUSION & SUGGESTIONS

E-health in Uttarakhand during post Covid -19 situation has gained popularity but not impressively impacted the functional areas based on ICT like patient care, laboratory, pharmacy and online registration etc. The patient registration and online appointments have been covered satisfactorily under e-health concept. Improvement in e-Health includes encouraging more online professional fellow system, informed approval process, privacy and empowerment and equity to be encouraged [12][16] for equitable access to health services in rural deprived states of Uttarakhand. [15]

LIMITATIONS & SCOPE FOR FUTURE RESEARCH:

The present study is not a comprehensive analysis of the entire health care system in Uttarakhand; it excludes traditional medicine like, AYUSH and Homeopath. But the present empirical study can be further studied by implementing the proposed TAM model to other hilly states of India for effective implementation of e-health services.

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APPENDIX

CONSTRUCT	MEASUREMENT ITEMS
Perceived Usefulness(PU)	PU1: Using the e-Health services will improve my life quality PU2: Using the e-Health services will make my life more convenient PU3: Using the e-Health services will make me more effective in my life PU4: Overall, I find the e-Health services to be useful in my life
Perceived Ease of Use (PEU)	PEU1: Learning to operate the e-Health services will be easy for me PEU2: I can easily become skillful at using the e-Health services PEU3: I can get the e-Health services to do what I want it to do PEU4: Overall, the e-Health services are easy to use
Privacy (PRI)	PRI1: I believe that privacy of e-Health participants is protected PRI2: I believe personal information stored in e-Health system is safe PRI3: I believe e-Health systems to keep participants' information secure
Trust (TRU)	TRU1: Based on my experience with the e-Health in the past, I know it is trustworthy TRU2: Based on my experience with the e-Health in the past, I know it is not opportunistic TRU3: Based on my experience with the e-Health in the past, I know that it keeps its promises to its patient
Intention to Use (INT)	INT1: I have high intention to use the e-Health service INT2: I intend to learn about using e-Health services INT3: I plan to use e-Health services to manage my health
Actual Use (ACT)	ACT1: e-Health service is a pleasant experience ACT2: I use e-Health service currently ACT3: I spend a lot of time on e-Health service

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RESEARCH ARTICLE

GENDER INEQUITY IN UTILISATION OF PUBLICLY FUNDED HEALTH INSURANCE SCHEMES: FINDINGS BASED ON INSURANCE DATA FROM A SOUTHERN INDIAN STATE

---Is there a difference in utilisation of state sponsored health insurance between men and women?

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ABSTRACT

While Publicly Funded Health Insurance Schemes (PFHIS) can be an effective strategy to achieve Universal Health Coverage by offering financial protection, the extent to which they facilitate gender equity has been less explored. Women constitute one of the main vulnerable groups owing to a combination of health and economic vulnerabilities to access inpatient care services. Gender health equity requires that healthcare resources, such as PFHIS effectively reach women. This study investigates the gender differences in utilisation of Chief Ministers' Comprehensive Health Insurance Scheme (CMCHIS) by looking at a large volume of claims data covering 2012 to 2014 in the southern Indian state, Tamil Nadu. Previous studies indicate that women in the state had a higher hospitalisation rate than men and are entitled equally to CMCHIS.

By disaggregating the data on number of beneficiaries, claim status, average and total claim value, type of procedures based on gender on a random selection of 230265 cases, the paper points out that women's utilization of CMCHIS is significantly lesser than men. Women constitute only 36% of all beneficiaries and received only half of the total claim value disbursed through the scheme. This pro-male bias was found to be statistically significant and consistent across the scheme years, age group and type of procedures. The study concludes that the gender inequity in utilization of CMCHIS is conspicuous and needs immediate attention from policy makers and administrators. With recent inclusion of COVID19 testing and treatment under PFHIS, the paper urges for further research lest more women are left behind.

KEYWORDS

Gender difference, PHFIS, claims, gender equity, CMCHIS, India

INTRODUCTION

There is an impetus across lower middle-income countries like India to introduce new health insurance schemes to different target groups in order to increase the access to medical treatments and achieve Universal Health Coverage (UHC). UHC is closely tied to the concept of health equity .[1] For achieving health equity, healthcare

resources should be allocated similarly to all those with similar need (horizontal equity) and differentially to those with different needs (vertical equity). [2]Women's health needs are both similar and different to that of men. Gender health equity is achieved only when both horizontal (such as diabetes) and vertical equity (such as sexual and reproductive health issues) concerns are acknowledged and addressed.

Several studies in India that have found gender based differences in allocation of healthcare resources within the household [3–6].This has resulted in poor access to healthcare services for women and resulting in higher morbidity and mortality. In this context, health financing through publicly funded health insurance schemes (PFHIS) can serve as an excellent strategy to help women to increase access to healthcare. PFHIS targeted at the poor and informal population ensure financial protection by eliminating or limiting catastrophic health expenditures. Since 2007, India has had several state sponsored health insurance schemes such as Rajiv Arogya Sri, Rashtriya Swasthya Bima Yojana (RSBY), etc. culminating in 2018 as the Pradhan Mantri Jan Arogya Yojana (PMJAY) or National Health Protection Scheme. Due to the health and financial crisis created by COVID19 pandemic, in April 2020, Government of India announced that COVID19 testing and treatment would be covered under the PMJAY.

However not much is known on how much these health insurance schemes has facilitated women to utilize inpatient care. Literature on PFHIS consider insurance claims approved as a proxy for utilisation by beneficiaries. Utilization estimates assessed through claims data mostly indicated a pro-male bias in two states in India. [7–9] Primary studies have also found gender differences in utilisation of PFHIS favouring the male. [10-12] Occasionally some studies found a bias favouring women. [13,14] Studies that used the National Sample Survey Organisation (NSSO) by the Government of India also found gender differences in PFHIS utilization in India. [15] A recent systematic review[16] indicates this could just be the tip of the iceberg as often PFHIS studies base their findings on households as a single unit thereby neglecting to explore intrahousehold dynamics and vertical equity. As a result of the absence of a gender lens in PFHIS studies, gender equity continues to remain an under researched subject.

Given that a large share of the health budget is allocated to PFHIS within the country's limited fiscal space, there is a research gap on the whether they facilitate access to inpatient care for women. To fill up this crucial research gap, the current paper looks at one of the most developed states in India, Tamil Nadu (TN), where the development indicators such as sex ratio, female literacy, etc are higher than the national average. Unlike schemes like RSBY, all members of the household irrespective of sex are covered under the Chief Minister's Comprehensive Health Insurance Scheme (hence forth CMCHIS) [17] According to the National Sample Survey 71st round data, women in Tamil Nadu have a higher hospitalization rate (6.8%) than men (4.6%) [18], which meant that there is likely to be an equal if not higher utilization of CMCHIS by women in this state.

This paper seeks to find out gender differences in utilization of the scheme by analysing the insurance claims data of CMCHIS. The patterns in utilization are evaluated against what is expected from policy to meet the financial health protection needs of women.

METHODS

The administrative data was procured through a formal application by the first author as a part of her doctoral study to the implementing government agency. The data on insurance claims made under the CMCHIS was obtained from the Third-party Administrator (TPA) of the insurance company. Claims between January 2012 to December 31st 2014, totalling 924372 was obtained as a dump in Microsoft Excel format, which had to be cleaned and exported to SPSS for analyses.

Since the sample size was huge, for convenience a random sample consisting of 25% of the overall sample was drawn using the "select cases' function of SPSS v21. This yielded a total of 230265 cases which were then used for further analysis. Some dummy variables were created to facilitate analysis. Table 1 gives a brief of all variables.

Basic descriptive statistics was performed to explore the patterns in number of beneficiaries, age of beneficiaries, insurance claim amount (average and total), types of procedures and specialty, etc across gender. The significance of differences in key variables were computed using t-test and Chi square methods of analyses.

TABLE 1: TYPES OF VARIABLES USED IN STUDY

Name of Variable	Type	Explanation
Gender of Patient	Categorical & Independent	Male was assigned as 1 and Female as 2
Average Claim Value	Continuous & Dependent	The mean value of all claims approved expressed as INR
Total Claim Value	Continuous & Dependent	The sum of all approved claim values
Type of Procedure	Categorical & Independent	Follow-up procedures assigned as 1, Surgical procedures as 2 and Medical procedures as 3
Status of Claim	Categorical & Dependent	A total of 9 categories recoded to a dummy with 3 categories- Approved, Denied and Query (In process)
Specialty	Categorical & Independent	A total of 34 speciality categories such as Cardiology, Oncology, etc under which specific procedure falls

RESULTS

Results have been categorized broadly under the following sections:

A. Gender differences in CMCHIS Utilization
B. Gender differences in CMCHIS Claim Status
C. Gender differences in Average Claimed Value, Final Approved Value and Total Claim Value
D. Gender Differences in Type of Procedure
E. Gender Differences in Specialty

A) GENDER DIFFERENCES IN CMCHIS UTILIZATION

As shown in Figure 1, overall, men constituted 63.67% of all beneficiaries who made claims under the CMCHIS in Tamil Nadu over the three years.

A more concerning pattern as seen in Figure 2 is that though utilization of CMCHIS was improving year by year, the share of women in overall utilization of CMCHIS was decreasing from 2012 to 2013 and further in 2014. The gender difference was found to be statistically significant (Table 6 in Annexures).

FIGURE1: GENDER DIFFERENCES AMONG BENEFICIARIES OF CMCHIS 2012-14

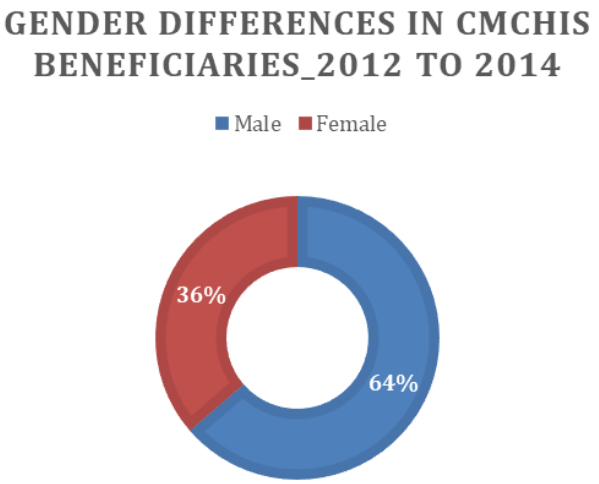
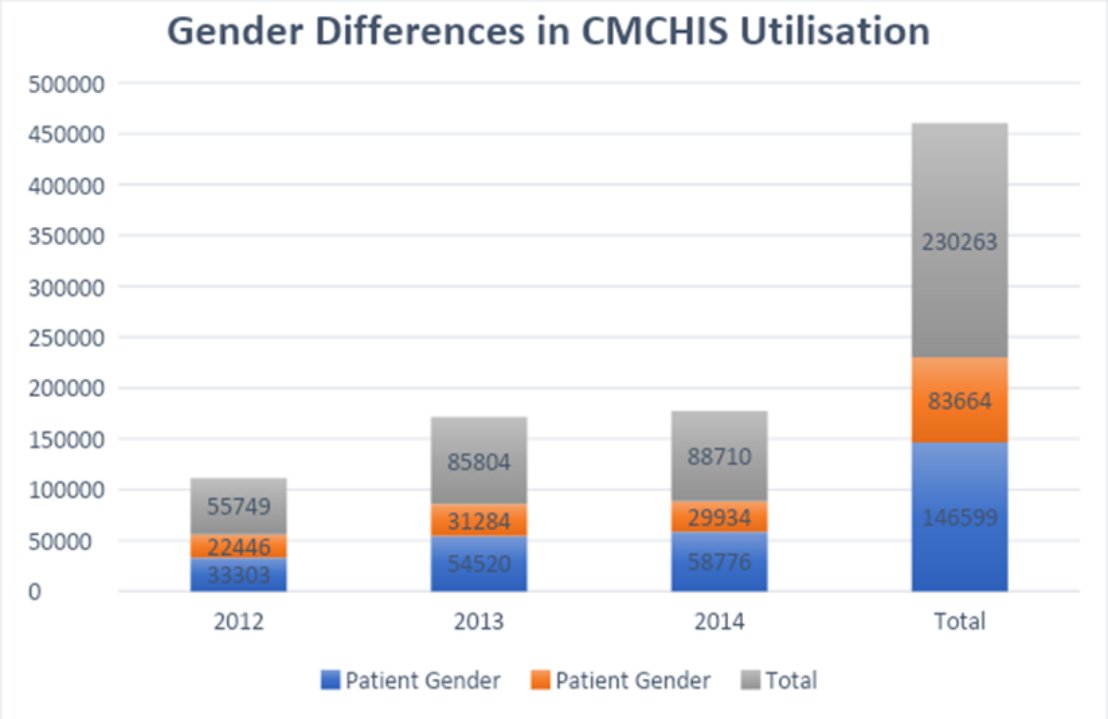


FIGURE 2 GENDER DIFFERENCES IN UTILISATION OF CMCHIS OVER THE YEARS 2012-2014



A. GENDER DIFFERENCES IN CMCHIS CLAIM STATUS

When a preauthorisation request is sent from the empanelled healthcare facility to the insurance company along with supporting documents, a decision is taken by the concerned TPA on whether or not the pre-authorisation can be approved. Based on the data shared by the TPA, the decisions by the insurance claims department have been classified under three heads as:

(1) Approved
(2) Denied
(3) In Query (In process, where final decision not yet taken)

Table 2 shows that for the years 2012 to 2014, for every year, almost 99% of all preauthorised claims were approved. The number of male beneficiaries were higher than the female in all the three categories, the largest gap being in the cases that were in query. The study found that there is a statistically significant relationship between status of claim and gender. (See Table 7 in Annexure)

TABLE 2: CLAIM STATUS IN CMCHIS BY GENDER_2012-14

	PATIENT GENDER		TOTAL
	Male	Female	
APPROVED	145150	82868	228018
	63.70%	**36.30%**	100.00%
DENIED	815	512	1327
	61.40%	**38.60%**	100.00%
QUERY	636	284	920
	69.10%	**30.90%**	100.00%
TOTAL	146601	83664	230265
	63.70%	36.30%	100.00%

B. GENDER DIFFERENCES IN AVERAGE CLAIMED AND AVERAGE APPROVED AMOUNT

Each treatment procedure included under the CMCHIS is pre-fixed for a specific reimbursement rate by the scheme administration agency. [17] When a preauthorisation request is made, usually the empanelled facility requests for the package rate or even occasionally higher depending on the other conditions of the patient. The TPA scrutinises

the merit of the case with the documents submitted and uses the discretionary power to finally award an amount that can be equal or lesser to the claimed amount.

Table 3 indicates that the average (or per capita) of the approved claim amount for males was INR[1] 11132.82 while it was INR 9714.37 for females. Similarly the final approved amount is higher for males compared to female (INR 20546.63 versus INR 19097.1). This difference was found to be statistically different at a 99% confidence interval. (Table 8 in Annexures).

The total claim value of all reimbursed amounts put together in the scheme over the years showed that the male share of claims was almost double of that of women as represented in Figure 3. (INR 298,96,36,855 for males versus INR 158,72,36,232 for females).

FIGURE 3 TOTAL CLAIM AMOUNT IN CMCHIS 2012-14

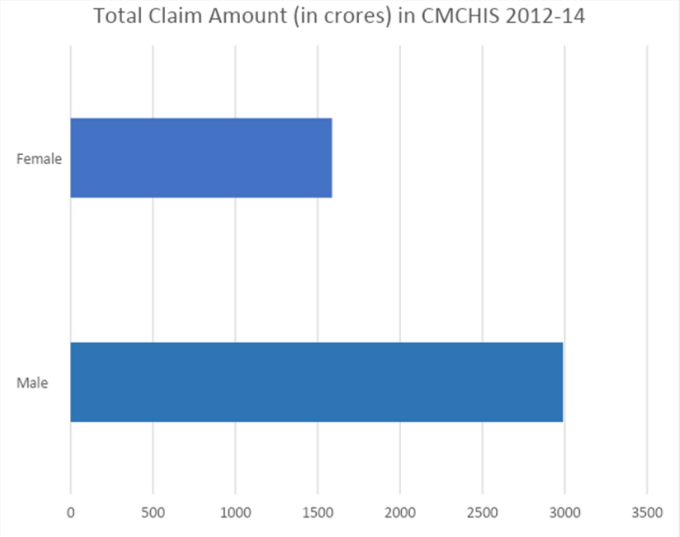


TABLE 3: GENDER DIFFERENCES IN CLAIMED AND FINAL APPROVED VALUE IN CMCHIS_2012 TO 14

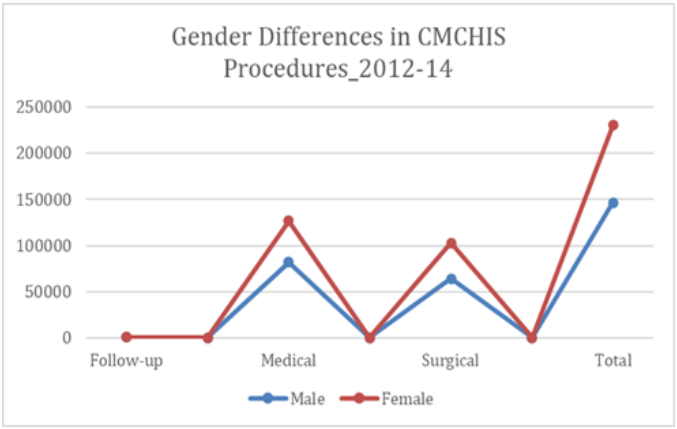
	PATIENT GENDER	N	MEAN	STD. DEVIATION	STD. ERROR MEAN
Claimed Amount in INR	Male	146601	11132.82	18443.7	48.17
	Female	83663	9714.37	17056.6	58.969
Final Approved Amount in INR	Male	145505	20546.63	22341.1	58.569
	Female	83114	19097.1	21250.2	73.71

C. GENDER DIFFERENCES IN TYPE OF PROCEDURES

The CMCHIS covers a total of 1016 procedures divided into Medical, Surgical and Follow up procedures. The study attempted to find if gender differences within each type of procedure exists.

Figure 4 shows that in general, utilization of Follow up procedures was far less in CMCHIS compared to Medical and Surgical. A sex disaggregated analysis shows that while claims from males dominate all three types of procedures, the gap between the sexes is starker in medical procedures.

FIGURE 4 GENDER DIFFERENCES IN CMCHIS PROCEDURES _2012 TO 2014



[1] Conversion rate in May 2021 stands at 1 INR= 0.014 United States Dollar

The study found that these gender differences across specialty were statistically significant. (Table 9 in Annexure)

The average approved claim amount for Surgical, Medical and Follow-up procedures were calculated and given in Table 4. The mean of Surgical procedures was the highest at INR 30939.05 while medical procedures was INR 11258.21 and the lowest was for the follow up procedures.

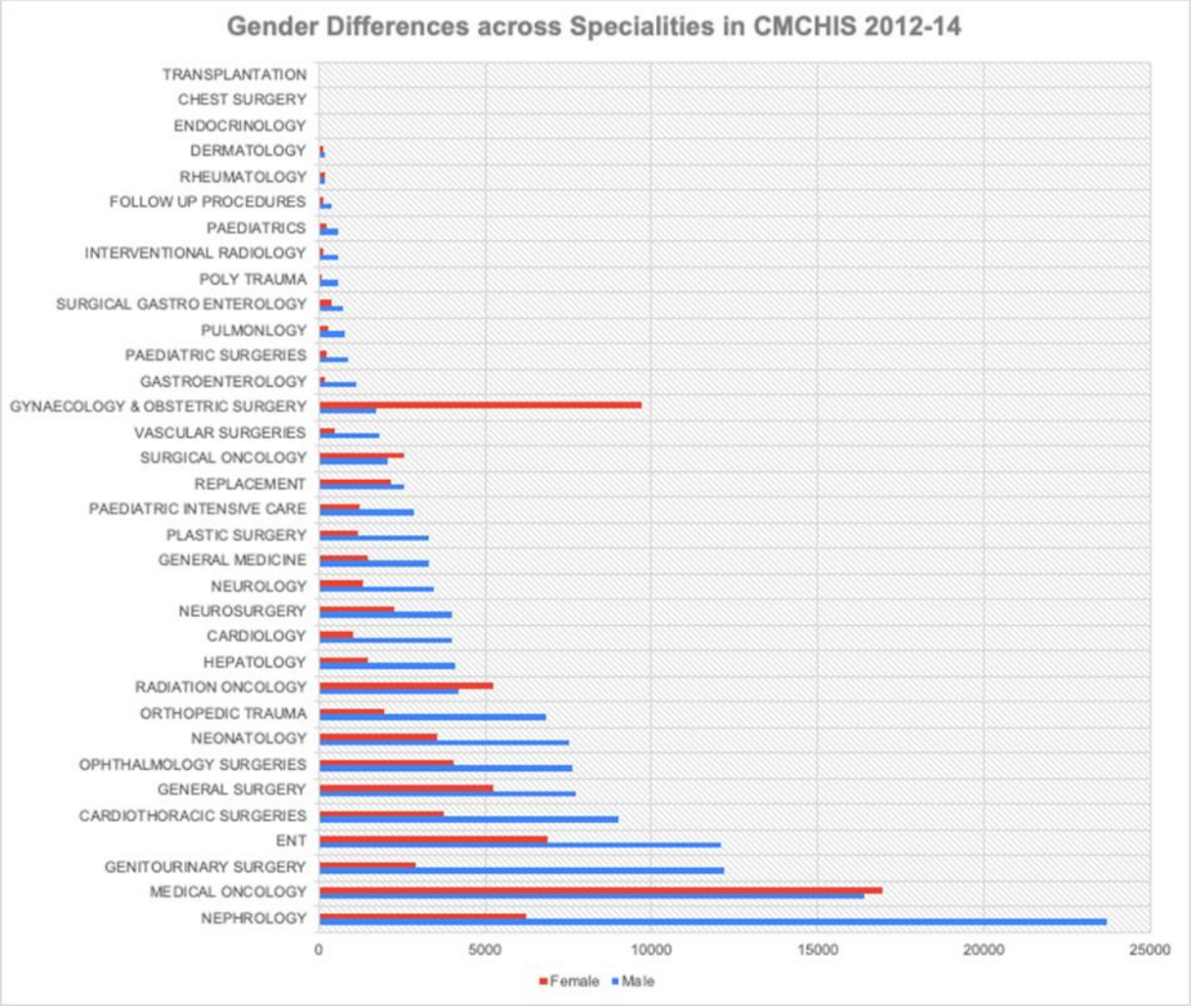
D. GENDER DIFFERENCES IN SPECIALTY

The gender differences across the 34 specialty[2] as represented in Figure 5 reveals that in most men overtake women, especially in Nephrology, Genito Urinary surgery, ENT, cardio thoracic surgeries, orthopaedic surgeries, etc. The only specialties where women overtake men were medical oncology, radiation oncology, surgical oncology and gynaecology/obstetrics

TABLE 4: AVERAGE CLAIM AMOUNT FOR DIFFERENT PROCEDURES IN CMCHIS 2012-2014

AVERAGE CLAIM AMOUNT (IN INR) OF PROCEDURES IN INR			
	Surgical	Medical	Follow up
Mean	30939.05	11258.21	1791.21
Median	20000	8000	1000

FIGURE 5 GENDER DIFFERENCES ACROSS SPECIALTY IN CMCHIS 2012-2014



[2] CMCHIS does not cover pregnancy and childbirth

TABLE 5: TOP 5 SPECIALTY UTILISED BY MALE AND FEMALE IN CMCHIS_2012-14 WITH AVERAGE CLAIM VALUES

	MALE	AVERAGE CLAIM AMOUNT IN INR	% OF ALL MALE CLAIMS	FEMALE	AVERAGE CLAIM AMOUNT IN INR	% OF ALL FEMALE CLAIMS
1	Nephrology	8320.72	16.2	Medical oncology	5793.60	20.3
2	Medical oncology	5793.60	11.2	Gynaecology & obstetric surgery	17777.99	11.6
3	Genitourinary surgery	22317.91	8.3	ENT	11157.22	8.2
4	ENT	11157.22	8.2	Nephrology	8320.72	7.5
5	Cardiothoracic surgeries	79584.38	6.2	Radiation oncology	20051.16	6.3

The top five specialities from among all male and all female claims have been listed in the Table 5 below. To determine if any particular specialty most utilised by men had a very high claim value (which then could explain the higher share of resource allocation to men seen in Figure 3), the average claim of each specialty is also listed alongside.

Most of the male claims came from the specialties of nephrology, medical oncology, and ENT. Though cardiothoracic surgeries were the fifth most reported specialty for male claims, the average claim amount (INR 79584.38) was higher than all the four categories. However, this specialty was the eighth most reported specialty for women. Medical oncology had the lowest average claim value (INR 5793.60) and was the most reported (20.3%) specialty for women's claims. The gender differences in distribution across specialty and its associated claim value may to some extent account for the gender differences in total claim reimbursed.

DISCUSSION

This paper is one of the few independent research studies based on the administrative data of CMCHIS implemented in Tamil Nadu spanning three years- 2012, 2013 and 2014. Using claims as a proxy for utilization of scheme and by drawing a 25% random sample from a larger volume of more than nine lakh cases, the analyses of the CMCHIS data has revealed stark gender differences in all the parameters explored- number of beneficiaries, claim status, average claim value, average final approved amount, total claim value and in the types of procedures and specialty. The gender differences in each category were further found to be statistically significant. Women constituted only 36.3% of all beneficiaries and a more disturbingly their share was reducing over the years. While men received an average reimbursement of INR 20546.63, women received only INR 19097.1, the difference being statistically significant. The study found that men were more represented in the medical procedures than surgical procedures, and the average claim value of surgical procedures were higher than medical.

From the total public money spent in the CMCHIS for the target group, the male beneficiaries received a larger share, almost double of what the women received together. We argue that this gender inequality translates to gender inequity in allocation of health resources with the following explanation:

- According to the NSSO findings, in TN, women have hospitalization rates higher than that of men and form a larger proportion of hospitalized individuals. Women are hospitalized not only for sex-specific conditions such as obstetric/gynaecological but cardiovascular ailments. For instance, 12% of men and 10% of women were hospitalized for cardiovascular conditions. [22] Hence the reasons for women not using CMCHIS for cardiovascular treatments indicates inequity.
- Women are less likely to have financial resources, autonomy, or other forms of social protection. Therefore, women are in greater need of policy enabled resources and health protection mechanisms like PFHIS. While the CMCHIS has not discriminated women from enrolling in the scheme, the study clearly points out to the contrary, whereby the benefits have failed to reach even equal number of women.
- If women were hospitalized but were not receiving protection from CMCHIS, it is likely that they were paying out of pocket for the hospitalisation services which could become catastrophic. In fact Tamil Nadu has a dominant private provider presence where the cost for a comparable treatment can sometimes be more than ten times than in public hospitals. [18] This accentuates the economic vulnerabilities of women.
- Since the inception of scheme in 2012, so far there have not been any independent investigation of the process and impact of the scheme in general, let alone, with a gender lens. [19] For instance, there is no sex disaggregated administrative data on enrolment to verify if all eligible women have been enrolled. These concerns have not yet been addressed by other evaluation studies or by the administration.

In the light of the above discussion, the observed gender differences in utilization volume and utilization value point to unjust, unnecessary, and avoidable differences within the purview of the policy.

There could be several reasons for the observed gender differences that future research might reveal. One possible reason could be lack of awareness among the women in lower income households. Another reason could be some form of systematic exclusion from enrolment due to operational issues. Another reason could be that women attempted to use but could not, due to factors related to supply side- such as the hospital not being empanelled under the scheme or a denial by the hospital authorities. It is also possible that the specific procedures the women required to undergo were not included in the CMCHIS package. Some of these reasons have started emerging in recent studies. [19–21]

While two other studies have also looked at the scheme administrative data [8,9], this is the first study on the Tamil Nadu scheme which takes an in-depth view with a gender lens combining a large volume of data and other existing evidence.

This paper provides much-needed evidence on the possible impact of PFHIS on women's access to health care treatment and role of public policy in furthering gender equity. There is a need to carry out further research to unearth the actual causes of this inequity and undertake measures to improve women's access to crucial inpatient services.

LIMITATIONS OF STUDY

The data analysed in this paper pertains to 2012 to 2014. A similar analysis of recent data, especially since the CMCHIS has merged with PMJAY in 2018 would be more useful. A considerable time and effort went in cleaning the raw data given by the TPA. Some important dimensions such as education, income, religion, enrolment of family members, urban or rural, etc were not captured by the agency and hence limited the analysis.

CONCLUSIONS

Though women constitute a large proportion of the informal sector as well as the poorer sections of society, their utilization patterns of PFHI schemes have not been explored, especially in the state of TN. This study revealed that even though women were seeking in-patient services and were most likely to be enrolled in CMCHIS, that they were not utilizing the CMCHIS for financial protection. The findings on gender differences clearly indicate inequity in utilisation of inpatient services and healthcare resource allocation. As women often lack financial independence, this trend if left unchecked can lead to distress coping encouraging a vicious of cycle of ill-health and debt or delays and denials in healthcare seeking. The recent

COVID19 pandemic has pushed several households further into poverty while at the same time made access to healthcare treatments more crucial but challenging. If women are facing barriers to access CMCHIS as revealed in this study, they are most likely to find accessing COVID testing, treatment, and vaccinations even if these services are included in the insurance schemes.

The study gives a wake-up call to scheme administrators, healthcare managers, insurance managers, healthcare policy makers on the need to constantly monitor the scheme using disaggregated data and address gender inequity in all forms of health insurance schemes. This study stresses the need for UHC policies to make explicit provisions and monitoring mechanisms to ensure gender equity.

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APPENDIX

TABLE 6: GENDER DIFFERENCES IN UTILISATION OF CMCHIS 2012-2014

	PATIENT GENDER		TOTAL
	Male	Female	
2012	33303	22446	55749
	59.70%	**40.30%**	100.00%
2013	54520	31284	85804
	63.50%	**36.50%**	100.00%
2014	58776	29934	88710
	66.30%	**33.70%**	100.00%
	146599	83664	230263
	63.70%	36.30%	100.00%

	VALUE	DF	ASYMP. SIG. (2-SIDED)
Pearson Chi-Square	629.859a	2	0
Likelihood Ratio	627.422	2	0
Linear-by-Linear Association	623.126	1	0
N of Valid Cases	230263		
a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 20255.90.			

TABLE 7: CLAIM STATUS IN CMCHIS BY GENDER_2012-14

	VALUE	DF	ASYMP. SIG. (2-SIDED)
Pearson Chi-Square	14.785a	2	0.001
Likelihood Ratio	15.053	2	0.001
N of Valid Cases	230265		
a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 334.27.			

TABLE 8: GENDER DIFFERENCES IN CLAIMED AND FINAL APPROVED VALUE IN CMCHIS_2012 TO 14 – T TEST RESULTS

	Levene's Test for Equality of Variances								
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	99% Confidence Interval of the Difference	
								Lower	Upper
Claimed Amount in INR	317.52	0	18.236	230262	0	1418.454	77.785	1218.092	1618.815
			18.629	185444	0	1418.454	76.143	1222.32	1614.587
Final Approval Amount in INR	217.76	0	15.188	228617	0	1449.528	95.44	1203.689	1695.366
			15.397	180169	0	1449.528	94.146	1207.022	1692.034

TABLE 9: GENDER DIFFERENCES IN CMCHIS UTILIZATION ACROSS SPECIALTY 2012-2014

	VALUE	DF	ASYMP. SIG. (2-SIDED)
Pearson Chi-Square	171.200a	2	0
Likelihood Ratio	171.912	2	0
N of Valid Cases	230265		
a 0 cells (0.0%) have expected count less than 5. The minimum expected count is 190.39.			

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ANALYSIS OF MANAGEMENT PRACTICE

ROLE OF REGULATORY AUTHORITIES ON THE WORKING OF CONTRACT RESEARCH ORGANIZATION AND PHARMACEUTICAL COMPANY'S CLINICAL TRIALS IN INDIA

---A study of strategic alliances between pharmaceutical companies and clinical research organisations in India

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ABSTRACT

The evolution of the drug development process and testing its efficacy is a primary responsibility of pharmaceutical companies. The time cost investment involved in identifying a compound suitable to its target disease and making it available to the masses eventually led to the rise of the Contract Research Organization (CRO) in the domain of clinical research. Pharmaceutical companies outsource the research and clinical trials to CRO's. A CRO has a vital role from drug discovery to the launch and marketing of drugs. India is emerging as attractive location for global clinical trial. It has cost advantage compared to other countries and a well-developed associated services like data management, medical writing and pharmacovigilance. The Central Drug Standard Control Organization (CDSCO) is the National Regulatory Authority in India that aims to bring safe drugs and standardize clinical research.

Pharmaceutical Companies benefit by strategically working with CRO to gain speed and efficiency in drug discovery, generation and retention of clinical data integrity. The risk associated with CRO relates to delays and inferior quality of work, thereby making CRO a critical decision for Pharmaceutical Company.

KEYWORDS

Contract Research Organization (CRO), Drug Development, Clinical Trials, Regulatory Authorities, Pharmaceutical Brand Reputation.

INTRODUCTION

The pharmaceutical is one of the most regulated sectors in India as government implements various legislations to safeguard the health and welfare of people. Pharmaceutical companies select Contract Research Organisations (CRO) to carry out clinical trials and bring out a new molecule, a new treatment or innovation in medical devices. It also reduces the cost of completion of a drug research project. [1] There are risks associated with CRO regarding the conduct of trial design, confidentiality of the data, and publication of outcomes. CRO practices have

also raised ethical concerns related to inadequate consent, safety measures or poor on-site monitoring.[2] The regulatory authorities have specific requirements from CRO's regarding the safety and efficacy of drugs and protecting public health. They have a role in ensuring the protection, and effectiveness of all pharmaceutical products distributed in their region.

The evolving regulatory framework in India poses unique challenges for compliances and has implications for the strategic alliances formed by pharmaceutical companies with CRO. [3]

PURPOSE OF THE STUDY

- To study the nature of alliances between CRO and pharmaceutical companies.
- To study the scope of regulations on clinical trials conducted by CRO for pharmaceutical companies in India
- To explore the branding implications of success or failure of clinical trials for CRO and pharmaceutical companies.

INDUSTRY BACKGROUND

GLOBALIZATION OF CLINICAL TRIALS – EMERGING OPPORTUNITY FOR INDIA

Pharmaceutical companies conducted clinical trials conventionally in technologically advanced countries like the US, UK, and Western Europe. There has been a gradual shift to emerging economies like Eastern Europe, Latin America, and Asia. The companies have to ensure that the design, oversight, and execution meet the local regulatory and ethical requirements.[4] The World Health Organisation has facilitated the registry of clinical trials at the international level for improved access of clinical trials data to all stakeholders.[5] India has the world's largest population and costs advantage, making it a favourable destination for clinical trials.[6] The rise of CRO's in India can be attributed to many factors such as minimized operational cost, possibilities of quick patient recruitment, the ease of the regulatory approval process, rapidly developing and emerging scientific research and development activities capacity. [7]

PURPOSE OF CLINICAL RESEARCH ORGANIZATION

A CRO is an outsourcing company that a sponsoring company hires as an independent contractor to lead clinical trials and other research support services on its behalf. CROs typically contract with companies in the pharmaceutical, biotechnology, or medical device industries, but their clients also include governmental institutions, foundations, and universities. [8] The strategic alliances are forged between pharmaceuticals sponsors where both share risks, and CROs are responsible for reducing the cost of the production process while retaining quality.[9]

REGULATORY INFRASTRUCTURE

The governments enforce regulations on Pharmaceutical Companies to promote safety standards and protect participants on trials. The Pharmaceutical companies expect the regulators to protect their intellectual property. Some of the prominent regulators are the European Medicine Agency (EMA). United States FDA, China's National Medical Products Administration.[10]

The chief regulatory authority in India for drugs and clinical trials is the Central Drugs Standard Control Organization (CDSCO) and the governing official of the CDSCO is the Drugs Controller General of India (DCGI), who would approve the clinical trials taking place in India.[11] The responsibilities of the DCGI would include the assessments of the clinical trial sites, sponsors, and drug manufacturing facilities with the support of the institutes such as the Indian Council of Medical Research (ICMR) and the Department of Biotechnology (DBT). These institutes have technical expertise on rare and critical diseases of national importance. Other institutes such as Drug Consultative Committee and Drug Technical Advisory Board assist the DCGI in examining the New Drug Applications. [12]

METHODOLOGY

To understand the nature of strategic alliances and regulatory influences on the relationship between CRO and Pharmaceutical companies, qualitative interviews with the following industry experts were undertaken:

1) Dr. Sudhakar Bangera: Clinical Research Professional, Trainer for Ethics Committee and Registrations of Ethics Committee.
2) Dr. Vishal Narang Ph.D, MBA: Director, Clinical Project Leadership and Operations, Cipla.India.
3) Ms.Ekta Shah; Regional Trial Manager- AP EMEA at Sanofi. India.
4) Ms. Manjari Madanan; Global Clinical Quality Specialist; IQVIA. India
5) Ms. Kartik M; Clinical Data Manager, IQVIA. India

The questions were on how a pharmaceutical company in India selects a Contract Research Organization for the

clinical trials. Does the regulatory body of the Central Drugs Standard Control Organisation influence the selection of a CRO by a pharmaceutical company? What are the benefits accrued to the pharmaceutical company by outsourcing their clinical trial to a CRO? How would the success and failure of clinical trials affect the CRO and sponsoring pharmaceutical companies?

The response of the experts interviewed is recoded, and transcriptions are prepared. The insights are summarised in the following section.

DISCUSSION

DECISION MAKING CRITERIA INVOLVED IN THE SELECTION OF CONTRACT RESEARCH ORGANIZATION BY PHARMACEUTICAL COMPANIES

Pharmaceutical companies can optimize their resources and increase innovations in drug development by alliances with CRO. Though the environment fosters outsourcing to CRO, the relationship is fraught with challenges like CRO not being able to adhere to timelines, delays increasing project cost, lack of transparency, difficulties in design and execution of protocols.[13]

The Pharmaceutical Executive committee would initiate by creating awareness of the clinical trials requirement and activate the vendor and CRO network. The committee would then be visiting the CRO to observe their operating procedures and regulatory compliance. Alternatively, they will send out (Request for Proposal) RFP/ Proposals to several CROs. They are expected to work on the process of trial site, data-related formulations, test license, and pharmacovigilance safety reporting.

"No Law across the world says Pharma company have to hire a CRO; if they want pharma company can choose to run a clinical trial on its own with its set people or resources but the alliances are mutually beneficial" by Dr. Sudhakar Bangera.

CRO's can undertake projects on a global scale and have emerged as the centre of excellence. One successful alliance has been between Covance and Sanofi-Aventis.[14]

A decision analysis tool can be used to identify and evaluate the competency of the contract research organization using multicriteria decision modelling.[15] The Key Performance Indicators (KPI) metrics are also used for services they offer in the specified therapeutics domain, clinical data management, pharmacovigilance and operations.

The government of India has brought amendments in schedule Y of the Drugs and Cosmetics Act (1940) to provide guidelines for the ethical conduct of clinical trials in the country. Central Drugs Standard Control Organization (CDSCO) under the Director-General of Health Services, Ministry of Health and Family Affairs is the National Regulatory Authority NRA) of India.

CDSCO has audited and ensured the ethics committee providing approval to all the clinical trials that are to take place on Indian soil are registered under its purview from the year 2013. [16]

While Regulatory Authorities are not primarily involved in CRO appointments, they consider CRO as an extension of the pharmaceutical company for any ongoing clinical trial and subject them to regulatory audits. The compensation for any trial-related death or injury is in the purview of the ethical committee. The trial sites approach the CDSCO approved ethics committee in their region to review and approve the essential clinical trial documents.[17]

"Working with a CRO with regulatory affairs/ submissions expertise is an assurance of good processes in place" by Ms. Ekta Shah.

The complex regulatory environment often requires a long time to get clearance for projects causing Phase lag, and delays in customs clearance of medical devices hamper the trial process. [18]

SUCCESS OR FAILURE OF CLINICAL TRIALS IMPACTING CRO AND PHARMACEUTICAL CORPORATE BRAND REPUTATION

The rate of Failure of Phase II and Phase III drug trials is very high globally. There reasons for failure could be lack of design protocols, inability to meet the required efficacy or the adverse effect, or the commercial non-viability. Certain therapeutic specialties like oncology and Cardiovascular have a higher failure rate, and specific recombinant proteins have a higher failure rate than monoclonal antibodies.[19].

"The CRO's track record definitely has an impact on its Brand Equity" by Dr. Vishal Narang.

CRO have their own technologies, infrastructure, and tools to improvise treatment outcomes. For Example, the IQVIA world-renowned Contract Research Organization has used a cloud-based application (IQVIA Virtual Trial Solution) to manage virtual. The outcome of the clinical trial would impact the brand value of both CRO and pharmaceutical. More specifically both Indian CROs and globally renowned CROs will have to ramp up their clinical operations in terms of site monitoring, clinical data management, regulatory compliance.[20]

FUTURE SCOPE OF THE STUDY

The future studies can address the challenges of strategic alliances between pharmaceutical companies and contract research organizations. The pharmaceutical industry is facing intense pressure to bring out the new drugs to the market as blockbuster patents expires and research and development cost increases. Presently sponsor pharmaceutical company is the dominant player in the alliance between sponsor pharma & CROs and it would bear complete responsibility for success or failure of the new drug molecule or new treatment and not the CROs. There is need to investigate the alignment based on value and risk sharing and regulatory compliance between the CRO's and the pharmaceutical companies.

MANAGERIAL IMPLICATIONS AND CONCLUSION

The Pharma industry spends many resources in drug discovery, but it does not translate into an increase in new therapeutics. The outsourcing to CRO helps in optimally allocating the resources. The alliance between a sponsor and CRO has both benefits and risk-associated partnership. The prevalence of different languages spoken across the country compounds the problem of informed consent for clinical trials. There is a greater responsibility on CROs to protect the integrity of the vulnerable population.[21] India has a large generics industry which gives opportunities for the growth of CROs. The regulatory approval process has become increasingly stringent for clinical trials to be conducted in India. The motive is to safeguard the wellbeing of participants recruited for clinical trials. The successful alliances between pharmaceutical companies and CRO can create a culture of innovations in research and development in India.

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RESEARCH ARTICLE

IMPACT OF COVID-19 LOCKDOWN ON PHYSICAL AND MENTAL HEALTH OF 5-12 YEARS OLD CHILDREN; FROM PARENTS' PERSPECTIVE: A CROSS-SECTIONAL STUDY

---Physical and Mental Health of Children during COVID-19 Lockdown: Parents' perspective

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ABSTRACT

The COVID-19 pandemic has forced children to spend increased amounts of time at home resulting in adverse effects on their physical and psychosocial wellbeing. Parents need to be aware about the changes in the mental and physical health of the children.

OBJECTIVES:

To identify the physical and mental health problems the children are facing because of the lockdown and to assess the awareness of such problems amongst the parents.

DESIGN:

A cross sectional online survey was conducted to assess the impact of COVID-19 on physical and mental health of the children from parents' perspectives.

SETTING:

Mumbai, Maharashtra, India

MAIN OUTCOME MEASURE:

Parent reported questionnaire.

RESULTS AND CONCLUSION:

There was a significant increase in the number of hours spent on mobile phones, sitting, and sleeping during the lockdown as compared to before the lockdown whereas the number of hours spent on physical activity significantly decreased and also impacted their mental health. By taking part in the survey, the parents of the children became aware of the changes occurring in their child. These findings can guide immediate programmatic and policy efforts to preserve and promote child health during the COVID-19 outbreak and crisis recovery period, and to inform strategies to mitigate potential harm during future pandemics.

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KEYWORDS

COVID-19, lockdown, physical activity, mental health, children

INTRODUCTION

The tragic COVID-19 pandemic 'has collateral effects extending beyond direct viral infection,' said Myles Faith, PhD.

The psychological resilience of the Indian masses is increasingly being tested due to the pandemic of Corona Virus (COVID-19). The international focus has mostly been on testing, finding a cure and preventing transmission; whereas people, including children are going through a multitude of psychological problems to adapt to the current way of life in lockdown and dread of the associated disease.

Millions of children and their families worldwide have been affected by the application of measures (school closures, social distancing) to contain the spread of COVID-19 by the government in various countries. [1] Studies have shown that children are less directly affected than adults from a health standpoint. But they risk being amongst its victims, as the children's lives have had far reaching effects. [2] Some preliminary concerning reports indicate that COVID-19 pandemic is posing considerable challenges affecting the overall health and well-being of children. The confinement measures can have indirect, downstream implications; and furthermore, these effects could have long term repercussions. [3]

As part of necessary measures, schools have been shut and this has resulted in the children not having access to physical activities (PA) in school such as physical training, recess, and travelling to/from school. [4] Social distancing measures such as the closure of playgrounds, trails and beaches; and the cancellation of youth sports and recreational classes such as gymnasts, dance, karate and judo etc. This stops children from attaining required levels of PA. [5] The children have reduced scope of interaction with their friends, and now don't have the sense of structure which is stimulated by the school setting which is crucial for good mental health. 6]Increased screen time, decreased PA, lack of concentration, anxiety and early depression is caused because of lost social interaction and lack of structured routines. Due to increased sitting courtesy of online classes and mobile phone use with no supervision, the child adopts an abnormal posture and may develop a habit of the same and may also begin to gain weight. The sleep cycle of the children has also been disturbed due to addiction towards social media. Energy and fatigue levels are affected, and the child becomes irritable. [7] The effect of physical exercise on mental health is well established in the literature, so the absence of physical health may in turn impact cognition and the confidence of the child, again adding to their mental stress. [8]

Although child health experts have already warned about the devastating effects of such behaviours, the evidence showing these negative effects is scant. [9] It is unclear how PA participation among school-going children have been affected by COVID-19 related lockdown, closures, cancellations, and restrictions. [10] New behavioural habits of physical inactivity during the lockdown that are extremely difficult to change have been adopted by children and when pandemic-related school closure and sports day cancellations end will have a great impact. Brief changes in physical behaviour may become perpetually established in later childhood and adulthood, leading to greater risk for serious health conditions. [11]

Due to increased amounts of time spent at home the parents need to be aware about the changes in the mental and physical health of the children. Investigating by way of the questionnaires from the parents' perspectives will allow us to understand the level of awareness that the parent has of the impact of COVID-19 lock down on the health and wellbeing of the child. The study might help them to understand their child's physical, emotional, and social needs better so that they can make necessary changes to have a healthy relationship; and conducive physical and mental environment in the house for promoting their child's health and behaviour. As the primary caregiver they will have a positive impact on the young minds.

This study, thus aimed to survey the effects of the COVID-19 pandemic lockdown on physical and mental health of school-going children. These findings can guide immediate methodological and strategic efforts to conserve and encourage health during the COVID-19 pandemic and crisis convalescence period, and to design policies to reduce the possibility of harm during future pandemics. The specific objectives outlined of the study are as follows:

1) To identify the physical health problems the children are facing during the lockdown.
2) To identify the mental health problems the children are facing during the lockdown.
3) To assess the awareness of such problems amongst the parents.

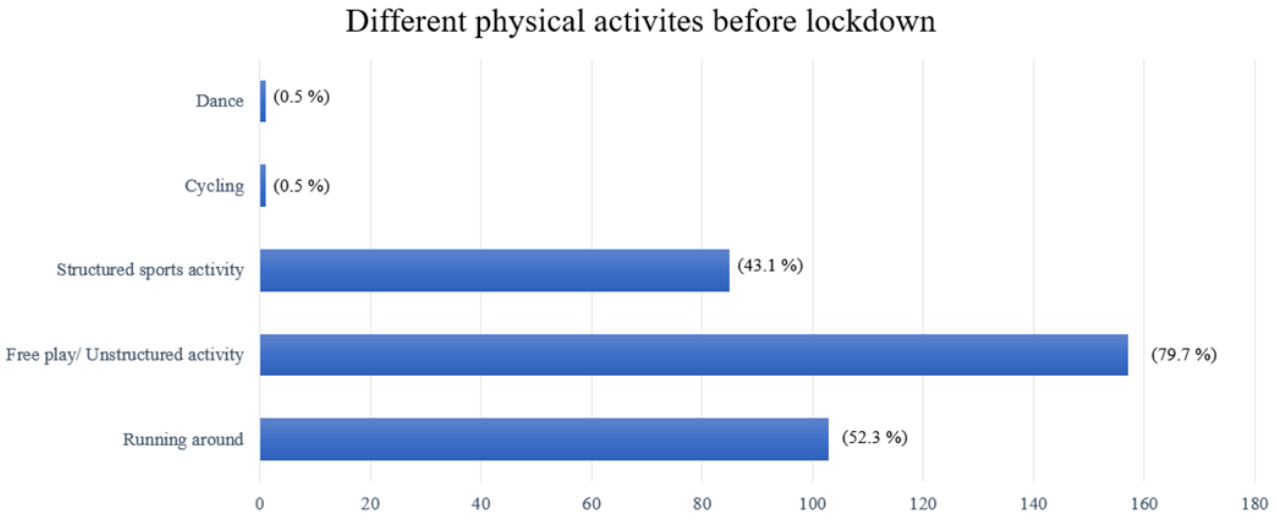
METHODOLOGY

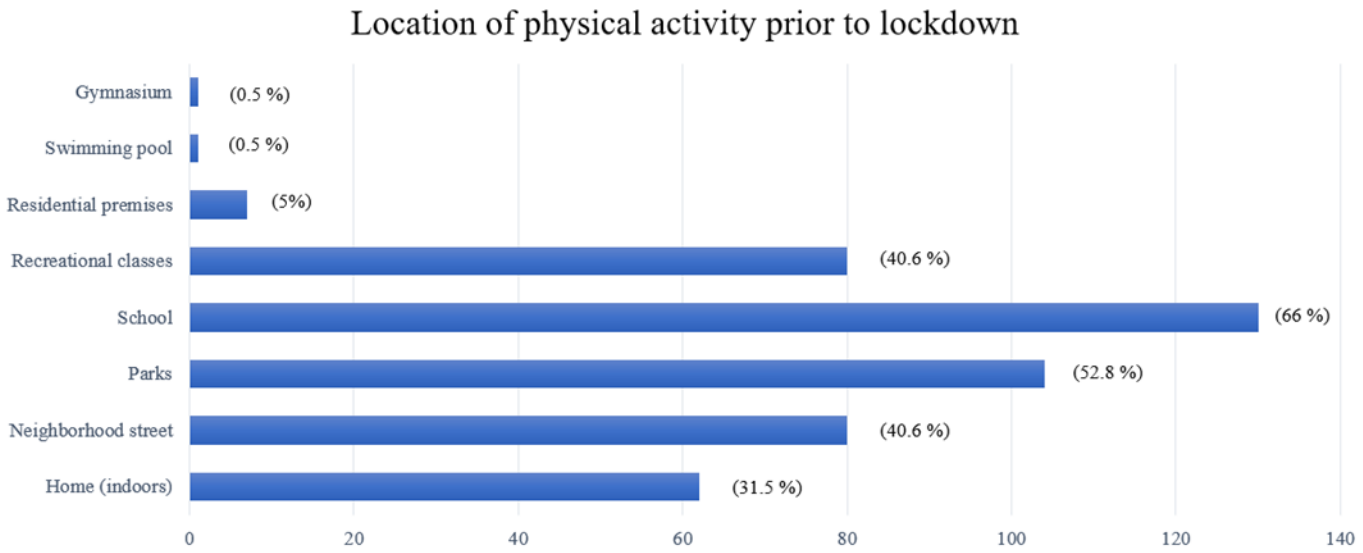
A cross sectional survey was designed to analyse the impact of COVID-19 on the physical and mental health of children. We collected data using an online survey platform to avoid face-to-face or physical interaction (Study period: January 2021 to February 2021). Potential respondents were invited through social media platforms and after obtaining informed e-consent were directed to fill in a google-form. Participation in the study was voluntary and anonymous. Parents/legal guardians of children of the age group 5-12 years of either gender; able to speak and read English; and currently staying with their child were included. Exclusion criteria was set as (a) refusal to participate in the study, (b) child with any congenital or acquired physical health problem or mental illness, or (c) parents themselves had any psychiatric or cognitive issues based on self-report. A non-randomized convenient sampling method was used to recruit the target population living in India. Sample size was not calculated before conducting the study, but maximum participation was desirable and anticipated owing to the current social relevance of this topic.

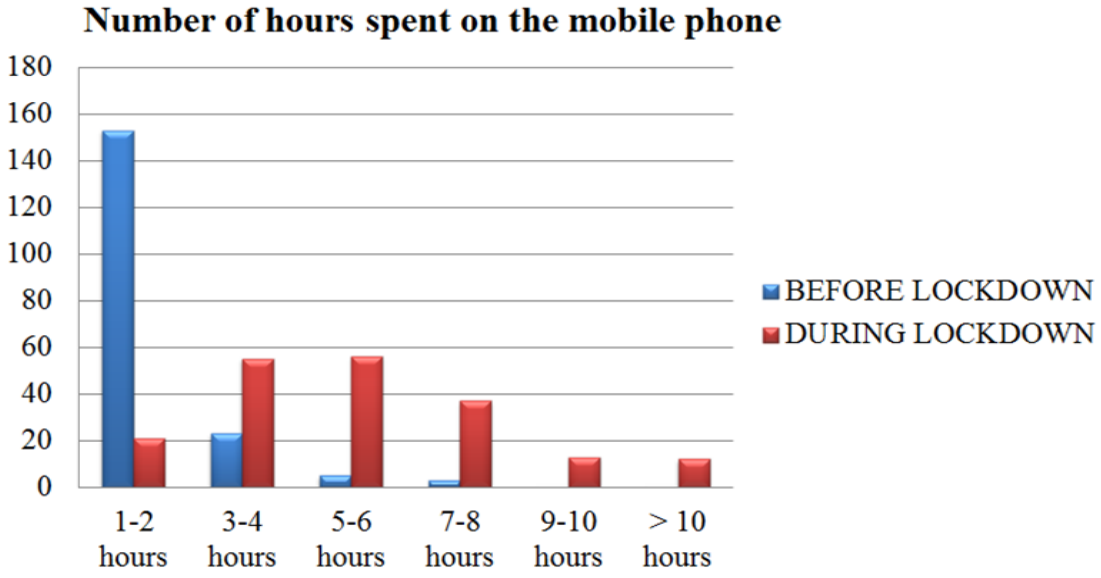
A semi structured questionnaire was developed with several open and close ended questions to examine the effect of lockdown on the mental and physical health of the children from parent-reported changes. PA characteristics were assessed using variables like the child's current level of PA; location of PA; and, the quantity and pattern of sleep; and use of digital devices. The rates of use of remote and streaming services for PA were also identified. Any mental health issues and emotional problems newly emerged or aggravated during lockdown were also enlisted. Another objective was to determine the level of awareness amongst parents about the importance of PA for the child. From pre COVID-19 and during lock down periods parents reported observable changes in physical and emotional behaviour, which were then analysed.

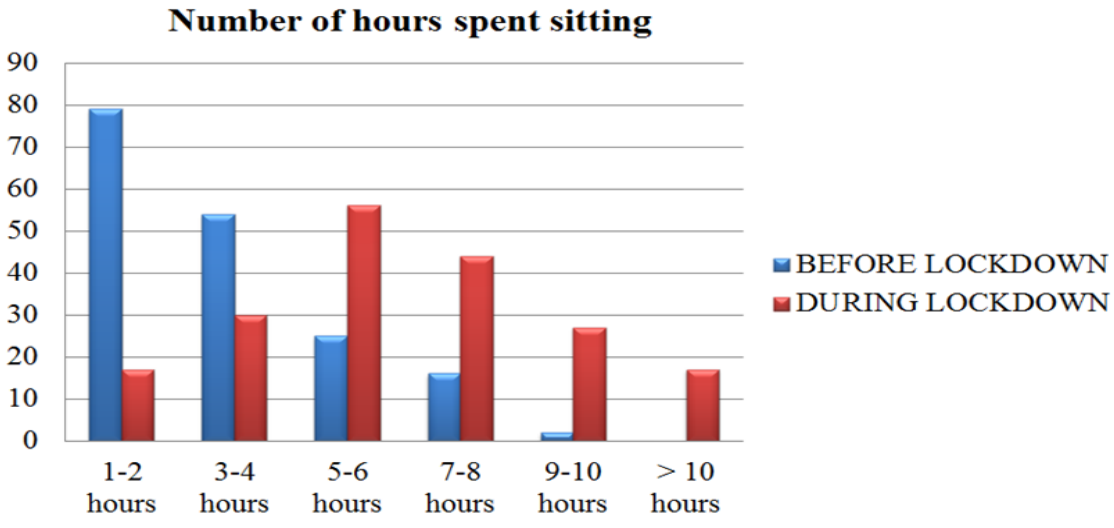
RESULTS

A total number of 197 children participated in the study. The mean age of the participated children is 9.52 with a standard deviation of 2.34.

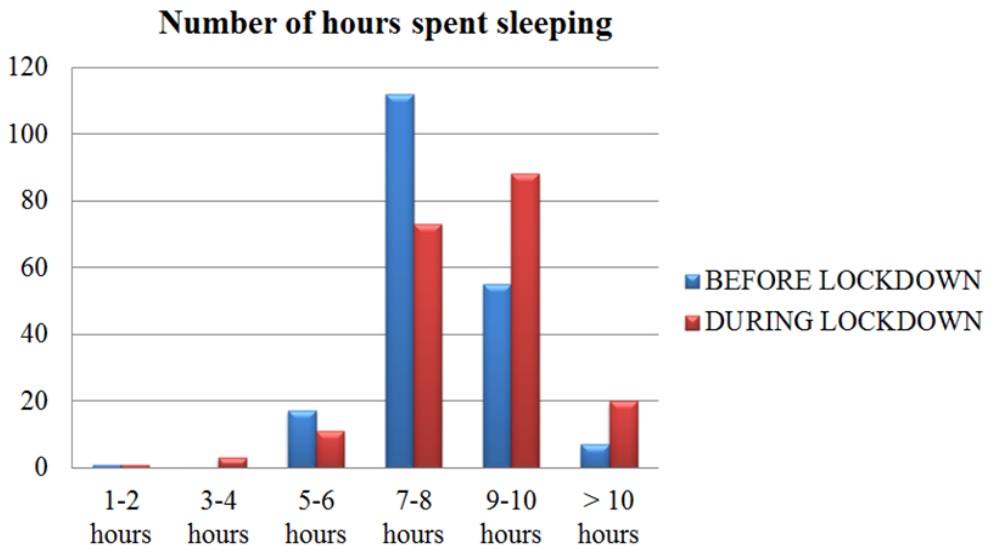


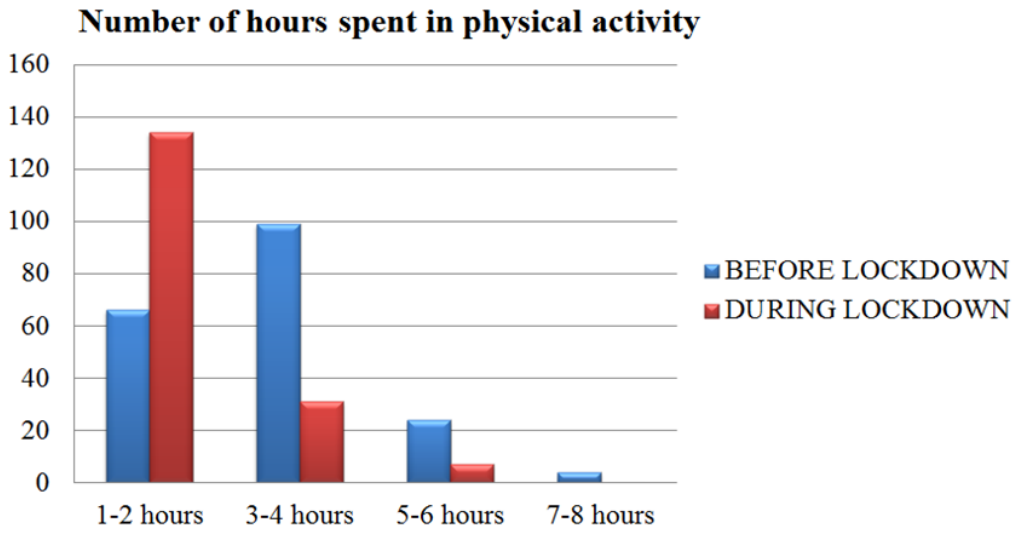

Location of physical activity prior to lockdown
Gymnasium
(0.5 %)
Swimming pool
(0.5 %)
Residential premises
(5%)
Recreational classes
(40.6 %)
School
(66 %)
Parks
(52.8 %)
Neighborhood street
(40.6 %)
Home (indoors)
(31.5 %)
0
20
40
60
80
100
120
140


Number of hours spent on the mobile phone
180
160
140
120
100
80
60
40
20
0
1-2 hours
3-4 hours
5-6 hours
7-8 hours
9-10 hours
> 10 hours
BEFORE LOCKDOWN
DURING LOCKDOWN

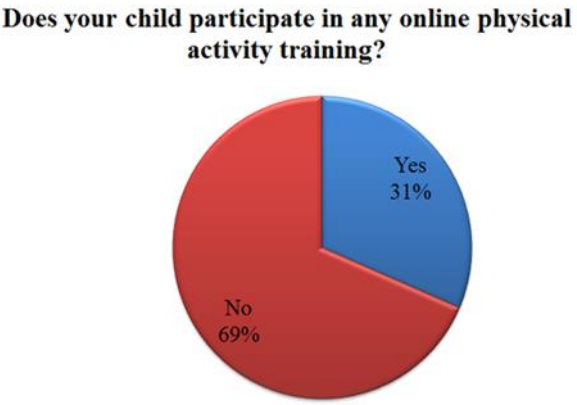

Number of hours spent sitting
90
80
70
60
50
40
30
20
10
0
1-2 hours
3-4 hours
5-6 hours
7-8 hours
9-10 hours
> 10 hours
BEFORE LOCKDOWN
DURING LOCKDOWN

:



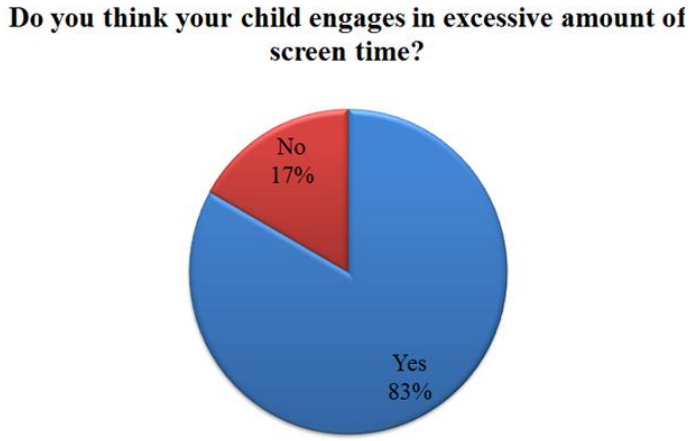


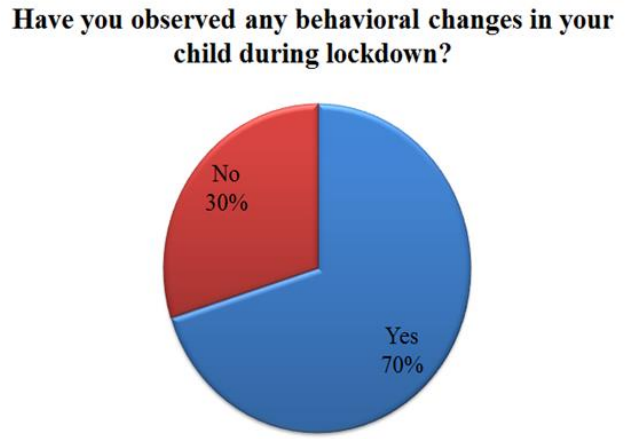
There was a significant increase in the number of hours spent on mobile phone from 1-2 hours to 3-6 hours, number of hours spent sitting idly from 1-2 hours to 5-6 hours, and hours spent sleeping increased from 7-8 hours to 9-10 hours during the lockdown as compared to before the lockdown whereas the number of hours spent on physical activity was significantly decreased from 3-4 hours to 1-2 hours.

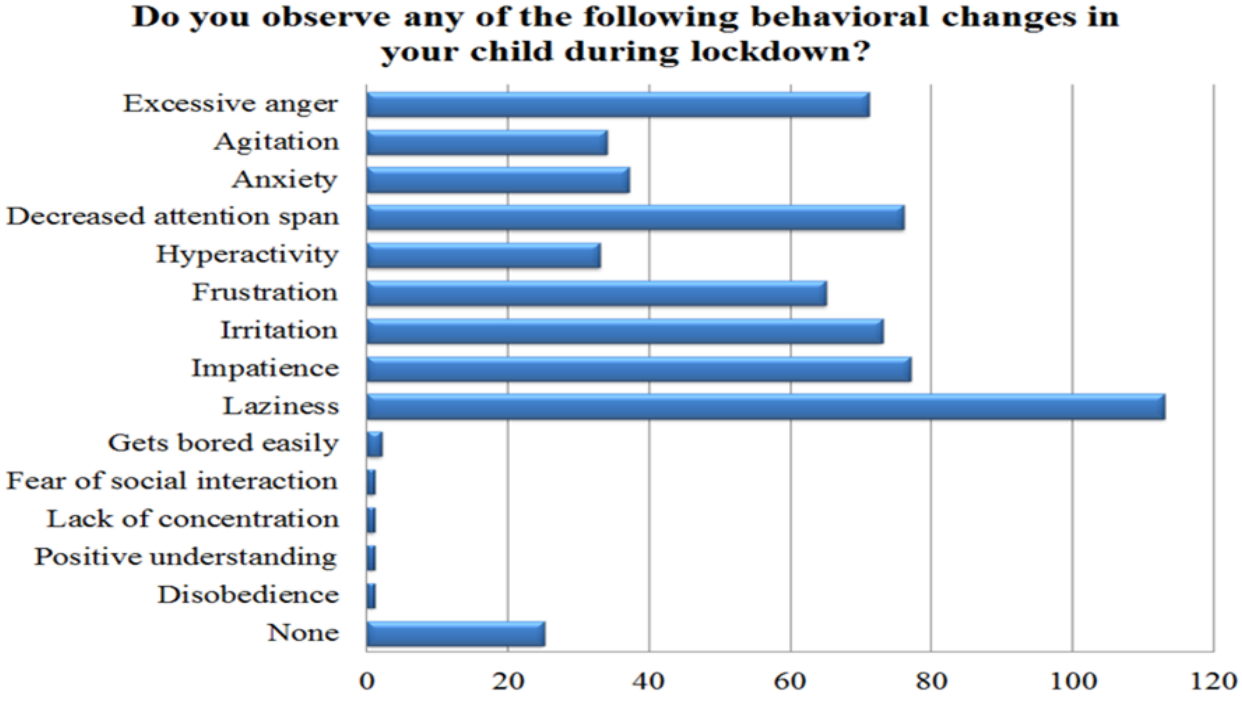


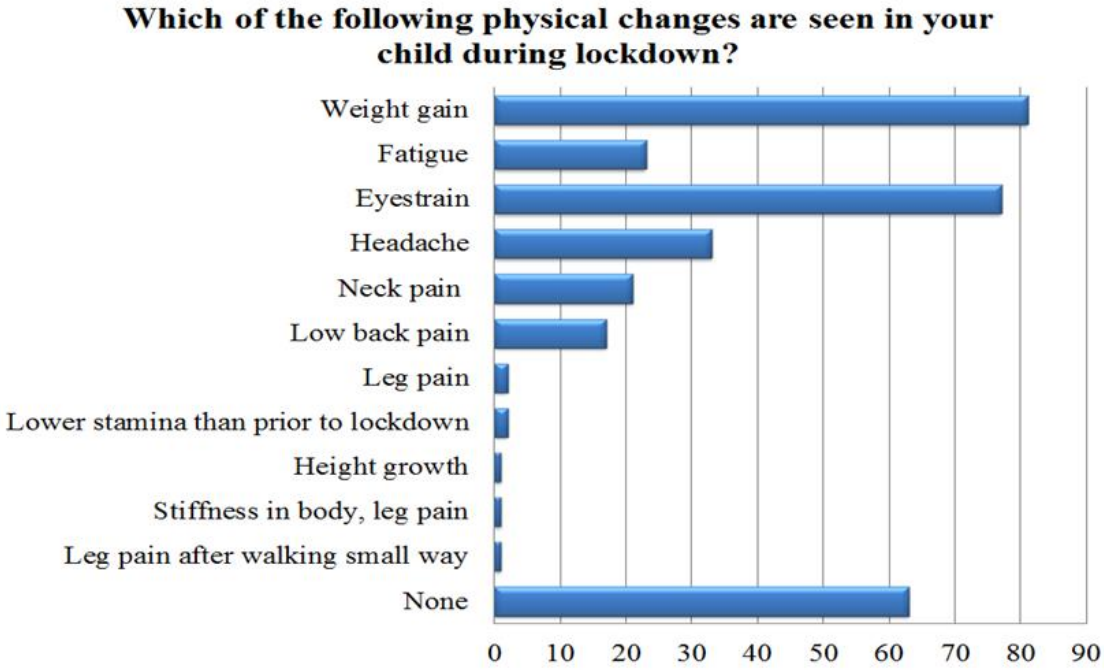
It was observed that 69% of the children do not participate in any online physical activity training.

83% of the children engage in excessive amounts of screen time.



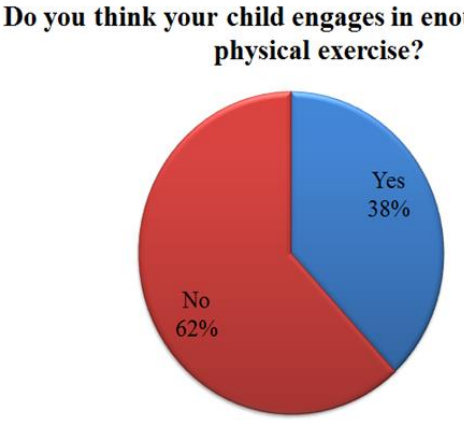




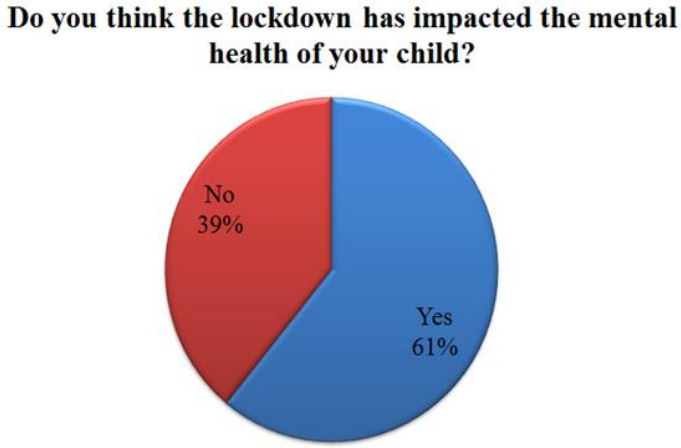


70.8% of the respondents reported behavioural changes in their child. The major behavioural changes were laziness (57.4%), impatience (39.1%), irritation (37.1%), decreased attention span (38.6%), excessive anger (36%), frustration (33%), anxiety (18.8%), agitation (17.3%) and hyperactivity (16.8%).

54.3% of the respondents reported physical changes in their child such as weight gain (41.1%), eyestrain (39.1%), headache (16.8%), fatigue (11.7%), neck pain (10.7%) and low back pain (8.6%).



63 % of parents agree that their children do not engage in enough physical activity.



61.5% think that the lockdown has impacted their child's mental health.

> P55: "Most of the kids might be under stress or may have been impacted mentally because they are feeling left alone".
>
> P90: "It is not possible to supervise them all the time...We need methods to keep children engaged in a healthy way".

During pandemic, some parents inculcated new hobbies and interests in their children.

> P127: "While COVID isn't a good experience for any one of us, it has definitely taught a lot of things to every age group and has made people think "Out of The Box". Sitting inside and playing video games and on mobile phones or watching online platforms were easy options; but not the only options to keep yourself engaged."

By participating in this survey, the parents are now more observant and are sensitized about the increased amount of screen time by their children, be it online education or playing games or social media. From the perspective of parents.

> P47: "It helped me to analyse the change in my child."
> P129: "By answering this survey I realized how much time my child spends on screen time."
> P141: "It's an eye opening for a parent that along with physical health, mental health should also be taken into consideration."

While appreciating the relevance of this research study in the current situation, parents perceived the benefit of participation as:

> P87: "We look forward to it creating a right impact on our lifestyle!"

While unanimously appreciating the need for physical activity for their children, some parents expressed the need for more information and guidance in this regard.

> P75: "Kindly organize a webinar to create awareness of all the side effects of online school to children"
> P114: "There should be some measures taken by the government for mediation for children."

DISCUSSION

In this sample of school-going children, there were significant perceived declines in children's PA as reported by parents. A different pattern in terms of location of PA, type of PA along with other variables may represent a unique trend observed during the COVID-19 pandemic. One of the most unique findings to come out of the study could be the percentage of children who had begun using remote and streaming services to engage in PA during the COVID-19 period representing a significant departure from how children were typically accessing organized PA prior to the pandemic.

Parents unanimously mentioned that school closure has been the major factor and has affected the physical activities of their child. Studies conducted prior to lockdown have identified that children are engaged more in sedentary time and reduced levels of PA on weekends as compared to weekdays. Children tend to put-on weight during holidays, especially those who are not enrolled in recreational activities and summer camps. [5] It can be hypothesized that there may be vast repercussions on children's overall physical health during the prolonged lock down situation because of school closure lasting a year or more. With a rise in inactivity and disrupted sleep schedules/quality in children during the COVID-19 lockdown there have been disrupted behaviour across 24-hour day. In a national survey, only 4.8% of children were meeting combined movement behaviour guidelines during COVID-19 restrictions. [12]

Also, various mental health issues were identified. Parents reported that in online education the kids are losing concentration and focus. Because of the limitations in physical activity, the children are unable to channel their energy which could have created an adverse impact on the psychological state of the child. Confinement measures and changes in daily routine have shown to negatively affect parents' psychological dimensions, thus exposing children to a significant risk for their well-being and psychological maladjustments.

We acknowledge several limitations of this study. The results of this survey are specific to the population of school going children. The results are not applicable to children with physical or mental disabilities who may have had a different experience during the lockdown. Family structure and dynamics such as number of siblings, nuclear or joint family, parents' working status, etc. will have an influence on the child's behaviour and was not analysed in the present study. This study did not consider the effects of a child's dietary habits and nutrition on their physical and mental health.

Asking parents to report on children's PA and sedentary behaviour was necessary for the youngest children in the

sample (e.g., ages 5–7 years) who may not yet have the reading or cognitive capabilities to reliably report for themselves. However, parents may be less aware of the amount of time their middle-school children (e.g., ages 9–12) are spending on activities even when both children and parents may be at home together due to the pandemic. Along these same lines, asking parents to compare their children's late-COVID-19 (Jan–Feb 2021) PA and sedentary behaviour levels to their pre-COVID-19 (February 2020) levels may introduce some reporting error and biases because most school-aged children were not in their parents' presence during school hours in February 2020. Also, some parents with essential jobs working out of the home and parents who were working full-time at home during the early-COVID-19 period may not have an accurate representation of how much time their children were spending in each type of activity. Furthermore, parents' levels of physical activity were not assessed, so it cannot be determined how children may be role-modelling their parents. Lastly, the survey respondents were mainly more highly educated parents with higher household income levels. Findings may not extend to children whose parents have not attained a college degree or who reside in lower income households. It will be useful for future research on the impact of COVID-19 on children's PA and sedentary behaviour to collect data from a more diverse sample and among lower income families.

MANAGERIAL IMPLICATIONS FOR THEORY AND PRACTICE

The immediate collateral effects of the COVID-19 outbreak on children that may arise indirectly because of lockdown are affirmed by this survey. These detrimental consequences and downstream implications should not be ignored.

Considering children, the upcoming risk accounts for suggesting specific modifications and types of activities to ensure maintaining health, at least partly, by physiological balance and physical fitness and avoid the occurrence of new unhealthy habits or routines that young people could retain after lockdown. [14] An understanding of the issues is essential for those who hope to advocate effectively for children to prevent irreversible damage to the adults of the future.

Overall, this study results emphasize the need for urgent attention and directed efforts to enable parents and children to both adequately respond to the pandemic and ensure optimum health of the children. Program and policy strategies should be directed towards developing prevention programs to attenuate the indirect impact of COVID-19 pandemic on children's wellbeing and to avoid persistent lifelong changes in behaviour extending beyond the duration of the COVID-19 lockdown. Public health measures must therefore balance the effects of pandemic restrictions against the risk of negative health effects in children.

Using the socio-ecological model, policymakers, educators, parents/guardians, healthcare providers, and community organizations can identify and implement simple, enjoyable, and creative strategies to increase physical activity, decrease sedentary behaviour, and promote optimal sleep-in order to preserve health in children and adolescents during the COVID-19 pandemic and to mitigate potential harm during future pandemic. Financial resources can be directed towards health promotion campaigns/advertisements via social media.

Parents should be sensitized about the physical and mental needs of their children which are age appropriate, and they should be equipped with strategies which will negate these damaging effects. According to WHO recommendations, children and adolescents aged 5 to 17 years should engage in at least 60 minutes of moderate to vigorous intensity physical activity every day for example, aerobic exercises like jumping, spot running or dancing. Keeping this in mind, parents can devise a daily routine plan for their child and incorporate enough opportunities to play, read, rest and engage in physical activity.

School authorities can reinforce the need for physical activity such as Zumba and aerobics and incorporate them during online classes. This can bring a sense of regularity in the child. Teachers also have a role to play in the promotion of mental health. They can teach simple exercises, including deep breathing, muscle relaxation, and positive self-talk. They can conduct creative online academic and non-academic sessions by making their classes more interactive, engaging students in the form of quizzes, puzzles, small competitions to break the monotony of the online classes. They can ask the students to keep their videos on and make correct their postures hence keeping them alert.

In summary, this study explores the physical and psychological effects, emphasizes the role of parenting

and education, and guides to offer practical advice about how best to provide support as a healthcare professional.

IMPLICATIONS FOR RESEARCH

Interventional studies targeting physical activity and mental health could be conducted in children to determine if the negative impacts of lockdown could be nullified. The study can be extended to rural areas.

CONCLUSION

This study provides preliminary evidence in the wake of the COVID-19 pandemic and has shown that social restrictions to contain the spread of the virus have disrupted behaviours across the 24-hours day with decrease in PA, increase in sedentary behaviour, and disrupted sleep schedules/sleep quality in children. The confinement measures can have indirect, downstream implications; and furthermore, these effects could have long term repercussions. The parents of the children are not fully aware of the changes occurring in their child and need professional support and guidance.

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CONFLICTS OF INTEREST: The authors declare that they have no conflict of interests.

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RESEARCH ARTICLE

WORK FROM HOME, MENTAL HEALTH AND EMPLOYEE NEEDS: A PILOT STUDY IN SELECTED INFORMATION TECHNOLOGY ORGANIZATIONS IN INDIA

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ABSTRACT

INTRODUCTION:

The Coronavirus (COVID-19) pandemic has impacted the economy and has resulted in changes to the working arrangements of employees who are based at home and may continue to work from home (WFH). Organizations are expected to develop an inclusive policy for their employees to promote mental health whilst working from home. The aim of this study was to document the impact of WFH on mental health and determine the expectations of employees from their organizations regarding occupational health policy.

METHODOLOGY:

A cross-sectional study was conducted on the impact of work from home on mental health and to document the mental health support needs of employees. Google form was floated through social media platform to receive the responses. A total of 74 responses were received. Descriptive analysis was conducted using Microsoft Excel, while qualitative answers were manually analysed.

RESULTS:

About 67% employees (n=45) mentioned that their workload has increased significantly during work from home. Thirty five percent (n=26) felt lonely and lost and 47% (n= 34) felt disconnected from the real world, indicating the mental health impact of work from home. Fifty three percent employees (n=40) mentioned that there were no efforts made by their organization to reduce the mental health impact of work from home.

CONCLUSION:

The results of this study indicate that there is an urgent need to create a comprehensive occupational health and safety policy inclusive of strategies to improve mental health by the organizations in light of "work from home" as a "new-normal".

KEYWORDS

Work-from-home, Mental health, COVID-19, Occupational health and Safety.

INTRODUCTION

COVID-19 began as an unprecedented global health challenge but quickly transformed into a development crisis. [1,2] Governments across the world implemented a range of measures to contain the spread of the virus. [3] Stringent measures like lockdowns and limitations on travel were adopted as the primary strategy to save lives, but they came with huge socioeconomic ramifications. The pandemic has changed the fundamental principles of work globally with over 400 million full-time jobs were lost in the second quarter of 2020. [4] In terms of work environment, employees who are working in the sectors where remote working is possible, home has become the new workplace and will be a long-term scenario given the potential circulation of COVID-19 virus in the community. [5,6]

Work from home (WFH) is not a new concept in the world of work. WFH, however, was widely accepted in the IT sector in the early 2000s with improved internet connectivity; when workers could easily WFH to avoid commuting, provide flexibility in schedules, and achieve a better work-life balance. [7] In recent times, WFH has become easier with the help of new emerging technology that has revolutionized the work pattern significantly. [8, 9] There are certain noted benefits of WFH. It saves the time required for daily commuting, offers more flexibility for employees to manage family time. WFH also allows employees to work flexibly when they are most productive and also reduces distractions by the co-workers. [7, 10-11] The negative impact on health, especially mental health due to certain issues such as blurring boundaries between work and family, extended work hours, lack of social interaction and limited support from the organization cannot be neglected. [12] In light of current pandemic, when individuals are reacting through a sense of fear, anxiety, loss of connection with society, [13] the new reality of changing pattern of work can further affect the mental wellbeing of individuals.

Although limited, the available literature indicates the complexity of WFH impact on employee's wellbeing. Employees appear less connected; projects take longer to be completed. In addition to this, lack of separation between work and life, along with continuous communication and long work hours are the top workplace stressors. [14] Another article suggested that physical and mental wellbeing was significantly affected with WFH and was associated with several influencing factors such as exercise, increased food consumption, lack of communication with co-workers, distractions while working, changed work hours and lack of proper workstation set-up. [15]

Thus, while work from home has been proven as a successful model to reduce transmission of the COVID-19 among the working population and protecting physical health of the population, emerging evidence has indicated that it leads to several mental health related issues such as blurring of boundaries between work and personal life, unequal burden of work and rising stress. [15] Investigating the mental health impact and expectations of employees to improve the mental health wellbeing during WFH is highly required in recent times. Especially employers need insights on how to provide best working environment to their employees to avoid negative impact of WFH and to improve the work productivity. Against this background, the present paper seeks to understand the mental health impacts of working from home among a cross-section of population who embarked on working from home in India.

METHODS

Study Design, setting and participants: This study used cross-sectional study design to elicit the information from the participants. The study was set in India. Participants of the study are from several states of the country. The inclusion criteria was a) working in the field of IT b) working from home for minimum of 3 months C) providing verbal consent to participate in the study. The exclusion criteria were a) those who are currently not working in the IT sector b) those who refused to give consent to participate in the study.

Study Instrument: The study instrument was anonymous, online questionnaire developed using the google forms. The questionnaire included questions on demographics of participants, history of WFH, perception about self-mental well-being during WFH, organizational initiatives to provide comfortable work environment and their expectations from the organization to further reduce the negative impact of WFH on mental well-being. Questions related to demographics of participants were of multiple-choice nature. Likert scale questions were asked to understand the mental well-being of participants. In addition to these closed ended questions, one open ended question was

also included to understand the impact of WFH on the mental health of participants. In order to elicit the information regarding the efforts made by the organization to maintain the well-being of participants and their expectations from the organization, open ended questions were included in the questionnaire. The average duration to complete the total questionnaire was about 12 to 15 minutes per participant.

Ethical considerations: Participation in the study was voluntary. Oral consent of participants was sought before sending the questionnaire. All the data was collected anonymously. Participants were assured that the data will be strictly used for research purpose and will not be exposed to any other purpose.

Data Collection: Participants were recruited through emails and social media platforms, with snowball sampling used to extend the recruitment process. Eligible participants were identified by an initial screening question based on the inclusion criteria and their willingness to participate in the study. A total of 107 responses were received to this initial screening, of which 21 did not want to participate in the study, while 12 did not complete the screening questionnaire. Thus, a total of 74 participants were recruited in this study. The link for google questionnaire was provided to these participants after the oral consent was sought. The response was automatically received by the authors. The data was collected in the month of March 2021.

Data analysis: Data obtained through the closed ended questions was analyzed using Microsoft excel. Likert based questions contained the options such as 'Strongly agree', 'Agree', 'Neutral', 'Disagree', and 'Strongly disagree'. While some questions have the options such as 'Always', 'Almost always', 'Sometimes', 'Almost never' and 'Never'. Descriptive statistics was used to describe the mental well-being of participants based on these Likert scale-based responses. The data obtained through open ended questions was analyzed manually to understand what do the participants feel about the efforts taken by their organization to improve the mental health as well as their expectations from the organization to further improvement.

RESULTS

DESCRIPTION OF PARTICIPANTS:

Table 1 describes the general characteristics of the participants. Out of total sample (n=74), there were 58% males (n=43). About 51% of the total sample belonged to age group of 31-40 years (n=38) while 59% (n=44) were married. It was seen that 30% (n=22) and 46% (n=34) of the participants were junior level and mid-level management employees respectively. When the question related to how long they are working from home was asked, almost 56% (n=41) mentioned that they were working from home only during the COVID-19 pandemic. All senior level employees on the contrary were working from home regularly even before the pandemic

TABLE 1: GENERAL CHARACTERISTICS OF PARTICIPANTS

DESCRIPTION	NUMBER (%)
Total sample	74(100%)
Sex	
Male	43 (58%)
Female	31 (42%)
Age	
21-30 years	26 (35%)
31-40 years	38 (51%)
41-50 years	10 (14%)
Marital status	
Single	25 (34%)
Married	44 (59%)
Divorced	5 (7%)
Designation in the current organization	
Junior level	22 (30%)
Middle management	34 (46%)

Senior level	18 (24%)
Years of experience	
Less than 5 years	19 (26%)
6-10 years	21 (28%)
11-15 years	24 (32%)
16 years and more	10 (14%)
Working from home since	
1-3 years	26 (35%)
More than 4 years	07 (9%)
Only during COVID-19 pandemic	41 (56%)

PERCEPTION OF PARTICIPANTS TOWARDS WORK FROM HOME:

As table 1 shows that WFH was comparatively new experience for 56% (n=41) employees, this section describes the overall perception of participants towards WFH. Fig.1 shows the perception in terms of efforts from organizational level and perceived impact on performance and personal life. The results show that almost 73% participants (n= 54) who reported being strongly agree and agree that the organization made the transition from office to WFH easy and smooth. Although 67% employees (n=50) replied being strongly agree and agree that WFH increased their workload, they also strongly agreed and agreed to the fact that their quality of work was better due to WFH (n= 35, 47%). While 96% highly agreed to the fact that WFH has reduced their travel time (n=71), the participants also mentioned that their physical exercise has been negatively impacted due to WFH (n= 58, 78%).

WORK-RELATED CHANGES AND CHALLENGES EXPERIENCED DURING WFH

Figure 2 describes the changes experienced by the participants both at personal and professional as they began working from home. At the professional level 64% of participants (n=47) either strongly agreed or agreed that they had become better with time management. However, when the question was asked if they could give more time to their family, it is noteworthy to see that about 13% (n=10) completely disagreed and 44% (n= 33) remained neutral. Another interesting finding was that almost 37% (n=28) of participants felt that they have no privacy while almost 28% (n=21) remained neutral for this question. Forty-seven percent (n=35) participants either strongly agreed or agreed to the statement that they felt disconnected from real world due to WFH and 30% remained neutral (n=22). Only about one fourth of the participants however used calming techniques such as meditation to manage stress and stay calm (n= 19).

FIGURE 1: PERCEPTION OF PARTICIPAANTS TOWARDS WORK FROM HOME

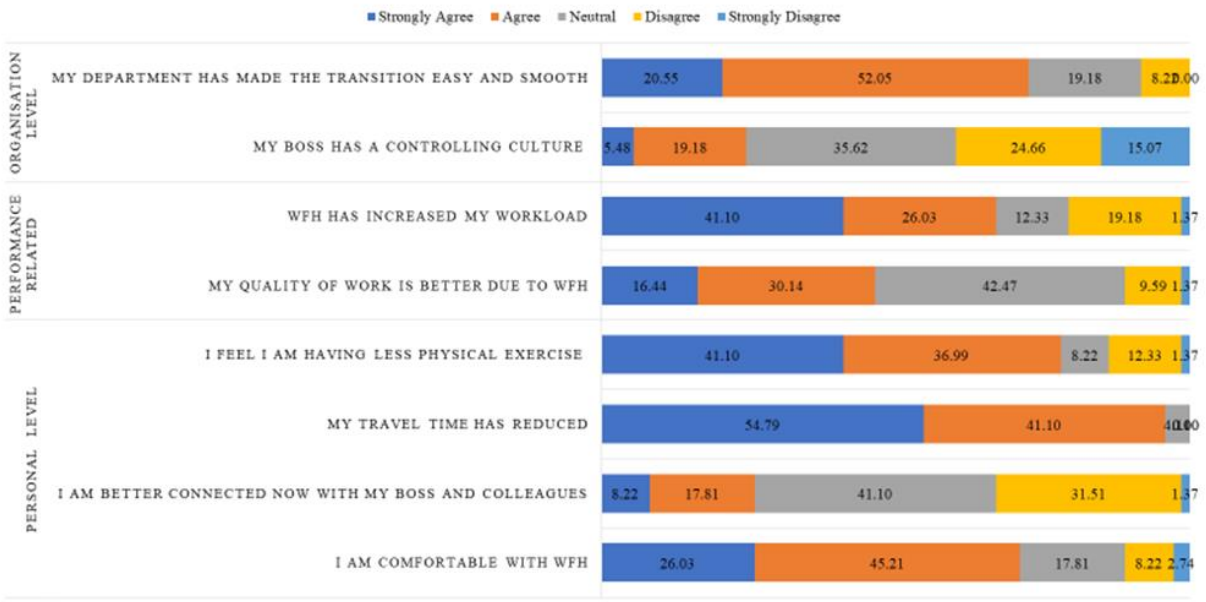
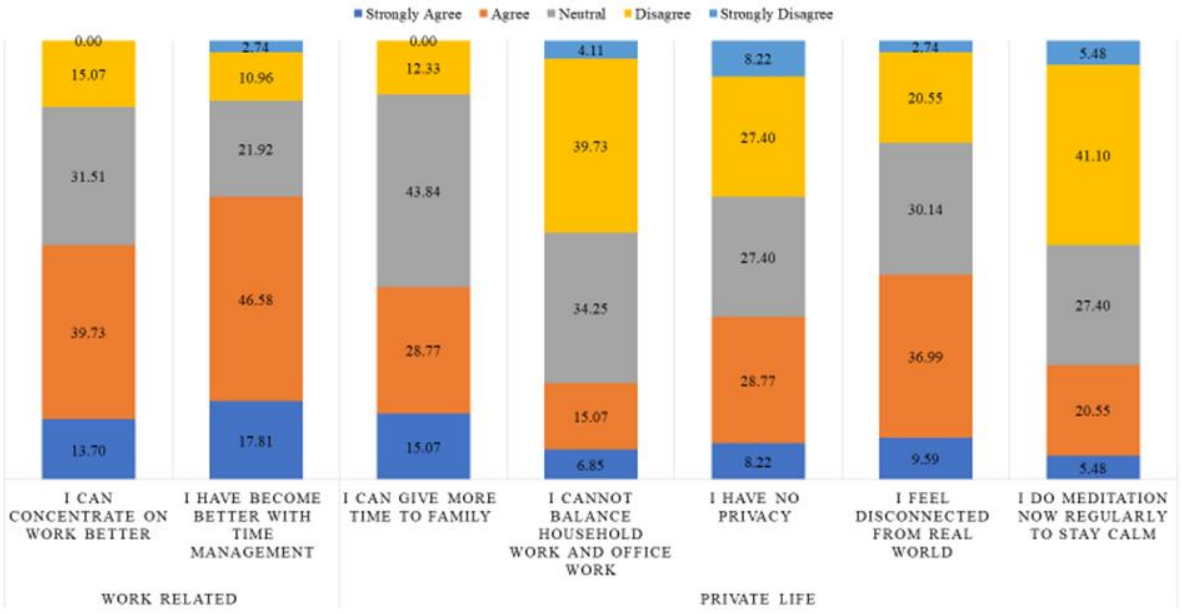


FIGURE2: WORK-RELATED CHANGES AND CHALLENGES EXPERIENCED DURING WFH



STATUS OF MENTAL HEALTH OF EMPLOYEES DURING WFH

Table 2 shows the responses noted for the questions related to mental well-being of the participants. Although there is a positive trend seen in the overall responses, the proportion of participants mentioning the occurrence of particular issue sometimes in last 30 days is noteworthy. While almost 60% (n=44) mentioned that they were most productive in last 30 days during WFH, a total of 26 participants (34%) however mentioned that they were sometimes productive during WFH as compared to earlier when they used to work from office. Similarly, in terms of negative feelings almost half of the participants sometimes felt stressed, anxious and felt angry and irritated (48% and 49% respectively), in addition to 23% and 22% (n=17, n= 15 respectively) participants who were always and almost always stressed, anxious and felt angry and irritated.

In addition to these quantitative responses, participants were also asked an open-ended question to write about the mental health impact of WFH. It was seen that more than half participants (n=60, 81%) used negative words to elicit the impact. The words which appeared frequently in the narratives of the participants include - 'stress', 'angry', 'loss of privacy', lonely', 'detached', 'lost', irritated,' social disconnect', 'absence of connect with colleagues' (Fig. 3).

TABLE 2: MENTAL HEALTH OF PARTICIPANTS DURING WFH

		ALWAYS	ALMOST ALWAYS	SOMETIMES	ALMOST NEVER	NEVER
Positive Feelings	I feel cheerful and relaxed	9.59	42.47	38.36	9.59	0.00
	I have been most productive	16.44	43.84	34.25	5.48	0.00
Negative Feelings	I feel stressed and anxious	1.37	21.92	47.95	21.92	6.85
	I feel angry and irritated	1.37	20.55	49.32	21.92	6.85
	I feel lonely and helpless	4.11	16.44	31.51	31.51	16.44

FIGURE 3: IMPACT OF WFH ON MENTAL HEALTH

TABLE 3: THEMATIC ANALYSIS OF RESPONSES OF PARTICIPANTS

THEMES	RESPONSES FROM PARTICIPANTS
Emotional issues related to family	*I don't get time to play with kids* *Lack of work-life balance, feeling of irritation*
Emotional issues related to work, engagement with colleagues	*Work preoccupies my mind, so cannot enjoy* *There is pending work, feeling of restlessness* *Loss of collective voice - management has become more demanding, more aggressive and less accommodating, less approving* *Fear of the future*
Impact on mental health	*Stressed, angry, feeling abnormal, loss of privacy, social disconnect, lonely, alone, detached,* *feel weak and lost*

Further, a thematic analysis was done of the responses received from the participants to gain a complete understanding of the additional themes which emerged in the narratives on mental wellbeing. The responses of the participants can be divided into three categories – emotional issues related to family, emotional issues related to work and engagement with colleagues and impact on mental health (table 3). It is evident from the thematic analysis that WFH caused a certain amount of mental health issues which also might have psychosomatic consequences.

ORGANISATIONAL INITIATIVES TO PROMOTE MENTAL WELLBEING OF EMPLOYEES

Although 53% of participants (n=39), reported that organisations did not take activities to ensure mental wellbeing of their employees, rest of the participants (n= 35, 47%) narrated the initiatives undertaken by their organisations to take care of their emotional wellbeing. These activities comprised of arranging sessions with counsellors, webinars on mental health, launching a helpline, conducting quiz, mind games, online gaming, meditation, stress-related workshop, frequent townhall, greater interaction with colleagues, and continuous

communication from senior officials. About 38% (n=28) of the sample were satisfied or moderately satisfied by their organisational initiatives, while and equal share of the participants also expressed displeasure and dissatisfaction about these initiatives to address mental and physical health related concerns.

EMPLOYEES' EXPECTATIONS ABOUT PROTECTION OF MENTAL HEALTH OF WORKERS

While 34% of participants (n=25) reported that they did not have any expectations from their organisations; rest of the participants have provided suggestions about how organization can ensure better employee well-being and consequently, increase performance of individuals and teams and make workplaces safer and inclusive. Some of the suggestions are; leaders should be empathetic, ensure job assurance and appreciate employees frequently, increase communication with employees, offices can organise yoga/meditation sessions over video calls, conduct webinars on motivation, for making employees feel connected, track employee well-being – conduct mental health-related surveys.

DISCUSSION AND CONCLUSION

WFH has been implemented as a part of broad public health and epidemiology measure to prevent the spread of COVID-19. Although not a new concept, the WFH was adapted rapidly all over the world and will likely remain as a long-term measure to manage physical distance required to curb the spread of infection. In light of availability of limited literature on the impact of WFH on the mental health of employees, this study aimed at documenting the mental health status as well as activities undertaken to mitigate the impact of WFH on overall health and needs of employees to further alleviate the suffering.

The results of this study commensurate with the results of several other publications which mentioned the impact of WFH in terms of increased workload, thinning the line between professional and family life and also negative impact on physical health especially in term of lack of physical exercise (15). It is pertinent to add that even though this was a pilot study; it clearly highlights the impact of the prevailing pandemic on health of the employees. However, the findings from the pilot, underscore the need, for expanding the scope of the study across the country, in order to develop a robust Work from Home policy. As mentioned in the earlier section that COVID-19 pandemic has resulted into a complex web of emotions such as uncertainty, anxiety, feeling of loneliness the changed workplace environment is certainly adding to the negative feelings by disconnecting people from each other, lack of communication with co-workers. The result of this study shows that the radical change in work environment – absence of all forms of physical interactions between colleagues - led to a sense of isolation and disconnectedness from the real world for many participants. The virtual work environment, increased screen time, the pressure to be continuously available – heightened stress, anxiety and insecurity. The cumulative effects of working virtually for a prolonged period of time had a detrimental impact on the emotional well-being of the employees.

Although certain measures were reported to be undertaken to provide better work environment by the organizations, participants expected more contribution of the organization to provide decent work (SDG 8 goal) environment while WFH. The study indicates that there should be a greater dialogue on how WFH impacts mental health of employees. Data suggests that organisations should develop a checklist to periodically monitor the physical and mental health of the employees. Periodic monitoring will help organisations gauge the actual physical and mental health needs of the employers in remote working conditions. This assessment will also help organisations to plan better interventions to reduce stress, anxiety, isolation and panic; rather than organise ad hoc, isolated events. The study also intended to see if there is any difference in the status of mental health and response to changing work space and environment as per the gender of respondents. However, there was no significant difference that was observed.

The study has few limitations. Firstly, due to its pilot nature, the sample size is small. Secondly, the COVID-19 pandemic had created restrictions for field-based data collection. This impediment in data collection made it difficult to adopt a structured sampling and get a countrywide representation. Hence, participants were selected through purposive sampling completed in online mode through social media connections. Thirdly the results of this study can be strengthened with further national investigations. In conclusion, this study highlights factors that impact employee's mental health well-being while working from home and provides a foundation to the organizations for considering how to best rework their occupational and safety management process to create a positive WFH experience.

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RESEARCH ARTICLE

DUAL IMPACT OF COMORBIDITIES AND SYMPTOMS OF CORONAVIRUS ON MENTAL HEALTH DURING COVID-19 PANDEMIC AMONG MALES AND FEMALES IN INDIA: ONLINE CROSS SECTIONAL STUDY

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ABSTRACT

BACKGROUND:

The novel coronavirus disease 2019(COVID-19) has become a pandemic affecting health and wellbeing worldwide. In addition to the physical health, economic, and social implications, the psychological impacts of this pandemic are increasingly being reported in the scientific literature. Individuals with certain pre-existing comorbidities have been identified as a high-risk group for fatalities of COVID-19 infection. Thus, this study aimed to analyse the association of COVID-19 symptoms and the presence of comorbidities with the mental health of the population during this pandemic.

METHOD:

A cross-sectional web-based online study was conducted from 13thJune to 31stJuly 2020, and link was circulated using social media platforms. Participants were of age ≥18 and residents of India were included. HERO's scale was used to assess the mental health status. A multivariate logistic regression was performed to examine associations.

RESULTS:

Out of 1021 eligible individuals (460-females, 561-males), 15.2% females and 11.2% males reported poor mental health status. The COVID-19 symptoms such as nausea, vomiting, cough, shortness of breath, runny nose, fever, and sore throat were associated with poor mental health among males, while only nausea, vomiting was associated among females. Also, the presence of any one or more comorbidities was associated with poor mental health across gender.

CONCLUSION:

Poor mental health was reported by both genders across the study population. Comorbidities and COVID-19 symptoms were significantly associated with poor mental health among males than females. These findings strongly support the need for an infrastructure to comprehend the gender-specific mental well-being as a core component of health across all the sections of Indian society.

KEYWORDS

COVID-19 pandemic, COVID-19 symptoms, Comorbidities, Mental health, India.

INTRODUCTION

Mental health issues are responsible for contributing around 13% of the global burden of disease. [1] Around 80% of people with mental disorders live in low- and middle-income countries, which account for more than 10% of the total burden of disease in these countries. Due to this mental health services are already overburdened in many countries. [2]

This pandemic has affected 152,534,452 individuals globally and India accounts for 19, 925, 604.[3] Several regulations were made in place to prevent the spread of the disease. The countries have imposed severe restrictions on movement, likewise, India also went into nationwide lockdown to prevent its spread. The COVID-19 has not impacted physical health, also mental wellbeing across the world. [4] Several psychological problems and significant consequences in terms of mental health problems including stress, anxiety, and depression during the COVID-19 outbreak have increasingly emerged. [5] Stress, anxiety, and depression go hand in hand with the COVID-19 pandemic, results from studies done worldwide has shown the increasing prevalence of mental health issues among numerous population groups. [6] Emerging data suggests the presence of comorbidities such as heart disease, hypertension, diabetes, kidney failure, liver, cancer, asthma, and tuberculosis are often associated with an increase in severity and poor prognosis in individuals with positive COVID-19 infection. [7] Restrictions such as isolation, quarantine, and work from home, social distancing have also influenced mental wellbeing. [8]

While everyone is following social distancing and preventive measures amid lockdown, there is an add-on responsibility for people with co-morbid conditions to take the utmost self-care and manage these conditions effectively at home and avoid the risk of COVID 19 infection. [9] Further, the disease outcome for the COVID-19 infection is widely related and associated with the presence of comorbidities Thus, it is reasonable to anticipate that individuals with comorbidities such as hypertension, diabetics, and heart disease will face mental health problems such as anxiety, depression, and increased stress. [8] All available evidence states that the existence of comorbidities is associated with a poor outcome with COVID-19 infection.[10] The authors hypothesized that those with comorbidities along with the symptoms of COVID-19 will report more mental health problems during this pandemic than those without the co-morbidities or COVID 19 symptoms.

The most common symptoms of COVID-19 infection as notified by the Centre for Disease Control and Prevention (CDC) are fever, cough, cold, nausea, vomiting, and diarrhoea. The infectious disease outbreak of the COVID-19 (coronavirus) pandemic has had a significant impact not just on the physical health but also on the psychological well-being of communities. [11] This psychological impact is likely to affect the well-being of the individual and community and could persist long after the pandemic. [12]

Looking at the current scenario there is a need to understand the existing mental health problems among the population in the presence of comorbidities and COVID-19 symptoms. This study aimed to assess the association of the presence of comorbidities and COVID-19 symptoms with mental health outcomes among Indians during this pandemic.

METHODOLOGY

STUDY DESIGN AND PARTICIPANTS RECRUITMENT

A cross-sectional study was designed to assess the impact of comorbidities and COVID-19 symptoms on the mental health status of the Indian adult population. Face-to-face interviews during the pandemic time were not feasible, therefore, data were collected using a web-based snowball sampling method. The link was shared via social networking sites such as Facebook, LinkedIn, Instagram, Healis website, via email, and through WhatsApp. RedCap ('Research Electronic Data Capture') which is a secure web application for building and managing online surveys and databases (13) was used for data collection. All individuals 18 years and older who are residents of India were eligible to participate in the study. Online written consent was obtained from all the participants before they participated in the survey. The study was approved by Healis Institutional Ethical Committee (IEC).

DATA COLLECTION TOOL

The survey questionnaire comprised 31 close-ended questions which took around approximately 20 minutes to complete the survey. The questions were split into sections such as demographics, symptoms of COVID-19, comorbidities, physical activity, dietary habits, tobacco use, alcohol use, mental health, COVID status, and family

composition during the pandemic. The Mental health was measured using a reliable and validated HERO's scale questionnaire (14) which contained the following questions:

Hero's scale
1. I had disturbed sleep often since last 2 months
2. I felt physical pain often since last 2 months
3. I am worrying often since last 2 months
4. I feel sad often since last 2 months
5. I feel angry often since last 2 months
6. I feel tired since last 2 months
7. I feel stressed often since last 2 months

DATA COLLECTION PROCEDURES

The online survey included a short overview of the study context, purpose, eligibility criteria for the participants, consent form, and directions for answering the questionnaire. Clicking on the survey tab automatically led respondents to the study overview and informed consent page. The survey link was active on the various portals from 13th June to 31st July 2020 and 1291 individuals participated in the survey. A total of 270 individuals were excluded from the study, the common reasons being 141 missing values in the data, 126 used duplicate email ids, and 3 other gender. Thus, 1021 participants were included in the final data analysis.

DATA ANALYSIS

To subject the collected data for further analysis the study variables were recoded accordingly. In this study, age was recorded as a continuous variable but for analysis, purpose recoded as 18-25 years, 26-35 years, 36-45 years, 46-55 years, and above 55 years. The income variable was as monthly income below Rs.60, 000 and above Rs.60, 000 (11 participants did not reported income). Symptoms of COVID-19 were recoded as no COVID symptoms and any one or more COVID symptoms (Fever, Cough, Shortness of breath, Sore throat, Runny nose, Nausea, Vomiting, and Diarrhoea). The variable 'Comorbidities' were recoded as 'No comorbidities' and 'any one or more comorbidities'. The response option defined as "other comorbidities" included kidney disease, liver disease, cancer, asthma, tuberculosis. The response options in the HERO's scale were binary and recorded as "Yes" and "No". The mental health score was calculated and if the score based on 7 questions was between 0 - 4 it was defined as "Good mental health" and between 5 - 7 was defined as "Poor mental health" (17 participants did not reported mental health status).

Descriptive statistics were calculated for all variables. A categorical variable was compared by Chi-squared test (χ2-test) and Fisher's exact test. All statistical analyses were performed and a two-tailed P value < 0.05 was considered statistically significant. The association of socioeconomic status, family income, zones, COVID-19 symptoms, and comorbidities with mental health during the COVID-19 pandemic was studied using the multivariate logistic regression model. The logistic regression was adjusted for age, family income, and zones with comorbidities. Further, the regression analysis done to associate the exposure of COVID symptoms to mental health was additionally adjusted for comorbidities. The data were analysed using the Statistical Package for the Social Sciences (SPSS) v25.0.

RESULTS

The collected data were categorized into zones for analysis- West zone (from Maharashtra, Goa, Gujarat, and Rajasthan), East Zone (Bihar, Orissa and West Bengal), North Zone (Haryana, Jammu & Kashmir, Punjab, Uttaranchal, Uttar Pradesh, Chandigarh, and Delhi), South Zone (Tamil Nadu, Telangana, Kerala, Andhra Pradesh, and Karnataka), North-East zone (Assam, Manipur and Arunachal Pradesh) and Central zone (Madhya Pradesh and Chhattisgarh). For analysis purposes, these six zones were further categorized into three zones namely, West Zone, Central Zone and all other combined zones.

The survey data (Table 1) showed that the highest number of participants were from the West zone (68.5%) and the lowest from the North-East zone (0.5%). Poor mental health status was reported highest from East zone participants (40.0%) while lowest from West zone (10.9%).

TABLE 1: DISTRIBUTION OF ZONE WISE PERCENTAGE OF PARTICIPANTS AND PREVALENCE OF MENTAL HEALTH STATUS IN INDIA DURING THE COVID-19 PANDEMIC

ZONES	STATES	PARTICIPATION N (%)	PREVALENCE OF OVERALL MENTAL HEALTH N (%)
West Zone	Maharashtra, Goa, Gujarat, and Rajasthan	699 (68.5)	76 (10.9)
Central Zone	Madhya Pradesh and Chhattisgarh	172 (16.9)	24 (14.0)
North Zone	Assam, Manipur, and Arunachal Pradesh	78 (7.6)	13 (16.7)
South Zone	Tamil Nadu, Telangana, Kerala, Andhra Pradesh, and Karnataka	46 (4.5)	10 (21.7)
East Zone	Bihar, Orissa, and West Bengal	20 (2.0)	8 (40.0)
North East Zone	Haryana, Jammu & Kashmir, Punjab, Uttaranchal, Uttar Pradesh, Chandigarh, and Delhi	5 (0.5)	0.00
Total		1020*	131 (12.84)

Note:* indicate 1 participant did not reported state

FIGURE 1. SHOWS THE MENTAL HEALTH PROBLEM BY GENDER FROM THE STUDY.

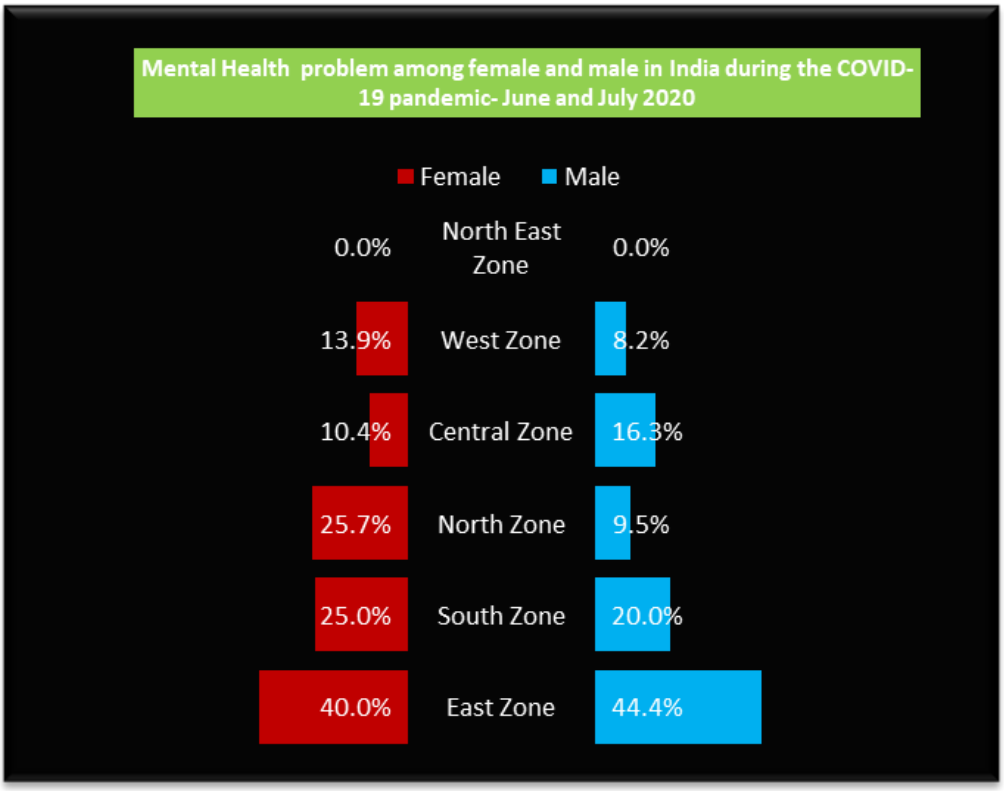


Figure 1 shows that 44.4% of males and 40.0% of females from the East zone had poor mental health status.

The data in Table 2 shows the unadjusted logistic regression analysis of the association between socio-demographic factors and mental health status. Females in the age group of 18-25 years reported twelve times higher odds (OR 12.50) of having poor mental health status than the females above 55 years of age. An increasing trend with a significant association in poor mental status was observed among females with decreasing age whereas no such association was found in males. An association with poor mental health was observed among only males in the central zone (OR 2.23), whereas both the genders showed a significant association for all other zones (OR: M- 2.28, F-2.14) when compared to the West Zone

TABLE 2 UNADJUSTED LOGISTIC REGRESSION ANALYSIS OF THE ASSOCIATION BETWEEN SOCIO-DEMOGRAPHIC FACTORS AND MENTAL HEALTH STATUS DURING THE COVID-19 PANDEMIC IN INDIA

SOCIO-DEMOGRAPHIC FACTORS		MENTAL HEALTH STATUS									
		FEMALE					MALE				
		GOOD MENTAL HEALTH	POOR MENTAL HEALTH	OR	95% C.I.		GOOD MENTAL HEALTH	POOR MENTAL HEALTH	OR	95% C.I.	
					LOWER	UPPER				LOWER	UPPER
Age	Above 55 years	40	1	1	1	1	62	7	1	1	1
	18-25	64	20	12.50*	1.61	96.79	37	9	2.15	0.74	6.27
	26-35	127	27	8.50*	1.12	64.58	160	14	0.78	0.30	2.01
	36-45	90	18	8.0*	1.03	62.01	166	21	1.12	0.45	2.77
	46-55	67	4	2.39	0.26	22.12	74	11	1.32	0.48	3.60
Family Income	Below Rs.60,000	165	24	1	1	1	219	22	1	1	1
	Above Rs.60,000	217	45	1.43	0.83	2.43	279	39	1.39	0.80	2.42
State	West Zone	278	46	1	1	1	342	30	1	1	1
	Central Zone	61	7	0.69	0.30	1.61	87	17	2.23*	1.17	4.22
	All other zone	48	17	2.14*	1.13	4.04	70	14	2.28*	1.15	4.52

Note- '*' indicated by statistically significant

Table 3 presents the logistic regression analysis of the association between comorbidities and mental health problems adjusted by age, family income, and zones. The presence of one or more comorbidities was found to be significantly associated with poor mental health status among males and females. Heart disease, diabetes, hypertension, and 'other diseases' were associated with a poor mental health status among males.

Table 4 presents the logistic regression analysis of the association between symptoms of COVID 19 and mental health status adjusted for age, family income, zones, and co-morbidities. All except diarrhoea COVID-19 symptoms nausea-vomiting, cough, shortness of breath, runny nose, fever, and sore throat were associated with poor mental health status among males.

TABLE 3: LOGISTIC REGRESSION ANALYSIS OF THE ASSOCIATION BETWEEN COMORBIDITIES AND MENTAL HEALTH STATUS DURING THE COVID-19 PANDEMIC IN INDIA

COMORBIDITIES		MENTAL HEALTH STATUS									
		FEMALE					MALE				
		GOOD MENTAL HEALTH	POOR MENTAL HEALTH	OR	95% C.I.		GOOD MENTAL HEALTH	POOR MENTAL HEALTH	OR	95% C.I.	
					LOWER	UPPER				LOWER	UPPER
Comorbidities	No comorbidities	335	57	1	1	1	391	29	1	1	1
	Any 1 or more comorbidities	53	13	2.72*	1.26	5.89	108	33	5.79*	2.99	11.21
Heart Disease	Yes	4	0	_	_	_	10	9	13.87*	3.70	51.94
Any other disease	Yes	19	8	3.81*	1.41	10.31	13	7	11.23*	3.59	35.17
Diabetes	Yes	17	4	2.67	0.75	9.54	43	19	9.12*	3.87	21.45
Hypertension	Yes	23	2	2.02	0.38	10.85	66	22	5.94*	2.77	12.72

Note- Logistic regression analysis adjusted by age, family income, zones; No comorbidities is the reference category; '*' indicated by statistically significant; '-' indicated by inadequate numbers

TABLE 4: LOGISTIC REGRESSION ANALYSIS OF THE ASSOCIATION BETWEEN COVID-19 SYMPTOMS AND MENTAL HEALTH STATUS DURING THE COVID-19 PANDEMIC IN INDIA

COVID-19 SYMPTOMS		MENTAL HEALTH STATUS									
		FEMALE					MALE				
		GOOD MENTAL HEALTH	POOR MENTAL HEALTH	OR	95% C.I.		GOOD MENTAL HEALTH	POOR MENTAL HEALTH	OR	95% C.I.	
					LOWER	UPPER				LOWER	UPPER
Symptoms	No symptoms	323	49	1	1	1	428	37	1	1	1
	Any 1 or above symptoms	62	21	1.69	0.92	3.13	64	23	3.43*	1.83	6.40
Nausea, vomiting	Yes	9	6	3.37*	1.09	10.41	3	3	7.86*	1.30	47.69
Cough (new or worsening)	Yes	15	3	0.88	0.23	3.45	18	13	7.16*	2.97	17.23
Shortness of breath (new or worsening)	Yes	5	4	3.04	0.68	13.63	6	3	5.30*	1.13	24.88
Runny nose	Yes	19	5	1.50	0.51	4.41	22	9	5.26*	2.07	13.32

Fever	Yes	19	3	0.84	0.23	3.12	19	10	4.48*	1.79	11.25
Sore throat	Yes	19	8	2.44	0.95	6.31	27	12	3.83*	1.65	8.88
Diarrhoea	Yes	6	4	2.87	0.75	10.99	8	3	2.25	0.50	10.09

Note- Logistic regression analysis adjusted by age, family income, zones, comorbidities; 'no symptoms' is the reference category; '*' indicated by statistically significant odds ratio

DISCUSSION

WHO estimates that about 7.5 percent of Indians suffer from some mental health problem and predicts that by end of the year 2020 roughly 20 percent of Indian population will suffer from mental diseases. According to the numbers, 56 million Indians suffer from depression and another 38 million Indian population suffer from anxiety disorders. [15] The current global pandemic has posed unprecedented circumstances for the communities. These circumstances which were enforced to prevent and protect the population have resulted in a global mental health crisis. The impact of the COVID-19 pandemic on mental health is complex, varied, and wide-ranging, affecting all parts of societies and individuals. In addition, the presence of comorbidities like heart, lung disease, diabetes, and other chronic diseases which makes the population more vulnerable to COVID-19 has also added to the mental health burden. [16] Recognizing that there is an existing significant mental health burden worldwide with limited access to mental health services the pandemic has challenged the health care services. [17]

The present study confirms that the presence of comorbidities and symptoms of coronavirus are significantly associated with mental health status among the Indian population. An epidemic of COVID-19 not only impacted physical well-being but also caused disruption, anxiety, and stress which has resulted in mental health problems among the population. The rapid spread of COVID 19 infection resulted in the enforcement of regulations to stop the further spread of the disease. The nation-wide lockdown, isolation, and quarantine of affected persons, social distancing, closure of educational institutes, offices/workplaces, and entertainment places all consigned people to stay in their homes. [18] In the literature, it has been stated that the fear of COVID -19 infection, loss of job, strict lockdown, deaths, and lack of a caregiver and family support, meant the population experiencing a mix of emotions that can potentially damage their mental health problem. [19] Studies have also identified that separation from loved ones, loss of freedom, dullness, and uncertainty can cause a worsening in an individual's mental health status. [20]

The presence of comorbidities is an important predictor of poor mental health among individuals. [21] This study confirms the findings reported in the literature that one or more comorbidities like hypertension, diabetics, cardiovascular, and other chronic diseases increases the mental health problems like stress, anxiety, and depression which further leads to mental health problems. [22] Evidence also reported that individuals have poor mental health due to the disease itself and have expressed worries about the chronic and potential long-term problems of the disease. [23] The present study highlights that mental health problems are exaggerated at a higher end in the pandemic situation than the regular disease scenario.

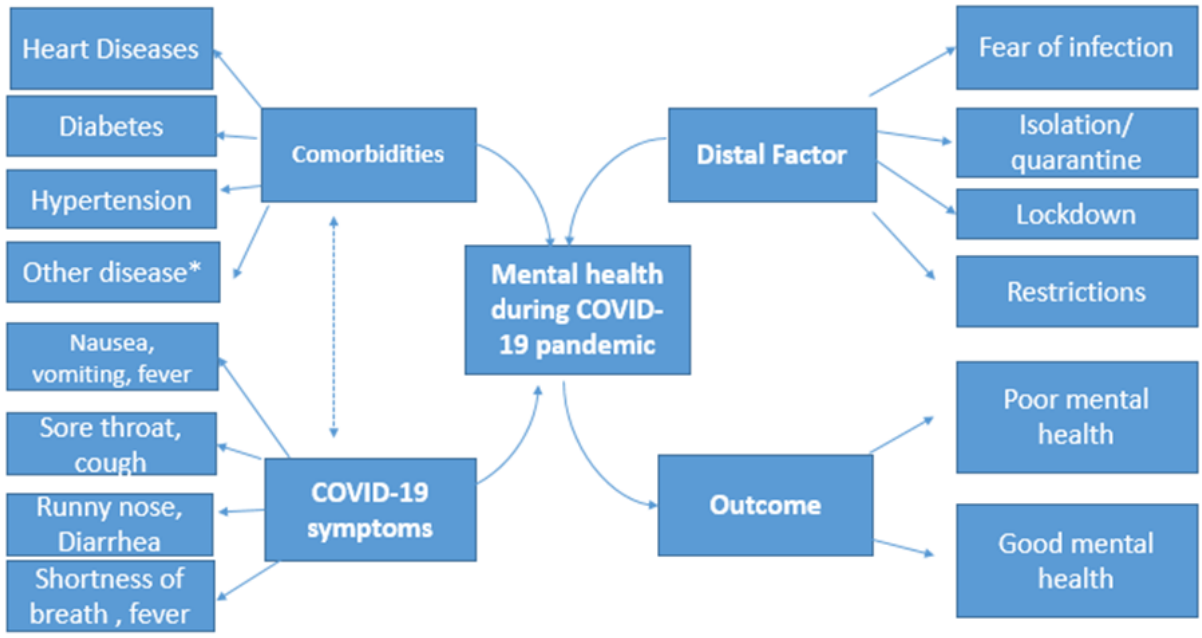
This signifies the occurrence of prevalent mental health burdens in the current pandemic. The simultaneous existence of comorbid non-communicable diseases (NCDs) like hypertension, diabetes, and other chronic illnesses and psychological co-morbidities like stress, anxiety, and depression results in individuals into a 'vicious' cycle. [24] In the current study, we have identified gender-specific responses between relationships of comorbidities with mental health status during this pandemic. The study reported males who have heart disease, diabetes, and hypertension, reported higher odds of poor mental health status while no such association was reported among females. The study indicates further representative national study to identify gender-based differences and ways to address them.

The most common reported symptoms by the CDC for COVID-19 are fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, and diarrhoea. In the present study, the overall prevalence of having any one or more COVID-19 symptoms was 25.8% among the participants. Additionally, the study highlights three times the odds of poor mental health status among

the participants who reported COVID-19 symptoms than the non-symptomatic ones. Similarly, a study showed an impact of COVID-19, 16–18% of participants reported anxiety and depression. [25] However the other studies did not see the symptom-wise association on mental health in the present study that has explored the symptoms and predicted the mental health status of the participants. In the present study the adjustment of comorbidities was highlighted, poor mental health status was still at a higher-end denoting the reason being the current pandemic situation. The gender-based findings in this study have identified that various Covid-19 symptoms were associated differently with poor mental health status which needs careful consideration in future planning.

The following Figure 2 displays a conceptual framework of the presence of comorbidities and COVID-19 symptoms and its interrelationships of outcomes of mental health of individuals in the context of a pandemic. The current situation of COVID-19 is exercising a strain on the individuals and the families who may be directly affected by the virus or hit indirectly due to fear of infection, social isolation, lockdown, or restrictions illustrated in the below mentioned conceptual map (Figure 2).

FIGURE 2. CONCEPTUAL FRAMEWORK OF THE PRESENCE OF COMORBIDITIES AND COVID-19 SYMPTOMS AFFECTING MENTAL HEALTH



*Other disease includes kidney disease, liver disease, cancer, asthma, tuberculosis

Identifying the poor mental status among the Indian population facing the pandemic highlights the need to address these issues in the existing COVID-19 management protocols. Outcome-based strategies to tackle the mental health problems due to the existing pandemic are the way forward. The healthcare providers can explore various digital programs/internet platforms for telecommunication to reach out to the appropriate population during this pandemic. Public health policymakers can incorporate mental health outreach into growing COVID-19 protocols, particularly to high-risk populations that have existing chronic diseases. Furthermore, non- communicable disease program targeting the comorbid population should include preventive health messages related to susceptibility to COVID 19 infection. The pandemic put forward the demand for a global public health campaign to raise awareness of mental health and its related components to the global pandemic. The study highlights the requirement for more gender-based mental health research to design specific gender-targeted problem-based strategies. Along with this media and internet-based portals can be utilized to spread information about the effect of COVID -19 on mental health status. These channels can also be exploited to reach the mass at the

larger level and render mental health services. The survey findings also strongly underpin the need for an infrastructure to promote and support mental well-being as a core component of health along with the physical well-being for both genders across the population.

LIMITATION OF THE STUDY

This was a cross-sectional self–reported online survey that may be subject to recall bias and the direction of the association may not be ascertained similar to cohort or randomised control study designs. The study limitations include the participants' recruitment methods wherein only internet users were captured and the language of administration of the questionnaire was in English. This denotes the non-representation of non-internet users or those who do not read and write in English. Furthermore, the survey was limited to the set of the population which had access to social media platforms. As it was also not feasible to define a sampling frame for this study we used the snowball sampling method. However, the sample may not be representative of the population and the study results would apply only to a population similar to the study sample.

CONCLUSION

COVID-19 pandemic is a worldwide public health emergency with extensive effect on the mental health of individuals. The present study shows that individuals with the presence of comorbidities and COVID-19 symptoms have a higher risk of getting impacted in this pandemic and are most vulnerable to mental health problems. Moreover, the impact has been observed among both genders. Taken together, the existing comorbidities and the mental health problems inform a psychiatric pandemic is co-occurring with the COVID-19 symptoms, which is becoming a global health challenge. This evidence should be widely communicated with the general public and global health community to prevent the mental health consequences of COVID-19 across gender as well. Nevertheless, it is essential to identify highly vulnerable persons and connect them to required special care, whereas access to mental health facilities and resources should be promoted, aiming for positive mental health outcomes. To conclude, evidence-based policymaking and practice should be adopted to guide how those mental health challenges can be mitigated in different contexts amidst the COVID-19 pandemic and future public health emergencies.

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RESEARCH ARTICLE

ADOLESCENT TOBACCO USE ESTIMATES FROM THE GLOBAL YOUTH TOBACCO SURVEY, INDIA: TOBACCO A RISK FACTOR FOR FUTURE SPREAD OF COVID 19

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ABSTRACT

BACKGROUND:

Tobacco use has been identified as a risk factor and causes negative outcomes to the COVID 19 pandemic. Adolescents' tobacco users in India are the vulnerable population to acquire COVID-19 in the future. The study aimed to understand tobacco consumption patterns among adolescents in India to highlight the vulnerability of this population to COVID-19 infection.

METHODS:

The Global Youth Tobacco Survey (GYTS) reports were identified and recovered from the Centre for Disease Control and Prevention (CDC) data sets. The findings of the surveys in 2003, 2006, and 2009 were compared with respect to the prevalence of cigarette smoking and other tobacco use, and the determinants of initiation of tobacco use among the adolescent population.

RESULTS:

The total tobacco consumption among adolescents was found to have increased from 13.7% in 2006 to 14.6% in 2009. All forms of tobacco use were higher in boys than girls across all three survey periods. Also, the trend of bidi (smoked tobacco form) use had increased in both genders. A reduction in exposure to Secondhand Smoke, with an increase in cessation services, media campaigns, and tobacco-related school curriculum was noted. If the increase in tobacco consumption between 2006 and 2009 had continued at the same rate, then in 2021 around 18% of adolescents are estimated to consume tobacco in some form.

CONCLUSION:

The significant overall tobacco use and increasing bidi consumption makes the adolescent group more susceptible to COVID-19 infection. This indicates an imperative need to include this age group for COVID-19 management to reduce the burden on health care.

KEYWORDS

Adolescent, Tobacco use, COVID-19, Health systems, India

INTRODUCTION

Coronavirus disease 2019 (COVID-19), has spread around the world and caused by severe acute respiratory syndrome coronavirus 2 (SARS- CoV-2). [1] The virus primarily affects the lung epithelial cells and causes viral pneumonia and acute respiratory distress syndrome. [2] The scientific community is constantly estimating the clinical characteristics of the disease and the prognostic factors. Tobacco has been identified to be associated with the negative progression, a positive diagnosis, high hospitalization rates, and exacerbated health outcomes of COVID-19. [3] [1] [4]

Tobacco has an established impact on lung function and reduces the immune efficiency of the body, that in turn, makes the users prone to respiratory infections such as COVID-19. [5] The use of tobacco products causes a high chance of transmission of the COVID- 19 virus. This is because of, contaminated fingers, constant touching of the face and mouth while use, sharing of the products, social gathering for smoking in closed environments, and spitting of the smokeless tobacco form. [6,7] COVID- 19 related mortality and morbidity are severe with higher rate among those with comorbidities such as non-communicable diseases (NCDs) including hypertension, diabetes, and chronic obstructive pulmonary disease COPD. [6] There is significant evidence stating the role of tobacco as a risk factor in the causation of the NCDs. [8] In addition a meta-analysis had reported a strong relationship between the history of smoking and severe COVID-19 cases with higher odds among smokers than the non-smokers. [9]

The recent COVID- 19 data in India indicates that the second wave of the pandemic is taking a toll on the younger age groups. The national statistics state, among the current COVID- 19 patients about 8.14% are in the age group of 11-20 years and 22% are in the 20 to 40 years of age group. [10] Visualising the younger generation scum to the pandemic, primary risk factors need to be identified and addressed. India is the second-largest consumer of tobacco in the world and the consumption patterns among adolescents are alarming. [11] The youth in India have reported initiating tobacco consumption at an early age of 15 years, resulting in a habit formation by the time they are adults. [12] Also, the youth, who are the current tobacco users, will constitute the adult tobacco consumers in the future. They will constitute the vulnerable population for the NCDs and be prone to COVID 19 infections as well.

The health and economic burden related to tobacco globally is a known fact and now the mortality due to COVID -19 has increased resulting in an additional burden on the health systems of the countries. [13] The low and middle-income countries (LMIC) have already been struggling under the burden of tobacco-related illness and death and are now unable to cope with the difficult COVID-19 circumstances. Given the burden, countries like India are facing challenges in rendering health care services with workforce shortages, absenteeism, poor infrastructure and quality of care, and inefficient health systems. [14] To address the substantial projection of the COVID -19 burden due to the extensive tobacco use in India, the country needs to identify the risk groups and adopt appropriate strategies.

With the link between tobacco use and the spread of COVID 19, it is essential to comprehend the consumption patterns and factors associated with tobacco use among the adolescent age group. This will provide a strong insight on how to integrate the present tobacco control policies into COVID -19 programmes. With this background, the present study aimed to understand the tobacco consumption patterns among adolescents in India to highlight the vulnerability of this population to COVID-19 infection. With this aim, we have studied and compared the trends and patterns of tobacco consumption and related factors among adolescents, using the Global Youth Tobacco Survey, India.

METHODS

The study used nationally representative data on youth in India collected through the Global Youth Tobacco Surveys. In the view of systematic monitoring and surveillance of tobacco use among youth, the Global Youth Tobacco Survey (GYTS) is carried out under the Global Tobacco Surveillance System (GTSS). [15] The GYTS in India has been conducted in 2003, 2006, and 2009 wherein the students of grades 8, 9 and 10 were surveyed. The survey collected data on the prevalence of tobacco use (smoking and smokeless) among the school students. It also recorded information about factors that influence adolescents to initiate tobacco consumption. [16]

The GYTS survey reports of 2003, [16] 2006 [17] and 2009 [18] were identified and recovered from the Centre for Disease Control and Prevention (CDC) data sets. Therefore, no ethical review was required for the study. The survey findings were compared with respect to the prevalence of cigarette smoking and other tobacco use and the determinants of tobacco initiation and use among adolescents. The determinants of tobacco use were exposure to secondhand smoke (SHS), cessation of cigarette smoking, media and advertising, access and availability of cigarettes, and tobacco-related school curriculum.

RESULTS

The survey findings, which could significantly aid future recommendations to reduce the susceptibility of this young population to COVID- 19 were identified and reported.

TOBACCO PREVALENCE TRENDS AMONG ADOLESCENTS:

The total tobacco consumption among adolescents was found to be 16.9% in 2003, 13.7% in 2006, and 14.6% in 2009 (Table1). Overall, both forms of tobacco were found to be consumed by the adolescent age group. Although the total (Table1) and gender-wise smokeless form consumption had declined over the years it was consumed at a higher rate than the smoking form. Boys consumed both smoking and smokeless form more than girls across all three survey periods. The reports revealed the following gender-wise distribution; (1) Smokeless form: 2003 (B-18.0%, G-7.9%), 2006 (B- 10.7%, G- 7.5%), and 2009 (B- 11.1%, G-6.0%), and (2) Smoking form : 2003 (B-10.5%, G- 4.2%), 2006 (B-9.4%, G- 3.6%), and 2009 (B-11.2%, G-3.7%). Also, the comparisons among the smoking form revealed that both cigarette smoking from 2003 (B-5.7%, G-1.8%) to 2009 (B 5.8-%, G-2.4%) and bidi (smoked tobacco form made by rolling a dried, rectangular piece of temburni leaf (Diospyros melanoxylon) with 0.150.25 g of sun-dried, flaked tobacco into a conical shape and securing the roll with a thread [19]) consumption from 2003 (B- 2.9%, G-1.1%) to 2009 (B-7.3%, G-2.2%) had increased. Furthermore, in 2009, the last survey there were at least 15.5% of non-smokers, who had reported to start smoking by the end of next year.

TABLE 1: TOBACCO PREVALENCE AMONG ADOLESCENTS

TOBACCO FORM	2003 (%)	2006 (%)	2009 (%)
Total current tobacco use	16.9	13.7	14.6
Smoking form	8.1	7.0	8.1
Smokeless form use	14.0	9.4	9.0

DETERMINANTS OF TOBACCO USE AMONG ADOLESCENTS:

Exposure to secondhand smoke

Overall (Table 2) the exposure to secondhand smoke (SHS) at home and in public places had reduced for both genders [20] [21] from 2003 to 2009. Furthermore, the number of people who thought smoking in public places should be banned and smoke from others was harmful was significant, with a minor decline in percentages as follows, 2003 (74.8%), 2006(74.0%), and 2009(63.3%).

Cessation of cigarette smoking

Although, two-thirds of the students reported that they wanted to stop smoking immediately, the proportion was highest in 2006 (70.3%) than in 2009 (66%). The help utilized for smoking cessation including both the boy and girls had significantly increased in 2009 since 2003 (Table 2). Consistent use of cessation services utilization had also resulted in 67.2% of the adolescent who tried to stop smoking in 2009. Also, 2009 (19.5%) had the highest increase in the percentage of ever smokers, who had received help or advice to quit smoking from various means, such as program, professionals, family members or friends.

TABLE 2: DETERMINANTS OF TOBACCO USE AMONG ADOLESCENTS

DETERMINANTS	2003 (%)	2006 (%)	2009 (%)
Exposure to secondhand smoke at home	36.2	26.6	21.9
Exposure to second-hand smoke in public places	48.8	40.3	36.6
Cessation services used	84.6	81.8	94.3
Media and advertising- view anti-smoking messages	NA	74.0	77.5
Access and availability of cigarettes- who bought cigarette in a store	64.8	51.9	47.0
Tobacco-related school curriculum- dangers of tobacco	52.3	54.4	63.3

Media and Advertising

The exposure to anti-smoking media messages in the past 30 days also had consistently increased since 2003 with the highest in 2009 (Table 2). Furthermore, the exposure to pro-cigarette advertisements on billboards had also increased in 2009 (74.4%) since 2003 (42.1%). The numbers indicate a progressively growing issue of tobacco marketing for this age group.

Access and availability of cigarettes

Overall, the current users buying cigarettes in a store had significantly decreased from 2003 to 2009 (Table 2). Also, there was a consistency in the percentage of students offered free cigarettes between 2003 (8.1%) and 2009 (8.1%). Furthermore, the percentage of students who purchased cigarettes in a store without being refused had seen a decline with 55.3%, 72.1%, and 56.2% in 2003, 2006, and 2009 respectively.

Tobacco-related school curriculum

The inclusion of dangers of smoking in the school curriculum had substantially increased over the years. (Table 2) The school curriculum had predominately included information related to the dangers of tobacco, reasons for smoking, and effects of tobacco use. The discussion about reasons why young people smoke had remained consistent over the survey years, but the discussion on the effects of tobacco in the class was highest in 2009 (55.9%) in comparison to the previous years.

DISCUSSION AND CONCLUSION

The comparison of the GYTS reports indicates that total tobacco consumption has increased by 6.57% in 2009 compared to 2006. Identifying the lack of any recent national representative survey on adolescent since 2009, if the increase in tobacco consumption between 2006 and 2009 had continued at the same rate then in 2021 around 18% of adolescents are estimated to consume tobacco in some form. Also, an additional 15.5% of never smokers who reported in 2009 the likeliness to initiate smoking from the next year might significantly add to the current tobacco users in this population. The secondary analysis of the GYTS survey of the Indian adolescent age group predominately points to prevalent tobacco use among the adolescent population. Extrapolating the findings from literature and the current COVID -19 age-wise distribution, tobacco use in this age group should be attention seeking for future coronavirus disease burden.

The high use of smoking and smokeless form of tobacco in this population and its association with the modes of spread of the COVID- 19 virus brings the health system to a 'worrisome' state. The transmission, mortality, and morbidity rates will be expected to rise drastically due to the increased susceptibility of these current young tobacco users in the future. The increased use of bidi in this population indicates the high use in the low socio-economic population who are unaware of the risks related to tobacco and COVID-19 infection, and with limited health care services around them will add to the enormous health burden to the country.

Currently, the COVID management strategies are targeted towards the older adults with complete lack of attention towards this population. The study emphasizes including this young population in the regimen of care for future planning of COVID 19 management. Furthermore, integration of the tobacco control policies into COVID-19 strategies is

required. India already has a widespread National Tobacco Control Programme based on the WHO- FCTC and the MPOWER policies which includes Monitoring tobacco use and prevention policies, Protecting people from tobacco smoke, Offering help to quit tobacco use, Warning about the dangers of tobacco, Enforcing bans on tobacco advertising, promotion and sponsorship, Raising taxes on tobacco..[22] Incorporating the comprehensive tobacco control program in the COVID 19 management, will aid in reduction of new COVID-19 infections and promote the younger generation to quit tobacco at an early stage.

The GYTS reports the effective tobacco control policies existing among this population in India. The reduction to SHS reported in the surveys is a sign wherein, the best use of tobacco control measures is seen. [23] The messages related to the harm of SHS can further consist of information about how SHS not only cause tobacco-related diseases among second-hand smokers but also makes them prone to CVOD-19. The age group knowing the importance of banning smoking in public places can be exploited to also inform them of the risk of transmission of COVID-19 in public places and increase the following of social distancing, and avoidance of mass gatherings, and places used for tobacco-related activities like the smoking rooms, restaurants and bars.

The increased use of cessation services and the attempts to quit in this age groups denotes the need for sound tobacco cessation services to be in place. The tobacco cessation services can include information about the COVID-19 and tobacco as a risk factor and the negatives outcomes due to it can be elaborated in the behavioural counselling.[6] The most effective tobacco control measure is the anti-tobacco mass media campaigns [24] with wide coverage in India. The adolescents reported in the GYTS demonstrated the increased viewing of such campaigns. Therefore, future mass media campaigns could include information related to COVID-19 and the risk of tobacco use, negative outcomes and burden of the disease due to tobacco, and stories of COVID-19 patients who had consumed tobacco.

The access to tobacco products among this population is the key reason for them to initiate the habit. Therefore, the strict enforcement of no tobacco policies in schools [25]along with information on use of tobacco as a risk factor to COVID-19 can be incorporated. This in turn will help to curb the initiation of the habit thereby reducing the future prevalence among this population. Under the national tobacco control programme, the promising inclusion of tobacco-related information in the school curriculum [25] is another mode that can be further exploited to include COVID-19 related information. The risk of tobacco consumers being prone to coronavirus infection and the preventive factors related to it can encourage the younger generation to have safe and good health practices.

The present study prominently denotes the need to include the younger generation in COVID-19 prevention and management strategies to reduce the future burden of the disease. The study also directs the need to carry out the national representative survey GYTS among the adolescent to have a better picture of the current tobacco use and now to include COVID 19 questions to the standard GYTS tools. This would aid in the incorporation of tobacco control measure in the coronavirus disease protocols. The cumulative advantage of including the tobacco control methods in the modalities for COVID 19 will be a rewarding strategy to improve and strengthen the health care system of the country.

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VIEWPOINT ARTICLE

PROVIDING FREE TREATMENT FOR COVID-19 PATIENTS: TRUE OR FALSE

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ABSTRACT

The policy of providing free treatment for covid-19 patients currently exists in many developing countries. At this short editorial comment, we discussed a crucial question " whether the free treatment for covid-19 patients leads to an increase in the number of cases or not?"

It is very important question that we think will change the financing policy of covid-19 treatment in a large number of countries.

KEYWORD

COVID-19, health financing, health care cost, health policy.

The policy of providing free treatment for COVID-19 patients is current in many developed countries [1] as well as in some developing countries such as India and Saudi Arabia. [2, 3] This policy along with early isolation has been cited in some scientific papers as a lesson for developing countries in combating the COVID-9 pandemic. [1, 4] However, providing free treatment for COVID-19 patients will impose high direct and indirect costs to the health system and insurance organizations and will go on to grow along with outbreak flow. The average health care cost for non-severe COVID-19 patients has been estimated US$ 939 per patient while in the severe cases the average will increase to US$ 8,878. Providing intensive medical care for complicated patients will also cost more than US$ 25,578 per case. [5] Therefore, the fiscal space for the health sector must be carefully planed and managed to be ready for a relatively long-run exposure to COVID-9 pandemic.

Although the policy of free treatment for COVID-19 patients seems somewhat reasonable due to its positive externality, but given the durability of this pandemic, health policy-makers need to be more careful about planning and consuming resources in the long run. Evidence based management of health care system is necessary more than ever in this situation. [6] According to the principle of "moral hazard", the reduction in the price of health care services for the patients, through negligence in self-care, can lead to an increase in demand for these services. [7] Negligence in self-care and disregard for health protocols is now reported in countries with free treatment policy. [8] In this situation, the crucial question is that whether the free treatment for COVID-19 patients leads to an increase in the number of cases or not?

There is currently no credible scientific evidence to

measure the price elasticity of demand for COVID-19 health care. Therefore, it is still not possible to say whether the demand for these services is sensitive to price or not. While certainly with increasing number of patients and vaccination coverage, the positive externality of treatment will decrease. On the other hand, according to moral hazard principle, free of charge treatment for COVID-19 patients may increase the likelihood of neglect in personal health care. Thus, due to resource limitation, it cannot be said that completely free treatment for these patients is a right policy for the long run as well as for all patients.

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REVIEW ARTICLE

NOVEL INSIGHTS INTO DATA MINING TO IMPROVE THE SPECIFICITY OF PHARMACOVIGILANCE AND PREVENT ADVERSE DRUG REACTIONS IN PSYCHIATRIC PATIENTS

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ABSTRACT

The aim of this perspective is to provide a review upon the fundamental computational methods deployed in data mining as applied to healthcare data, with particular regards to patient records of psychiatric patients. Albeit clinical data mining has advanced over the years, further research is needed to improve the specificity of pharmacovigilance and prevent adverse drug reaction in psychiatric patients. From describing the main principles and present challenges of data mining to its most-novel applications in clinical psychiatry, this literature review highlights current research gaps that have to be filled to increase the efficacy of psychiatric drugs nowadays, thus improving patient outcome and decreasing hospitalization costs.

KEYWORDS

Data mining; healthcare; pharmacovigilance

INTRODUCTION

DATA MINING FOR FACILITATING KNOWLEDGE DISCOVERY IN HEALTHCARE

Data mining denotes a variety of computer-based information system (CBIS) techniques aimed at discovering novel knowledge (e.g., useful data patterns/features) as derived from data in several fields that involve big data, e.g., business and finance, scientific, clinical and industrial research, as well as education. [4, 16, 19] In case of healthcare, data mining has been extensively applied to large clinical datasets, thus aiding medical diagnosis, enabling to tailor treatments to individual patients and improving the so-called "Health Care Output" (HCO) worldwide, resulting in an improved quality of care, patient outcome and a considerable reduction in hospitalization costs. [4, 13, 19, 33] Data mining helps in planning healthcare activities and reducing the number of inpatients in the hospital. This improves the convenience in healthcare systems. A similar study has suggested multiple strategies for healthcare systems' service convenience flexibility. [39] We have focussed on clinical data as clinical work deals with direct patient care. Non-clinical work may support patient care, but the work does not provide direct diagnosis, treatment, or care for the patient. Hence, the non-clinical data acquired isn't from first-hand experience.

Data mining highly relies upon methods of data patterns extrapolation (i.e., feature extraction), association, clustering and classification. [19, 33] The results drawn from deploying data mining techniques are useful to assist healthcare professionals in their decision-making process, thus helping design patient-specific treatments and drugs, minimising adverse reactions to medicines and improving the life of patients substantially, also reducing healthcare-related costs. [13, 33]

Nevertheless, the knowledge of the usage of data mining that has so far been inferred from medical data is still negligible. [16, 37] Research aimed at designing customized algorithms in data mining will help improve the whole healthcare system, making treatments more patient-specific and efficient, reducing costs considerably. [13] The prediction of trends in the data can be achieved not only by deploying data mining techniques that make use of meaningful patterns derived from the data themselves but also by discarding unnecessary pieces of information within the data that may severely impair the predictive power of data mining-based computational models. Therefore, questions upon how to use the pre-existing data meaningfully without adding to the current data further data have not yet been answered. Data Mining itself is a technique to identify patterns in a pre-built database. A suitable understanding must be developed between the data mining techniques and the previous data available at our deployment without worrying about the new data being accumulated. [36]

Data mining has three high-level objectives in health management: gaining an understanding of medical data, assisting healthcare professionals in their decision-making processes and analysing the pre-existing data to draw additional, new knowledge from them to improve our understanding upon the pathophysiology of different diseases as well as patient outcome. [16]

But solely in the United States, deploying data mining-based techniques wisely can save up to $450 billion to the healthcare system each year due to the large datasets collected in hospitals on a daily basis. [13]

DEFINITION AND APPLICATIONS OF CLINICAL DATA MINING

Healthcare involves medical procedures such as diagnoses, treatments, assessment of prognoses, methodologies aimed at preventing pathologies, physical injuries and mental disorders from arising in humans. [4, 19] Healthcare services and industries generate a vast amount of data every day, involving electronic medical records, as well as other benchmarking reports and findings. [19] Nonetheless, such healthcare-related data have not been efficiently deployed. [4, 19]

Enabling to retrieve useful knowledge from pre-existing data, without requiring the collection of further medical data, data mining-based techniques can be used to diagnose several pathologies and aid physicians in their decision-making processes regarding patient treatments and assessment of prognoses, thus improving patient outcome, and reducing the length and costs of hospitalization. [4, 16, 19] Therefore, clinical data mining (CDM) is the application of Artificial Intelligence (AI)- and data mining-based methodologies deploying clinical data to improve the quality of healthcare. [16, 33] Software-based applications aimed at storing patient data electronically have considerably facilitated an extensive use of data mining techniques and helped retrieve useful patterns from current data to diagnose and cure several pathologies. [16]

PHASES OF CLINICAL DATA MINING

The fundamental phases involved in CDM include data collection, pre-processing (e.g., sampling), analysis, maximization (e.g., feature extraction/selection), modelling, classification, clustering, outlier detection, prediction, ranking and holistic evaluation. [16]
All the above-mentioned steps are essential to retrieve meaningful and novel pathophysiological patterns from patient data (e.g., electronic records and data). [16] The major phases of clinical data mining will be examined in the following section.

LEARNING AND VALIDATION

The CDM modelling framework involves an initial learning phase in which the computational algorithms replicate the observed/learnt phenomenon as derived from the clinical data available, followed by a testing phase to validate the accuracy and reliability (e.g., robustness) of the computational model designed. [16] The most widely used performance assessment tools as applied to data mining techniques are the following: accuracy, sensitivity, specificity and receiver operator characteristic (ROC) curves. [16]

The learning stage can be achieved either via a supervised or an unsupervised methodology, respectively depending upon whether the class labels of the training data are preliminarily known or unknown. [16]

FUNDAMENTAL METHODS DEPLOYED IN CLINICAL DATA MINING

Models required for designing data mining techniques are either predictive, e.g., classification, regression, generalization, categorization, or descriptive, e.g., characterization, anomaly detection, clustering, association, pattern matching, data visualization, meta-rule-based methods and correlation analysis. [4, 16, 19]
Whilst predictive models tangentially deploy supervised learning-based methodologies to predict the future behaviour of specific variables [19], descriptive models make use of unsupervised learning algorithms to retrieve meaning patterns to describe the inputted data in order for them to be easily interpreted by human operators. [19] Therefore, due to their practical and clinically viable nature, predictive models are the most commonly utilized data mining-based techniques in the field of healthcare. [4, 19]

The techniques used for performing anomaly detection are standard support and density-induced vector data description, as well as the Gaussian mixture. [4, 19] Whilst the vector quantization technique is widely used for clustering, the following methods are deployed for classification [4, 19]: statistical, discriminant analysis, decision tree, Markov based, swarm intelligence, K-nearest neighbour, genetic classifiers, artificial neural network, support vector and association rule. Below are the data mining techniques available for healthcare management.

LOGISTIC REGRESSION

Logistic regression (LR) is a technique of data mining that deploys either continuous, discrete or hybrid types of datasets and the corresponding binary target, calculating a linear sequence of inputs and conveying it to a mathematical function named "logistic". [4, 19] Results attained in previous research works are not so promising owing to the considerably reduced size of the input datasets. [4, 19] Therefore, it is recommended to use a dataset of larger size to improve the accuracy of the LR-based learning type of data mining algorithm. [4, 19]

FEATURE RELEVANCE ANALYSIS

Feature relevance analysis [16] is a stage of data processing in data mining that allows scientists to discard some predictors of pathologies from a pre-existing dataset to facilitate data exploration, as their relative contribution to discerning the required classes in the data would not be significant [16], thus decreasing computational time and complexity substantially. [16]
Feature selection facilitates the visualization and understanding of clinical data, as well as their measurement and storage, also considerably reducing the time in training and testing data mining-based algorithms, improving their out-of-sample classification accuracies. [16]

ALTERNATIVE METHODS TO FEATURE SELECTION: GINI IMPORTANCE AND SWARM INTELLIGENCE

An alternative method to univariate statistics-based feature selection, named "Gini Importance" aimed at capturing population discrepancies in functional connectivity was designed to detect the most robust and highly predictive functional connections by summarizing multivariate patterns of interaction. [16] Differently from the univariate features that resulted in a considerably high variance across subsets of the data partitioned having a low classification/predictive power, the Gini Importance was able to accurately and reliably assess the extent of changes in functional connectivity as induced by Schizophrenia, thus enabling an early diagnosis of the condition. [16]

Alternatively, the Swarm Intelligence-based method was used to perform the same diagnostic task. [4, 19] Via particle swarm optimization (PSO), the computational algorithm enables to discern pathological data across large search spaces. [4, 19] The classification/predictive procedure resulted to be faster and more accurate if the number of features used were reduced. [4, 19]

CLUSTERING AND CLASSIFICATION

The clustering technique deployed in CDM is a widely applied descriptive method that blends statistics and numerical analysis whereby a set of groups or clusters able to describe the input data is found. [19, 33] The clusters so identified can be used to analyse and find the drug which has high probability of risk. [33]

The main algorithms deployed in the vector quantization

method are K-means, K-mediods and X-means, which can be compared via the Davies-Bouldin Index. [4, 19]

The clustering algorithms aim at grouping elements (e.g., medical records of patients) whilst maximizing a similarity metric, e.g., proximity, between elements of the same class or cluster. [16]

A generalization of the clustering method comes under the umbrella term of "classification", which makes use of different mathematical functions to assign patient data with certain patterns/features to a predetermined class, e.g., healthy or pathological. [16] The Bayesian classifiers, artificial neural networks (ANNs) and the Support Vector Machines (SVMs) Learning are amongst the most commonly utilized Artificial Intelligence-based algorithms for classification. [4, 16, 19]

ADVANTAGES AND DISADVANTAGES OF DEPLOYING DATA MINING-BASED TECHNIQUES

The main advantage brought about by CDM is the efficient utilization of pre-existing clinical data regarding patient demographics along with their medical conditions to obtain new clinically viable knowledge, retrieving useful patterns/features and their relative relationships from them without requiring further data to be collected. [16]
Nevertheless, some CDM-based tools may not handle missing data satisfactorily for some medical conditions, such as mental disorders. [16]

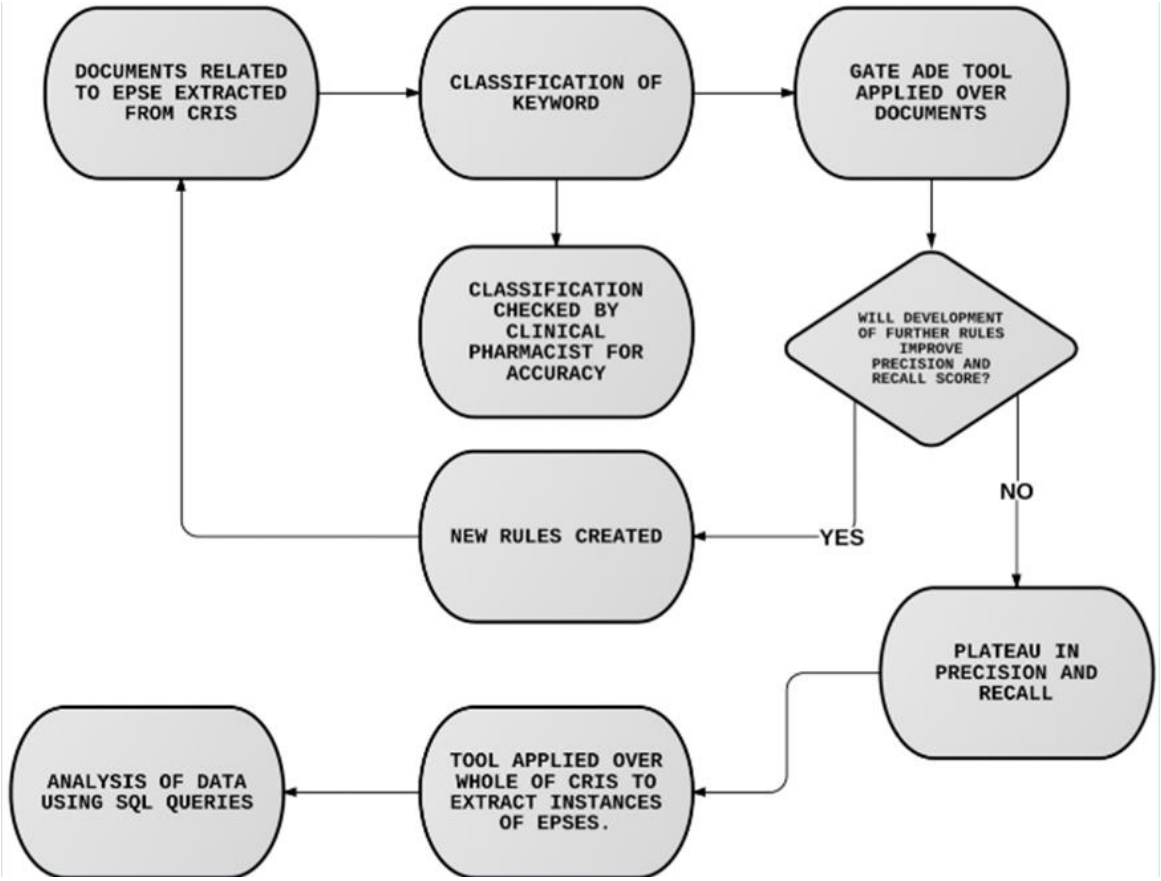
DATA MINING AS CLINICAL DECISION SUPPORT SYSTEM TO DETECT ADVERSE DRUG REACTIONS IN PSYCHIATRIC PATIENTS

In the field of psychiatry, data mining techniques can be useful in pharmacovigilance to detect adverse drug reactions (ADRs), thus assisting physicians in their decision-making processes aimed at identifying the most suitable drug for a psychiatric patient, decreasing the potential adverse drug reactions and, therefore, reducing the length of hospitalization and enabling recovery. [16]
ADRs, which is any harm occurring when a certain drug is used, may occur following a single dosage or prolonged administration of a drug or result from the combination of two or more drugs. [3, 10, 25, 33] Adverse Drug Reactions account for more than 5% of all hospitalizations and are one of the leading aetiologies of injury or death amongst psychiatric patients undergoing pharmaceutical treatments. [7, 9, 12, 29]

CDM can be deployed to mine readily available observational data such as electronic medical records (EMRs) [27, 29], where co-morbidities and concomitant drug use are present, to provide quantifiable patient-specific metrics of harm perceived by psychiatric patients. [9] Noteworthily, the information that can be retrieved from electronic healthcare records (EHRs) can be helpful for future research use, such as via the GATE Natural Language Processing (NLP) software developed. [35] Fig. 1 outlines a scheme upon how the software works. CDM improves patient safety and quality of care for multiple medical conditions by integrating individual patient data and evidence databases to facilitate clinical decision making. [38]

This procedure would be analysed concurrently with spontaneous reporting systems to provide a more reliable assessment of the patient condition and, hence, facilitate early diagnosis and treatment of mental disorders.
The knowledge derived from deploying CDM in this instance is essential for providing further informed medical care and, therefore, for preventing ADRs, thus helping psychiatric patients rehabilitate more and hopefully facilitating their reintegration into society. [7, 12, 20, 22, 28]

FIGURE 1. A SCHEME UPON HOW THE SOFTWARE "GATE NATURAL LANGUAGE PROCESSING (NLP)" WORKS. [35]



HIGHLIGHTS UPON RESEARCH GAPS IN DATA MINING AS APPLIED TO PSYCHIATRY

Clinical data outlining phenotypes and patient treatment are currently under-utilized; these resources could be used concurrently with data mining techniques to infer new medical knowledge. Data mining of Electronic Patient Records (EPR) can help unveil novel discrepancies amongst several psychiatric disorders and, therefore, assist physicians in tailoring treatments to individual patients, hence improving patient outcome and reducing hospitalization time and costs. An EPR is the systematized collection of patients' and population's electronically stored health information in a digital format. These records can be shared across different health care settings. Integrating the information from EPR with genetics would lead to unveil new pathophysiological aspects of mental illnesses.

The human body is a complex biological entity, which is composed of various levels (from genetic to cellular, molecular, tissue, organ and system level). [13] Hence, scientific research in tailoring data mining techniques to psychiatric patient data must take account of these different levels and be scalable to represent a correct pathophysiological condition and predict patient outcome further to adopting a specific treatment designed on a patient-specific basis. [13] Furthermore, such algorithms need to consider discrepancies perceivable amongst different populations of patients being considered. [13]

CONCLUSION

Clinical data mining is a research-based tool whereby physicians can retrieve and interpret pre-existing clinical data from patient records and infer new knowledge that can aid them in various decision-making processes regarding diagnosis and several treatment strategies. [16] Considering the high volume of medical records, data mining of readily available clinical data is more important and much more preferred than adding further data to the pre-existing ones. [16]

With particular regards to psychiatry, EPR data can be used to prevent ADRs via different techniques such as the GATE software [35], and, therefore, improve patient outcome, thus reducing the time and costs of hospitalization. [9, 27, 29, 33] This work is nifty in case of cancer patients who are the frequent victims of adverse drug reactions. Through our study, we believe that we could throw some light on the existing literature on the usage of data mining in case of pharmacovigilance. Future study can focus on the feature relevance analysis in order to provide more insights into the clinical dataset. A similar study can also be conducted by studying non-clinical datasets.

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REVIEW ARTICLE

ADOPTION OF ONLINE RESOURCES TO IMPROVE THE MARKETING PERFORMANCE OF SMES

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ABSTRACT

With the increase in the pace of globalization, SMEs are facing stiff competition from multinational firms. The entrepreneurs owning SMEs have fewer funds, but they need to improve the output of their organizations. Technology adoption can help owners of SMEs to match up with the pace of multinational firms because it can increase their reach and improve overall performance. In this paper, the authors will discuss whether online resource adoption (social media, e-commerce, technology 4.0) will enhance the marketing standard of small and medium enterprises or not. SMEs can achieve economies of scale because of the prominent usage of technology. The findings of this paper will help owners/managers of Indian SMEs to understand the use of online resources in improving marketing within a limited budget. COVID-19 has also pushed all the organizations towards the usage of technology. Either big or small organizations, none of them can ignore the use of technical sources for marketing in this digital era.

KEYWORDS

SMEs, Online tools, social media, Digital Marketing, E-commerce, Management

INTRODUCTION

As the pace of globalization is increasing, either it is a developed country or a developing country, the pressure is also growing. The government in all the countries is putting pressure on the companies to generate more revenue, sales and fulfill the goals of sustainable development. The focus of the government is not only on big multinational organizations, but it is also on SMEs. While looking for a creative solution, the governments are hopeful towards SMEs' progress. SMEs can be a game-changer, but they need some support. [1,2] have argued that technology adoption could be helpful for SMEs in overcoming all types of challenges. The COVID-19 has portrayed different kinds of challenges to SMEs, and technology can overcome all those challenges. SMEs with a better marketing effort can be a front runner in their contribution towards national growth. In this paper, the researchers will explore the effect on the marketing performance of SMEs with the adoption of different forms of technology, and there will be a discussion on other elements of digital marketing that can be helpful for SMEs. Marketing through social channels and

technology is still in a nascent stage, especially in SMEs located in developing countries.

KEY OBJECTIVES

The key objective of this paper is mentioned below.

- The key objective is to derive the various benefits in the marketing performances of SMEs by adopting different forms of technology, i.e., social media tools, e-commerce, and ICT tools.

PROBLEMS OF SMES

The definition of SMEs is different as per continent and country, but these SMEs have been categorized based on investment and people employed. SMEs are critical contributors to economic growth in both developed and developing countries. On the one hand, the government is expecting SMEs to contribute towards success, while on the other hand, the government is not able to relocate the resources towards SMEs. The owners and managers of SMEs are working in the dearth of resources. SMEs are producing goods and services, and they need to tap a much broader market if they want to increase their output and contribution to the economy. No one can deny the fact that marketing plays a vital role in managing the relationship between customers and firms in the business.

SMEs must reach many customers, but they have limited finance. Traditional marketing sources are costly, and SMEs also need to show some innovation in their approach. Customers are essential for big as well as small organizations but reaching many customers is a challenge for SMEs. The marketing department is a crucial department for SMEs because it connects the organization with the customers. Large multinationals are putting particular emphasis on marketing function because they want to increase their market share and sales. SMEs also need to understand the importance of marketing function because this function ultimately increases the sales of the organization. Technology adoption in any form can help organizations in sustainable development and finding solutions to problems [2, 3]. It can also help the organizations in improving their post-COVID performances. Pre Covid and Post Covid, marketing is always a challenge for SMEs. The list of problems is growing for SMEs, and some of the issues are mentioned below.

- How to tap the vast customer base?
- How to increase the market share within limited resources?
- How to reduce the expenses on marketing?
- How to produce more output in less input?
- How to improve the market presence and brand exposure?

LITERATURE REVIEW

S. NO.	AUTHOR (S)	HOW IS TECHNOLOGY ADOPTION IMPACTFUL FOR THE MARKETING ACTIVITIES OF SMES?
1	[4]	Twitter and other social media tools provide benefits for different types of business in terms of networking, improved relationships, and the online branding of firms. Usage of Twitter plays a vital role in electronic word-of-mouth marketing in SMEs.
2	[5]	In traditional sources, SMEs are investing more money in marketing. ICT tools can help those SMEs in the reduction of extra costs and advertising. It will speed up communication and can reduce the transaction cost. The physical limitations can also be avoided with the usage of ICT tools.
3	[6]	The usage of web-based marketing tools is in the initial stage in Malaysian SMEs, but this usage is beneficial for them. Web-based marketing can reduce the efforts of SMEs. The use of websites and emails as tools of web-based marketing can extend the approach and range of SMEs.

4	[7]	The authors have suggested the reasons to adopt social media marketing. Social media marketing helps in reducing advertising costs, provides an essential competitive advantage, helps in reaching new customers and target market. The benefits of using social media marketing are increasing brand awareness about the products, valuable customer feedback, customer support, and it also improves the participation level of the customers.
5	[8]	E-commerce adoption improves the overall marketing of SMEs. It establishes two-way communication, which enhances the sales and marketing efforts. It helps in customizing customer service, which will further increase the customer satisfaction level.
6	[9]	Marketing through social media tools is more helpful in increasing brand popularity, building more awareness, attracting a new set of customers, building loyalty, and increase the customer base. The adoption of social media channels enhances the marketing performance of SMEs.
7	[10]	The content was written on Facebook, and Twitter social networking sites play an essential role in attracting customers. It improves the communication process and overall interaction with the customers.
8	[11]	Facebook usage positively impacts the non-financial performance of the firms as it is helpful in cost reduction in marketing. The information flow is for a much wider audience, and it improves customer relations as well.
9	[12]	E-Marketing through various technological channels is easy to use, and it increases productivity as well. E-Marketing is suitable for advertisement purposes and provides a better way to communicate with customers. In fact, it helps in two-way communication with the customers.
10	[13]	The authors argued that digital marketing helps SMEs in business expansion, speedy communication, increasing sales, and creating more business awareness. The essential tools for digital marketing are SEO, SEM, emails, and other types of social media. SMEs need to improve their knowledge of digital marketing to grasp the full advantage of opportunities created by digital marketing.
11	[14]	Marketing through digital channels has some challenges, but it offers SMEs an increased number of opportunities to innovate their business performance, and it can also help in redefining customer segments.
12	[15]	The findings of the research suggest that SMEs are moving towards social media marketing due to low costs. The adoption of social media marketing is helpful in improving product sales, and it will also increase profits and customer satisfaction.
13	[16]	The E-marketing services with the usage of technology help in improving the export performance of the firms.

14	[17]	E-commerce adoption is helpful for the marketing performance of the organization as it increases sales and improves the company image.
15	[18]	Social media marketing improves the overall competitiveness of tourism SMEs in South Africa because it provides a chance to do two-way communication with the customers. Marketing on social media channels increases the market expansion.
16	[19]	The researchers have argued that social media tools play an essential role in the business growth of SMEs in all the dimensions of the marketing mix, business expansion, and customer relationship management.
17	[20]	This study suggests that social media tools are not only helpful in marketing, but they are also helpful for the sustainable development of SMEs.
18	[21]	In this era of globalization, web 2.0 tools are used as integrated marketing tools for the business expansion of SMEs.
19	[22]	The authors have argued and concluded that e-commerce adoption has a positive effect on the sale performance of SMEs. It increases the sales of SMEs and improves the relationship between the SMEs. The usage of e-commerce adoption results in increasing the income level of SMEs. As the income level of the SMEs will increase, it helps in improving the growth of the same.
20	[23]	The adoption of e-commerce and technologies helps the organizations in achieving more in terms of marketing in lesser time.
21	[24]	Digital marketing is making the work easy for SMEs because it will help them in providing accurate and on-time information. Digital marketing made the information flow more comfortable and natural. There are specific barriers to adopting digital marketing tools and their usage, but the process is helpful in increasing awareness.
22	[25]	The authors have argued that digital marketing through social media tools helps organizations in achieving sustainable growth.
23	[26]	The study reveals that if the organizations adopt information and communication technology, it will help them in improving their sales performance and take it to another level. The SMEs who are not investing in information and communication technology will soon be obsolete.

IMPLICATIONS FROM THE LITERATURE REVIEW

In the broader context, the literature review suggests that SMEs around the world have adopted mainly three types of technology, i.e., e-commerce websites, social media tools, and ICT tools. The SMEs are also moving towards technology 4.0, but it is in a very nascent stage [2]. [2] have argued about the adoption of different types of technology in which they have discussed technology 4.0 as an essential element, but the usage of that type of

technology is not much. There are specific critical insights drawn from the literature review. The first insight from the literature review is that though SMEs have started using technology, there are more challenges in technology adoption. The employees working in SMEs need more training on technological tools for producing better results. There is no doubt in the fact that usage of technology reduces the expenses of SMEs to the desired level. The use of technology helps SMEs in achieving economies of scale, and it allows them to fulfill their goals.

In this paper, the main aim of the authors is to find out the effect of technology adoption on the marketing performance of SMEs. It can be evoked out that the marketing performance of the firms is improving with the usage of ICT tools, e-commerce, and social media tools. SMEs can expand their reach, and the technology is helping them in business expansion over the boundaries. SMEs can market their product well and be able to take their products/services to many customers. In this era of globalization, the market is full of opportunities. The usage of technology is making the SMEs eligible to explore all the options which were not possible otherwise. Within limited finance, SMEs are growing only because of better usage of social media tools, e-commerce tools, and several other technological tools. Another aspect drawn out from the literature review is that technology adoption is also helping SMEs in moving towards sustainable development through sustainable marketing efforts. The owners and managers of SMEs also have the pressure of sustainability, and their practices should suffice the purpose of sustainability. Technology provides that impetus to the owners and managers of SMEs that they can move towards sustainable business practices. Marketing through social media and e-commerce tools is also helpful in improving brand awareness and overall feedback about SMEs. Basically, technological tools provide a way out of two-way communication between the employees and the organization.

DIGITAL MARKETING: BRINGS NEW OPPORTUNITIES FOR SMES

In the coming time, SMEs need to invest more in digital marketing because digital marketing can lead them towards the pathway of success. Digital marketing can provide equal opportunities to all businesses, either big or small. SMEs have limited finance, and digital marketing can flourish them in that limited finance. It has been noticed that companies using social media tools are generating 78% more business in comparison to the companies not using such tools. In actuality, the various components of digital marketing help the SMEs in targeting the right audience to whom they want to sell their product and generate high revenue as well. At the initial level, the buyers need some time of push or influence. Digital marketing provides that necessary impetus, power, and push to SMEs. Every SME wants to grow, and they want to sell their products/services in the global market. They have the option to market their products/services through traditional marketing channels like print media or television advertisements. At the initial level, the SMEs want to reach many people, there may be few who will show interest in products/services, but they cannot limit their approach. The online marketing tools inculcated in digital marketing can provide maximum reach to SMEs, which traditional forms of marketing cannot do for them. Online marketing can interact with prospective customers, which conventional forms of marketing cannot do. Traditional marketing is one-way marketing as it does not provides an opportunity for the customers to revert to an advertisement in any paper. Customers see an ad in print media, magazines, newspapers, or television, but they cannot revert their opinion or feedbacks while the scenario is different in online or digital marketing. Primarily organizations using social media tools for digital marketing, and those social media tools provide an opportunity for two-way communication between the company and the customers. The organizations can save a lot of money and reach a global audience within no time. Digital marketing analytics can help them to track the responses of their efforts as well. SMEs do not have many investments. They have limited investments, and in those limited investments, they need to manage the overall return on assets [27, 28]. Social media tools and online marketing can boost the overall return on investments for marketers.

There is no doubt in the fact that online tools and technologies are helping SMEs in increasing their sales and widening their business horizon. There are more than 3.6 million internet users across the world, and digital tools can help companies in reaching those users. There are specific strategies that can help SMEs is improving their digital marketing efforts.

- The first and foremost thing more SMEs do is to inculcate SEO analyzer tools on their websites. SEO helps the users in finding your website. When users put specific phrases or words, SEO marketing helps

them to find your website easily. SEO analyzer tool allows SMEs to find quality traffic. It is an inbound marketing process in which it is easy to reach out to the customers when they want your products and services [29]. Inbound marketing through SEO tools is much more customer-centric in which cold calling, cold emails, and interruptive advertisements can be avoided. Search engine optimization helps the organization in avoiding any unnecessary costs. The content published on the website matters, but once that content has been published, the organic traffic keeps coming on the website. SEO and PR are not different marketing strategies. One can use them in a combined manner. SEO marketing and PR marketing are other, but one can always use them in a combined way. Content is the key, but it connects both SEO and PR. SEO professionals can strengthen their PR with a substantial range. SEO strategy helps the organizations in moving ahead in the competition by solid content and blog marketing.

- The second marketing tactic for SMEs is to perform a keyword search. Keyword search through keyword planners can be beneficial for organizations. It opens new opportunities to rank your website high in competition against others [30]. The keyword planner on Google helps in finding new keywords and phrases. It helps in discovering different types of search volume trends and historical data. One can choose the keywords as per budget and bid prices. It is required to narrow down the result as per geographic location, date ranges, and other things. SMEs which are mainly introducing new products or services should find new keywords and check the volume and forecasts against those keywords. The average monthly searches and the work help the companies in identifying the potential benefits of the keywords.
- The third most crucial marketing tactic is to use blogging. WordPress can really be helpful for SMEs in writing a blog and all. Around the world, more than 409 million people read 23.7 billion blog posts [29]. The blog posts are an effective and interactive medium to connect with the customers. It provides opportunities to express ideas, emotions, and inner self.
- The fourth important marketing tactic which SMEs can use is the effective use of content marketing. Content is the key to drive the customers. It is essential for marketers to create quality, reliable and valuable content because, ultimately, content goes that initial thrust in the customers. The marketers can explore different dimensions of content. For example, one can always try creativity and innovation in content marketing through videos, podcasts, and online courses. SMEs can also take the help of outside content writers to prepare quality content.
- Email marketing is another important and decisive tool of digital marketing. Daily there is a lot of traffic on the websites. It is not mandatory that every person who is visiting the website will purchase the products or services, but marketers can capture the email address of the visitor. Later, emails remain as the highest converting channel for the leads generated. Email marketing is low in cost but has a global reach. It is easy to set up and automate email marketing. It is also the right way of interaction.
- Data analytics can be helpful for SMEs in their business growth because analytics can help you in understanding the demographics of your respondents or prospective customers. The main difference in traditional marketing is that the organizations are unaware of the future customers, but digital marketing and analytics will take you to the right customers. While doing traditional marketing, one never knows if he/she is targeting the right clientele or not. Digital marketing and analytics are much more economical and conventional in comparison to traditional media [31]. It is saving the cost of the company and improve their offerings because SMEs can track the seasonal changes in demand.

KEY FINDINGS AND IMPLICATIONS FOR MANAGERS

The key findings of this secondary research are mentioned below. The manager of the SMEs should seriously think about technology adoption because it can take marketing to another level. The managers should train their employees on the usage of online marketing tools because it is the need of the hour. The managers/owners of the organization should transfer the knowledge of technology usage to their employees.

- The primary finding of this paper is the marketing efforts of SMEs improve with the adoption of technology because it helps the organization to reach prospective customers, which is not possible with traditional marketing.
- Secondly, marketing through different technologies also helps in saving the cost, time, and efforts of the company.
- Thirdly, digital marketing is the new dimension of the technology mix, which can help SMEs in increasing their sales and reducing their cost. The different components of digital marketing help the marketing in accessing the market needs ideally.
- The online marketing tools and marketing through social media channels will also help the organizations in achieving their goals of sustainability.
- The traditional marketing tools only offer one-way communication between customers and organizations, but marketing with the help of technology can encourage two-way communication between customers and organizations.

CONCLUSION

In the end, it can be concluded that technology adoption can be very fruitful for SMEs in improving the marketing and sales of products and services. As the number of internet users is increasing, the internet is the most prolific medium which connects customers with the company. SMEs have started using technologies, but still, the adoption is in a very nascent stage. COVID-19 pandemic introduced a push in technology, and in coming years, SMEs will be bent more towards digital marketing. Digital marketing offers several tangible and intangible benefits to SMEs, and SMEs should train themselves well to adopt the technology.

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RESEARCH ARTICLE

LOW COVID-19 MORTALITY IN OLD AGE HOMES IN WESTERN INDIA: AN EMPIRICAL STUDY

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ABSTRACT

BACKGROUND:

The Coronavirus disease 2019 (COVID-19) has emerged as a public health crisis globally. Management of old age homes have been challenged during the ongoing pandemic crisis, as the elderlies are by far the most vulnerable population group in context to prone to infection of COVID-19 disease.

OBJECTIVE:

The study intended to understand the effect of COVID-19 on western Indian elderly care homes, the actions taken by the administration, and the challenges faced during and post-lockdown period.

METHOD:

A total of 44 care homes across three states of western India were contacted for data collection during the period of September-December 2020. Semi-structured interviews of the administrators were taken to gather the required information to achieve the study objectives.

RESULTS:

Out of 44 care homes, ten care homes reported 169 cases of coronavirus infection and seven deaths. Hence, the rate of reported COVID-19 cases was found to be 1074 per 10,000 residents.

DISCUSSION:

Results of the study indicated the significant steps taken by these old-age care homes to stave off the infection spread among the occupants. It was observed that an average of 26% of the occupants was sent back to their home/relative's home before the lockdown to decongest the care homes. Care homes in western India seemed to have a very low infection rate and a very low number of deaths as compared to the Global Scenario. The present study also highlights the gaps in policy and calls for urgent action by the government for the regulation of old age homes in India.

KEYWORDS

Old age homes, COVID-19, Low mortality, India, Elderly, Vulnerable

BACKGROUND

The sudden appearance of the COVID-19 epidemic has caused concerns among frontline medical staff, patients, and the general public. The WHO declared COVID-19, a pandemic on March 11, 2020, and has called for governments to take 'urgent and aggressive action' to change the course of the outbreak, especially for the vulnerable population.

COVID-19 has taken the world by storm. According to the World Health Organization, the elderly aged more than 50 years are highly susceptible to developing severe complications of COVID-19. [1] As elderlies are the age group where if the care is not taken, even due to the aging factors body's immunity goes down. [4] Hence, it is widely practiced to keep elderly people in a separate space or isolation due to the fear of family members transmitting infection to them and others. This has resulted in a higher level of anxiety and loneliness among the elderly. [5]

The elderlies are by far the most vulnerable population group in context to prone to infection of COVID-19 disease. As per the reports, age is the most important determinant in the magnitude of the spread and effect of COVID-19 disease especially after 65 years of age. [1] It has become significant to take extra care for elderly persons at home, but when it comes to old age homes, this becomes a huge challenge since not just one or two, all the occupants need special care to avoid getting infected. As care homes have a unique, mixed population of staff enrolled in multiple facilities and elderly residents with multiple underlying comorbidities, it becomes difficult to avoid any occurrence of infection spread. Elderly residents are at high risk of severe complications and death due to respiratory viruses, such as influenza etc. including SARS-CoV-2 Virus.

During the initial months of the COVID pandemic, community care facilities including nursing and residential homes were termed as "hubs" and "besieged castles" in North America and Europe, having experienced large outbreaks due to rapid transmission of SARS-CoV-2. whereas, Canada experienced a high number of coronavirus-related deaths in elderly care homes[2]. As per the global reports, England and Wales observed 45,899 deaths among care home residents between March 02 and May 02, and 12,526 got infected by COVID-19.[3] Similar experiences have been observed in France, Spain, and the United States, where only limited measures were taken. But conversely, countries like Australia, Austria, and Slovenia, which implemented "specific prevention measures" targeted at elderly care homes, including segregating units and wide screening for the COVID-19 disease, have reported fewer cases and resulted in fewer deaths. [2]

In India, according to the grey literature and news reports published, the southern part of India reported COVID-19 cases inside the old age home from Kerala, Tamil Nadu, and Karnataka [6] whereas few residents diagnosed with COVID-19 in Navi-Mumbai during October-November,2020[7-8]. It is surprising to note that only a few news reports documented the status of old age care homes in other states of India.

In India, as cases are rising abruptly, deaths are recorded on daily basis. The rate of COVID-19 death among the elderly is high in India. Despite, hardly any studies have reported any data on the numbers of elderly residents of long-term care facilities such as nursing homes, old age homes, who might have been infected or died from confirmed or suspected coronavirus. Hence, the present study intended to understand the effect of Coronavirus disease 2019 (COVID-19) on Indian elderly care homes. The study also aimed to know the actions taken by the administration of homes and the challenges faced during the lockdown period. It would be noteworthy to understand the administrative actions taken by Indian elderly care homes during such a difficult time of pandemic. The study was conducted to explore the situation in few states of India such as Gujarat, Maharashtra, and Rajasthan, where a number of covid infection cases are substantial in general.

METHODOLOGY

STUDY DESIGN:

We adopted a qualitative study design that included in-depth semi-structured interviews with administrators/managers of the old age homes. It was necessary to adopt the qualitative approach as this study required an in-depth assessment of the perceptions of administrators about the strategies adopted, challenges faced by them, which would not have been possible through a quantitative approach.

STUDY SETTINGS AND SAMPLING:

Respondents in this study were mainly administrators/ owners/ managers of care homes in three states namely, Gujarat, Maharashtra, and Rajasthan. These three states were selected based on two rationales, the first being states with a high rate of mortality and COVID-19 infection case reported and the second being the ease of reaching the care home respondents due to available contacts and references.

DATA COLLECTION AND ANALYSIS:

Data were collected through telephonic interview by trained doctoral scholar students, Research associates, and faculty. Total 52 care homes were contacted during the months of September-December 2020, out of which 44 responded. They gave consent to give macro-level information such as the current status of COVID-19 cases/deaths, the demographic profile of occupants and related statistics before and after lockdown, available facilities, specific precautions due to pandemic, challenges, and policy changes in wake of such difficult time.

A semi-structured interview guide was used for conducting in-depth interviews. The main purpose of in-depth interviews was to explore the knowledge, perceptions, and experiences of administrators working in the old age homes.

Data collection was done by using semi-structured interviews, with each interview lasting for about 20-30 minutes. Initial questions included information like name and address of care homes, followed by details such as rate of occupancy before and during a pandemic, reported/suspected covid infection case, and other related information. Moreover, Care homes' responses to pandemics were captured by asking open-ended questions related to challenges faced by administrators, available resources/ facilities, and actions taken to avoid the occurrence and transmission of infection among elderly residents. These questions were followed by questions related to their resourcefulness, staff and medical treatment accessibility and availability; for instance, frequency of doctors/nurses' visits, isolation or quarantine facility, and basic equipment/medical kits such as thermometer, Blood-pressure measuring equipment, Oximeter, and Oxygen cylinder. Subsequently, probing questions related to staff shortage during lockdown were followed.

Right at the outset, the participants were informed about the objectives of the study, and explicit verbal consent was obtained for conducting the interviews. Additionally, the authors gave assurance to the respondents that the interviews were solely for research and was not a sponsored exercise to evaluate the care homes objectively; anonymity was also assured and safeguarded in the analysis. All interviews were conducted in the local language and translated to English during transcription by the researcher who was fluent in both languages.

From the data, a generic framework depicting factors for attraction and constraints was constructed. General themes emerged from the qualitative data, such as the resourcefulness of the old age homes, Precautions are taken to avoid transmission and challenges faced by old age homes. A few quotes have been shown in the findings to illustrate the dominant opinion of participants.

RESEARCH ETHICS

Ethical approval for this study was obtained by the Institutional Ethics Committee of Indian Institute of Public Health Gandhinagar, Gujarat and the entire study was performed by ethical standards.

FINDINGS

Key findings are given in Table 1.

TABLE 1: CHARACTERISTICS OF ELDERLY CARE HOMES INCLUDED IN THE STUDY (N= 44)

	GUJARAT	MAHARASHTRA	RAJASTHAN	TOTAL
Total old age home surveyed in India	13	17	14	44
Types of ownership				
Private	7	10	7	24
Trust based/Public	6	7	7	20

Occupancy before lockdown (pre-COVID)	680	820	614	2114
Occupancy during COVID pandemic	525 (77 %)	598 (72 %)	450 (73 %)	1573(74%)
Occupants-Gender wise distribution Male Female	 40% 60%	 71% 29%	 47% 52%	 51% 49%
COVID cases reported	44	80	45	169
Deaths reported due to COVID	3	2	2	7

Maharashtra (total cases = 19,60,000 & 17,150 cases per million), Gujarat (total cases = 2,49,913, & 3986 cases per million) and Rajasthan (total cases = 3,11,620 & 4,523 cases per million) are the states situated in the western part of India and showing the higher number of cases in comparison to the other states. The most affected districts are Mumbai (total cases 2,97,638 & 16,176 cases per million), Pune (total cases = 3,77,265 ,& 120,918 cases per million) & Nagpur (total cases=1,29,210 & 53,614 cases per million) in Maharashtra, Ahmedabad (total cases 58,915 & 10,448 cases per million), Rajkot (total cases = 20,898,& 16,200 cases per million) & Surat (total cases = 50,554, & 11,334 cases per million) in Gujarat and Jaipur (total cases = 58,005, & 18,894 cases per million) in Rajasthan as of 10th January,2021. The old age care homes included in the study are situated in and around these districts.

As we can see from the summary table, three care homes out of 13 reported 44 cases and three deaths in Gujarat, five care homes out of 17 reported 80 cases and two deaths in Maharashtra, whereas two old age homes out of 14 reported 45 cases and two deaths in Rajasthan till we did the inquiry, i.e. 5th January, 2021. It was found from these surveys that an average of 26 % of the elderly residents left the home before the lockdown, i.e. during March-end. The same thing was seen in a total of 21 old age homes across the three states, where residents were sent back.

STATUS OF COVID-19 SPREAD IN OLD AGE HOMES

One of the old age homes in Gujarat reported 35 cases with the transmission from the administration department employee who was found to be asymptomatic covid infected. As per the information shared by the administrator, they all were shifted to the covid care centre and all recovered. Another old age home resident was diagnosed with covid when he was undergoing dialysis in the hospital. He died in the hospital itself and not in the old age home. One of the care homes in Maharashtra reported 19 covid cases during the last week of November out of the total residents of 60, whereas another care home near Mumbai reported 40 cases and no death. These care homes surprisingly reported no death despite a significant number of cases. One of the old age homes near Jaipur in Rajasthan reported 25 cases out of the occupancy of 100 and did not report a single death. One old age home near Mumbai reported 3 cases and one death of comorbid elderly.

It was found that 40 old age homes out of 44 did not have any cases till August 2020. Although later more than 100 cases were reported in these surveyed homes during the period of September-December, only seven deaths were reported. These findings contradicted the situation of the old-age care homes in other countries, where the majority of the cases and deaths were reported from old age homes. [9-11]

QUALITATIVE FINDINGS:

The resourcefulness of the old age homes

It was found that 100 % of homes were equipped with a thermometer, 95 % with blood pressure measuring equipment, 70 % with Oximeter but only 5 % with an oxygen cylinder. All the old age homes had the regular visit of doctors, although the frequency was varying from weekly to monthly. Three care homes had a facility of resident doctors for a medical emergency and well-equipped

hospitals to refer. While two homes had difficulty reaching out to hospitals during referral and the availability of ICU beds for COVID patients. 80 % of the care homes had a facility of isolation and quarantine ready if any cases arise. *COVID-19 is one of the greatest challenges we have faced during my entire tenure at old age home. We have followed the government guidelines strictly. As the elderly, are most vulnerable to COVID-19, therefore regular monitoring of their health is extremely important. We have procured the essential medical instruments- pulse oximeter, thermal screening equipment etc. One of the old age home administrator said.*

Initially, we were scared due to COVID-19. However, we have to manage the crisis and we have arranged the frequent visit of healthcare personnel to monitor the health of the elderly and look for early symptoms if any. Further, we have also made available isolation and quarantine facility. One of the Old-age administrators shared.

Only 18 % of the care homes faced the staff shortage and higher absenteeism during and after the lockdown period mainly because of their locational disadvantage being far from the city and lack of residential area nearby.

85% of the care homes were adequately funded and had no issues with resource allocation to meet the needs of residents, but in the rest of the homes, resources were scanty to meet the requirement. In some of such NGO-trust-based old age homes, trustee kept the homes in good shape by investing their money as a philanthropic activity. As he said that *these elderlies residing at this old age home is like my family, if donors do not turn up, I had to run the old age home by my fund. I cannot stop feeding my family and taking care of them.*

Due to lockdown, many of the donors are not able to visit the old age home. This has led to the financial crisis for some of the old age homes. Our study revealed that old age homes are not getting much support from the government. Few administrators have informed that the appropriate government policy is not in place to provide financial and other resources to meet the demand of old age homes.

Precautions taken to avoid transmission

The administrators shared the actions taken by them to keep safe their elderly residents from getting infected with the coronavirus.

We were scared to see how old age homes in other countries were affected by covid and how difficult it was to avoid transmission from staff and outside world. So, we first stopped all contact with the outside world as much as possible. We requested our staff to live temporarily in the old age homes, thus preventing contact with the outside world. One of the administrators said.

Interestingly, 65 % of the old age homes insisted their staff to stay in old age homes and not commute daily from their residence. The rest of the old age homes had a strict policy for their staff to get sanitized before entering into the premise of elderly homes. This was not seen in the majority of the western care homes, where rotation of staff among care homes was practiced. [10] Literature pointed out that the infection rate among care home residents was very high in a western country because the staff used to work in more than one old age home resulting in them being the source of transmission to elderly residents. [15] Hence, such a step of insisting the old age home staff to either stay in the old age homes or enter after through sanitization helped in stopping the spread of infection.

In March 2020, when we heard that virus has entered in our state too, we thought it would be difficult to follow the norms such as physical distancing, avoid group meetings etc if we run with our full occupancy. Hence, we requested the relatives of some of our residents to take them to their home so that it would be relatively easy for us to keep the old age home away from infection transmission. One of the old age homeowners said.

Six old age homes from Gujarat, ten from Maharashtra, and five from Rajasthan saw a decrease in the elderly population due to sending them back to their relatives to decongest the old age homes Thus, it was somewhat easy for them to manage the smaller number of residents and following the physical distancing norms from all aspects.

We ensured proper sanitization of all the outside items such as vegetables etc before entering the premises. we also took utmost care of proper sanitization of the old age home premise frequently. We had to take extra care, as we have all the vulnerable groups of people living with us. One administrator said.

Most of the old age home confirmed that the safety protocols of fumigation and deep sanitization were taken periodically. All elderly residents, caretakers, staff, and administrative staff were educated for maintaining social

distancing, wearing masks, sanitizing, other safety protocols, and preparedness.

I like the Indian food habits of our ancestors, which emphasis more on Ayurveda and Sativk food. Even before this covid came into our lives, we were preparing healthy food for our elderly residents. But soon after this virus started spreading, we started giving the ayurvedic "kadha" to everyone including residents and all the staff residing in old age homes.

Most of the administrators brought dietary changes and added certain physical activity to the routine of residents to keep them engaged and healthy. To boosts their immunity, vitamin. C, D, and multivitamins and ayurvedic "*kadha*" were added to their diet. The elderlies were encouraged to make video calls to their families to reduce their anxiety. No resident was allowed to go outside and there was no contact between staff who use to go outside to procure resources. Two of the care homes took special care for their bedridden elderly to avoid an outbreak situation.

Challenges faced by old age homes

It was challenging for some old age homes which were managed on a very shoestring budgets by non-professional philanthropic organization to ward off the probability of infection spread among their residents. Few of the care homes had enough funds to survive, whereas the majority of the old age homes faced a substantial decrease in the number of donors and funds.

Another challenge for the administrators was to keep their residents in a good mood and well-being. As one of the administrators shared, *Generally, we used to take our residents for some half-day or short excursion to nearby areas to bring some change in their monotonous daily routine, but due to such unprecedented pandemic time, we could not do so*. Most of the care home administrators mentioned this situation as challenging. Moreover, they could not allow their family/friends also, who generally used to come to spend quality time with their elderly residents, or for some donation and celebrations. Thus, this situation brought a lot of dullness in the lives of residents.

One of the administrators from Nashik said during the interview, *we have some residents who are homeless and have no families to look after them. They are completely dependent on us, so their physical and mental well-being is our responsibility. I want to urge the authorities to regulate the news channels and other media on which all the time news will be broadcasted related to deaths due to COVID-19 and chaos in different parts of the world due to COVID-19. They could have shown favourable cases of recovered and about the good recovery rate along with that news so that it can bring some solace among these elderly people*. Hence, this pandemic time has brought a lot of anxiety and mental well-being issues among elderly residents staying in old age homes away from their loved ones.

Although some of the old age homes made a provision for their residents of a video call with families, some lifestyle changes such as practicing yoga and meditation, etc. One of the managers at the old age home of Ahmedabad shared, *we have arranged online yoga practice sessions every alternate day for our residents so that their healthy routine continues and eventually will help to enhance their overall wellbeing too*. some of the administrators also arranged mental health counselling sessions for residents to improve their psychological well-being.

DISCUSSION

Unlike the "Spanish flu" of 1918, which became an international epidemic over a year, COVID-19 has spread to every inhabitable continent within weeks, outpacing our health system's ability to test, track, and contain people with suspected infection. The demographic transition led to a significant increase in the aging population, which is a challenge for healthcare systems. Aging is often accompanied by multiple and complex health problems associated with difficulties and disabilities in daily living [9]. The pandemic has affected the vulnerable population more significantly than others and one such group is the elderly. In India about 83 million persons are 60 years of age and older, representing over 7% of the nation's total population, according to World Health Statistics 2011 [10]. The elderly people are also associated with co-morbid conditions, which again makes them more vulnerable. The present study aimed at identifying the situation of old age home during the COVID-19 pandemic, mechanisms they have put for preventing the transmission of the infection, mental health challenges occupants have faced due to the social distancing and challenges faced by old age homes.

Our study revealed that old age homes are less affected than the general population, despite residents are more vulnerable to the COVID-19. The transmission of COVID-19

can be prevented with social distancing and other preventive measures like regular hand washing, use of mask, reducing exposure, and regular monitoring of health situation. In our study, we have found that old age homes followed the government and other guidelines strictly and this may be the reason for the low number of COVID-19 cases and mortality. However, the study also revealed that the majority of the old age homes were not prepared for public health emergencies of such magnitude. The old age homes in India are largely lack the public health orientation and staff members are not aware of preventive and public health approaches. Further, the government doesn't have any system to monitor the health of residents living in old age homes. In India, through *Rashtriya Bal Swasthay Karykram* (RBSK), the medical team visits schools and review the health of children. [11] This has helped in the early identification of children's diseases. A similar approach can be devised for old age homes, the government should come up with the appropriate policy, wherein nearby government health facilities can visit old age homes.

Senior citizens also need appropriate nutrition for tackling various diseases linked with poor nutrition and low immunity. Nutrition is also important to improve immunity and well-being. COVID-19 is more prevalent in people with low immunity and evidence suggests that COVID-19 is less severe in people with adequate nutrition including vitamin D level. [12] Therefore, old age homes should be equipped with nutritionist for guiding the food of residents and staff should also have orientation to nutrition. The training and capacity building of old age home staff in the area of public health, hygiene, sanitation, and nutrition should be planned. This will make them well prepared for any future public health emergency.

The total lockdown was the only immediately available, best, and ideal solution to the control COVID-19 pandemic for most of the nations. Social distancing is a critical means to break the cycle of infection. However, the lockdown, a popular policy of confinement has significant psychosocial, economic, and health consequences for a larger section of the society, especially for the elderly population. Isolation and social distancing help in achieving the goal of reducing infections, however, reduced access to family, friends, and other social support systems are linked with severe mental health issues. [13] The fear of infection, fear of death, loss of social contacts, uncertainty about various aspects of life, inadequate information, loss of outdoor and social activities, disconnection from nature, loneliness, depression, financial loss, and obstacles to access to essential services are key stressors during this critical period. [14] In our study, similar findings were obtained which indicated low mental well-being of residents due to curtailed access to outdoor activities, outings, lack of meetings with relatives and fear associated with the diseases. Further, the lack of mental health counselling and services exacerbated the mental health challenges for elderly residents. Access to mental health services should be made available for the elderly living in old age homes. The government through the National Mental Health Programme can take initiative for providing such services to old age home residents for helping them to improve resilience and also building coping capacity.

Our study also found that some of the old age homes also faced financial crisis due to lockdown and the pandemic. In India, the majority of old age homes are run by NGOs and social organizations and largely dependent upon the donations received from individuals and institutions. The lockdown resulted closure of transportation and mobility, which led to the unavailability of finance to run the old age homes. The Ministry of Social Justice and Empowerment is responsible for regulation and providing necessary support to old age homes. However, in India, old age homes are largely unregulated, and the government is not monitoring their situation regularly. The government has introduced several policies for the elderly including National Policy for Older Persons (1999), the National Initiative on Care for the Elderly (2004), and the Maintenance and Welfare of Parents and Senior Citizens Act (2007). [15] Despite the availability of several policies for the elderly, the implementation of these policies largely lacking. Recently, the Government of India has introduced the National Programme for the Health Care of the Elderly (NPHCE), aimed at prioritizing healthcare of the elderly and promoting palliative care. However, this program is largely aimed at providing institutional care and does not involves old age care homes and home-based care. In India, some states, like Kerala and Karnataka have initiated home-based care for elderly and chronically ill-patients. The Neighbourhood Network in Palliative Care in the state of Kerala includes several desired components such as care at home, caregiver support, financial aid from the community, and civil society involvement. [16] There is an urgent need to cover old age homes in the national program for the elderly and also in various government initiatives. The government should also work towards creating a robust database of all the old age homes and elderly living there. This will help in streamlining various

strategies for improving the well-being and health of the elderly during crisis.

CONCLUSION

The present study highlights the gaps in policy for elderly care in India and calls for urgent action by the government for the regulation of old age homes in India. There is an urgent need to provide necessary resources to old age homes for improving the health and well-being of the elderly. Further, the study also come up with interesting findings about the low level of mortality in old age of homes, despite the elderly being the most vulnerable population. There are some lessons to be learned from old age homes in managing the COVID-19 pandemic and reducing the transmission. It would be interesting for clinical researchers to understand the reason behind the low mortality and low infection rate in old age homes apart from the other reasons cited in the paper. The comprehensive documentation of such practices will help devise an appropriate public health emergency in the future.

LIMITATIONS OF THE STUDY

Since the study was done through a telephonic survey, there was an absence of non-verbal cues like observing their expressions, emotions with which they talk, observing the facility itself. Some of the respondents may not have given full information during the interview due to the fear of loss of image or lack of trust., hence, the authenticity of the responses was not confirmed. There might be some sort of respondent's bias about giving positive or distorted answers regarding the covid situations to showcase the favourable picture. These gaps in the study need to be addressed with on-site observations. This study was conducted at the macro level, which could not consider the perspectives and responses of old-age home residents. Findings could have been very different if the study could have been conducted taking all the old age occupants as respondents. This study considered only tested and confirmed covid cases and not the suspected cases. Results could have been different if sero-surveillance would have been done with blood testing and our interviews could have been conducted earlier in the situation at the starting of the lockdown period.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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RESEARCH ARTICLE

COVID 19 PANDEMIC: ASSESSMENT OF KNOWLEDGE AND ATTITUDES IN BIOMEDICAL WASTE MANAGEMENT AMONG HEALTH CARE PROFESSIONALS IN TAMIL NADU

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ABSTRACT

Coronavirus, which was started provincially at Wuhan of China, has become a worldwide pandemic by affecting individuals of almost all the world. The developing pandemic of COVID-19 disease requires social distancing and individual cleanliness measures to secure general wellbeing. The aim of the present study is to evaluate the knowledge, attitude, practice and awareness of biomedical waste management in this pandemic situation among healthcare workers and medical students across Tamil Nadu.

A cross sectional questionnaire survey was prepared to evaluate the knowledge regarding waste management and waste handling techniques. The survey found that most of the hospitals (50%) are using plastic containers for waste collection. Almost 79.7% of the respondents said they follow colour coding while disposing waste. When asked about exact category only few gave correct answers. Nearly 72.8% answered that they collect the Covid patient's wastes separately. As coronavirus is a contagious disease, each healthcare worker should be trained in safe handling of wastes. From this survey, it is clear that training about safe handling of waste is needed among workers. This survey will help government and healthcare providers to handle this Covid pandemic successfully and more effectively.

KEYWORDS

Biomedical, Waste Management, awareness, health hazards, COVID 19, Pandemic management

INTRODUCTION

The data from Central Pollution Control Board (CPCB), India indicates 28,468.85 tonnes of bio-medical waste during COVID-19 for the last six months between June to November.[1] India is the second most populous country in the world after China. [2-3] Biomedical Waste is the waste produced during diagnosis, treatment or immunization of human or animal research activities. The waste management framework consists of characterisation, quantification, separation, storage, transfer and treatment methods. India has a strict rule on onsite segregation of biomedical waste for storing, transporting and disposing as essential standards of good biomedical waste management. This practice depends on the idea of 3R's

reduce, recycle and reuse. The best Biomedical Waste Management aims at avoiding the generation of waste or recovering as much as possible rather than disposing.[4] A huge amount of biomedical waste generally arises from the isolation wards, quarantine centres and hospitals. New categories of biomedical waste has emerged after COVID-19 outbreaks.[5]

Biomedical waste differs from the municipal waste as it creates more health hazards. Biomedical waste management rules were enacted in the year 2016 and amended in the 2018. They were provided by Ministry of environment, forest and climate change (MoEF) to implement the handling activities occurring in biomedical waste management. Due to the inconsistent knowledge in biomedical waste, India has faced severe crisis during COVID-19. They are in total 198 approved biomedical waste disposal facilities in the country and 28 are under construction. [6] Biomedical waste includes general waste, pathological waste, radioactive, chemical, and potentially infectious waste, sharps (includes needles, scalpel blades), pharmaceuticals and pressurized containers are the eight categories of medical waste categorized by world health organization.[7]

For segregation, the waste can be categorised into ten types. For easy segregation, later it was changed to four categories of yellow, red, white, and blue. The yellow indicates infected waste, whereas red category is marked as non-infected and recyclable. The sharps and tiny metallic items fall in the white category and lastly blue denotes the waste material that consists of glass. They are mainly five methods available for the treatment of medical wastes. They include chemical, treatment, mechanical, irradiation and biological process.[8] It is estimated that only 10-25% of biomedical waste are harmful and the remaining 75%-95% is harmless waste.[9] The hazardous waste is further classified into infectious waste and other hazardous waste. The infectious waste contains non sharps, sharps plastic disposable and liquid wastes while other hazardous wastes contain radioactive wastes, discarded glass, pressurized containers, chemical wastes, cytotoxic waste and incinerators ash.[5] Segregated waste was kept in open ventilated area and stored waste was transported to the biomedical disposal facilities.[10]

The hazardous biomedical wastes can result in different types of infections like respiratory, skin, upper and lower abdominal infections, as well as acquired immunodeficiency syndrome (AIDS), hepatitis, Congo-Crimean, anthrax, brucellosis and tuberculosis.[11] For effective biomedical waste management source segregation is important in most of the healthcare establishment's segregations of medical waste was not done properly.[12] Improper disposal of infected face masks can make a significant risk for increasing COVID-19. [13] Most hospitals in India generate about one to two kg per bed per day except the tertiary care hospitals like AIIMS, Sher-I-Kashmir Institute of Medical Science (SKIMS) which produce increased amounts of waste. [14] After COVID-19 the waste generated increased significantly. The number of used facemasks and medical waste is increasing daily with the increase in number of COVID-19 cases. [15] In recent times, Delhi and Mumbai are most affected by corona virus in India. More than 40 sanitation workers have tested positive for the infection in Delhi and whereas in Mumbai 15 have lost their lives, 10 workers and 2 security monitors at the city's landfills, Kanjurmarg, have been contaminated with COVID-19 and recovered. [16] It is evident that private hospitals are producing more healthcare waste (Red and Yellow category of waste) than public hospitals in the given context. However, in blue category public hospitals are generating more waste than private ones. [17] Awareness programmes should not only be the objective for the doctors, nurses, paramedics; but also, the waste handlers. Proper training and demonstration of handling wastes should be given to waste handlers. [18] Literally, awareness about disposal of biomedical waste is very low among the lower age group people followed by male workers, supporting staff and lab-technicians. On the other hand, the doctors have good knowledge about rules and regulation regarding biomedical waste rules. Only few healthcare providers like medical students, health care professionals know the categorization of Biomedical Waste. [19] Teaching staff are also having more awareness in waste handling than non-teaching staff and other workers.[20] In this COVID-19 pandemic situation incineration is the best way to dispose of waste but, we should not forget the associated environmental problems [21] this causes. As indicated by the current circumstance, the pandemic is likely to extend past the year 2025. [22]

Effective biomedical waste management helps to reduce the environmental problems and safeguards public and healthcare workers from getting infected. Hence this present study aims to understand the knowledge, attitude and practice of biomedical waste management during this pandemic among medical students and healthcare workers across Tamil Nadu.

MATERIAL AND METHODS

In this study sampling technique was used. This method was taken because in this pandemic, movement was severely restricted in India. It is not possible to take the questionnaire survey through direct contact with people. The study was cross sectional, accidental sampling and non-probability sampling method were carried out. For the initial pilot study, the sampling methods were seen to be very effective and positive in time saving and cost effective. A prevalence study was taken from April 1st to 20th, 2021. We targeted people like doctors, medical students and faculty, nurses, health care professionals and some public people to know about their awareness level of corona virus. The semi structured questionnaire was prepared in concise form and reasonable English in Google form. The questionaries data were uploaded through Google Forms by distributing the link electronically. The question was structured and created for the people's knowledge on characteristics related to the handling and disposal of COVID-19 wastes and their consequences, identification of waste categories, hospital policies and awareness level on the COVID 19 virus. We disseminated the survey by social media, emails and mobile based networks like WhatsApp, Telegram. The participants showed the overwhelming responses where they passed to their friends all over Tamil Nadu. The questions were designed by standard guidelines and protocols as per WHO guidelines at the time. [23]

In total, 30 questions were included with 15 multiple choices and the remaining 15 were in YES/NO format. A total of 30 questionnaires were designed and distributed to medical college and hospitals treating COVID-19 patients across Tamil Nadu. We have received about 257 responses. Out of 257 responses, 39.69 %(n=102) students, 27.63%(n=71) nurse followed by doctors and faculty were 18.68 %(n=48) and 14 %(n=36) as described in Table 1.

TABLE 1: DEMOGRAPHIC INFORMATION OF RESPONDENTS

VARIABLES	PARTICIPANT (N)	PARTICIPANT PERCENTAGE (%)
Doctors	48	18.68%
Nurses	71	27.63%
Faculty	36	14%
Students	102	39.69%

RESULTS

The study presents the key findings from the total 257 respondents we divided the questions into four headings. The type of waste, ideas and waste generated during COVID 19 was shown in Figure 1, Figure 2 and Figure 3. The results of the survey were shown in the form of tables and charts, simultaneously the inference from the question has been discussed.

Table 2 is an extract of data from the survey and shows the awareness in the management of waste by the respondents

TABLE 2 AWARENESS ABOUT WASTE MANAGEMENT

QUESTIONS	PARTICIPANTS(N)	PARTICIPANTS IN PERCENTAGE
1.Do you follow the guidelines suggested by WHO for waste management?		
Yes	193	75%
No	64	25%

2.After COVID 19 there is massive increase in Biomedical waste production.		
Agree	241	93.8%
Disagree	16	6.2%
3.Whether COVID 19 infected waste is mixed with non-infected waste in your institution/hospital?		
Yes	201	78.2%
No	28	10.9%
May be	28	10.9%
4.How long do you store waste before treatment/disposal?		
Less than 24 hours		
More than 24 hours	109	42.2%
48 hours	60	23.4%
More than 48 hours	48	18.8%
	40	15.6%
5.Types of containers used for waste collection		
Plastic containers	129	50%
Metal containers	56	21.9%
Biohazard bags	72	28.1%
Sharp bins	0	0%
6.Whether anybody affected by COVID19 while handling wastes?		
Yes	44	17.2%
No	169	65.6%
May be	44	17.2%
7.Do you aware of biomedical waste rules and regulations followed in India?		
Yes	104	40.6%
No	44	17.2%
Know little bit	109	42.2%
8.Do you have separate bins for collecting COVID patient wastes?		
Yes	177	68.8%
No	80	31.2%
9.Could staffs be trained regarding collection of COVID patient's wastes?		
Yes	161	62.5%
No	44	17.2%
May be	52	20.3%
10.Improper waste management cause various health hazards		
True	229	89.1%
False	28	10.9%
11.Is it necessary to improve the waste management technique during COVID19 pandemic?		
Yes	205	79.7%
No	32	12.5%
May be	20	7.8%

12.Do you follow color coding while disposing wastes?		
Yes	205	79.7%
No	24	9.4%
Never noticed	28	10.9%
13.Which disposal technique is followed by your hospital/institution?		
Taken to Municipal landfill	109	42.2%
Buried at hospital ground	44	17.2%
Incineration	104	40.6%
14.Is there any biomedical waste disposal policy in your hospital/Institution?		
Yes	185	71.8%
No	36	14.1%
Maybe	36	14.1%
15.Whether maintaining Biomedical waste record is mandatory in your hospital/clinic?		
Yes	181	70.3%
No	76	29.7%
16.What type of waste you often see during COVID-19 pandemic?		
Masks	213	82.8%
Needles	20	7.8%
Gloves	20	7.8%
Bandages	4	1.6%
17.How long is the disposal site from your hospital/institution?		
Nearer	112	43.8%
Far apart	145	56.2%
18.What type of laboratory facilities do you have?		
Clinical/biomedical	175	68%
R&D	40	15.6%
Animal	42	16.4%
19.Which color bin is used to dispose glassware and metallic body implants?		
Blue bins	100	39.1%
White bins	72	28.1%
Yellow bins	32	12.5%
Don't know	53	20.3%
20.Pathalogical wastes are disposed in?		
Blue bins	44	17.2%
Red bins	41	15.6%
Yellow bins	100	39.1%
Don't know	72	28.1%
21.Contaminated wastes(recyclable) are disposed in?		
Blue bins	36	14%
Red bins	81	31.3%
Yellow bins	72	28.1%
Don't know	68	26.6%

22.Did you notice any charts regarding waste disposal displayed near dust bins?		
Yes	161	62.5%
No	96	37.5%
23.Types of waste generated during COVID-19 are		
Infectious	90	35%
Non-infectious	36	14%
Pathological	39	15%
Radioactive	13	5%
Chemical	28	11%
Pharmaceutical	51	20%
24.What ideas do you follow in waste management?		
Plan	72	28.1%
3R rule	64	25%
Committee	72	28.1%
Records	49	18.8%
25.Is there any future precaution to manage waste planned by your institution?		
Yes	193	75%
No	64	25%
26.Which of this method is followed by your institution for medical waste treatment?		
Thermal	56	21.9%
Biological	93	36%
Irradiation	28	10.9%
Mechanical	28	10.9%
None of the above	52	20.3%
27.Waste segregation at the source has high risk to waste handlers		
Agree	216	84%
Disagree	41	16%
28.Used masks (including 3-layer masks, etc.) are disposed in		
Blue bags	48	18.8%
Red bags	20	7.8%
Yellow bags	169	65.6%
Don't know	20	7.8%
29.Do you have sufficient bins in your hospital/institution?		
Yes	211	82%
No	46	18%
30.What is the rating given by you to your hospital/institution in waste management?		
1-3	20	8%
4-7	62	24%
8-10	175	68%

FIGURE 1: IDEAS FOLLOWED IN WASTE MANAGEMENT AND PERCENTAGE

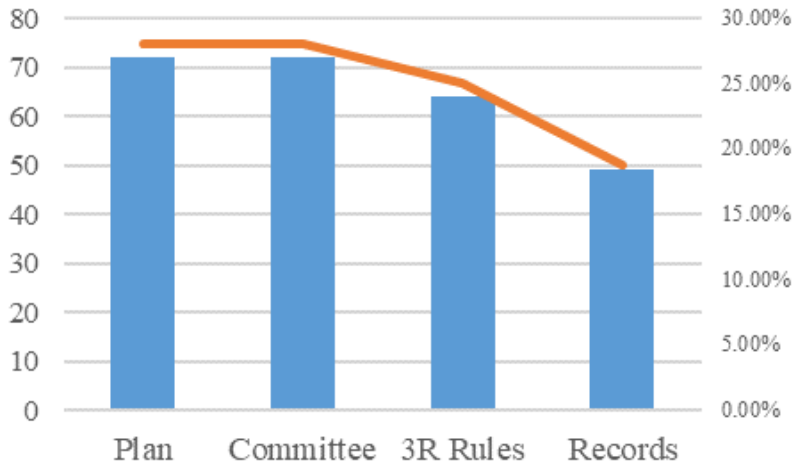


FIGURE 2: TYPE OF WASTE GENERATED DURING COVID 19 PANDEMIC

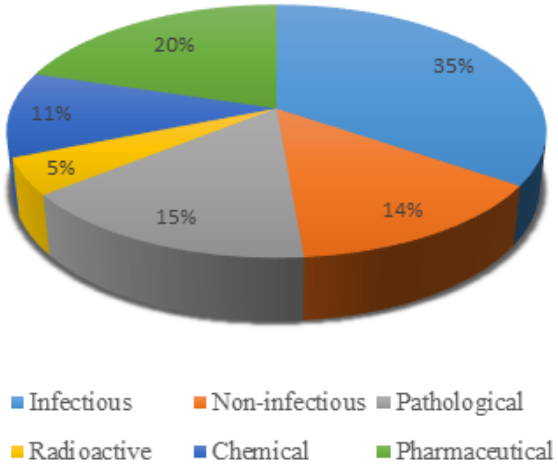
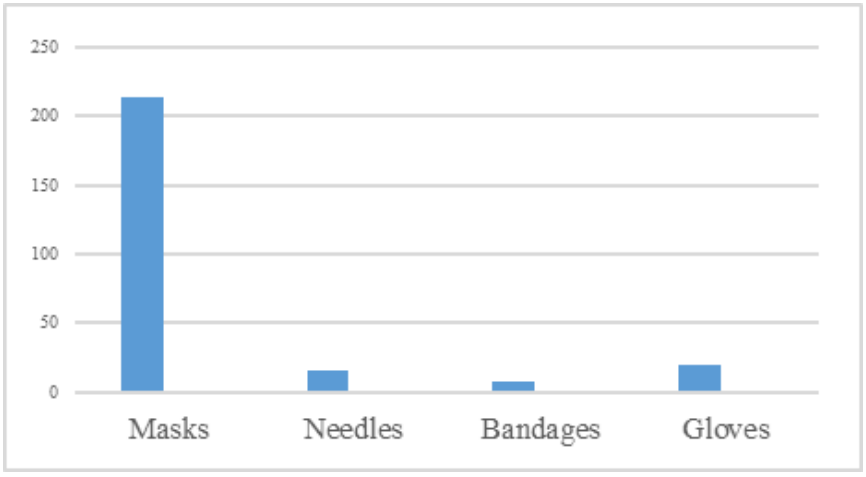


FIGURE 3: TYPE OF WASTE OFTEN SEE DURING COVID 19 PANDEMIC



RESULTS

The waste management procedures in the different hospitals and institutions revealed that 25% of the facilities didn't follow all the guidelines suggested by world health organisation and 75% of the facilities are following all the rules and regulations. A 'bitter truth' is biomedical waste

production is increasing daily with the increase in number of COVID cases. In our survey about 93.8% of the respondents agreed that there is a massive increase in biomedical waste generation after COVID-19. Most importantly COVID-19 infected wastes should be collected safely and separately. Almost 89.1% of the respondents aware that improper waste management cause various health hazards. From the survey it was found that 78.2% of the respondents answered COVID-19 infected waste is mixed with other common wastes in their hospital. and 10.9% of the respondents answered they collect covid patient's wastes separately.

It was also found that 28.1% of the facilities had management plans for handling wastes while 28.1% of the facilities had a separate management committee to deal the wastes, 25% of the facilities followed the 3Rs rule (Reduce, Reuse, Recycle) of waste management and 18.8% of the facilities are maintaining daily records of waste generation. 70.3% of the respondents answered maintaining biomedical waste records are mandatory in their hospital and also found that 71.8% of respondents have separate biomedical waste disposal policy in their institution/hospital. Almost 35% considered most of the wastes are infectious, 20% considered most of the wastes produced are pharmaceutical wastes. Nearly 14% of the respondents considered as non-infectious and 15% considered as pathological wastes. Very few respondents considered most of the wastes produced are radioactive wastes. This study also reveals that time of storage before disposal, some of facilities were storing wastes less than 24 hours. On the other hand, 18.8% of the facilities were having storage time of 48 hours; meanwhile, 15.6% of the facilities we're storing wastes more than 48 hours. It is found that nearly 50% of the facilities are using plastic containers for the collection of wastes and 28.1% of the respondents were using biohazard bags. Only few responded are using metal containers and 82% of them answered they have sufficient bins in their hospital/institution. Nearly 65.6% said that nobody in their hospital or institution affected by COVID-19 while handling waste.17.2% were not aware of such things and 17.2% said some of the healthcare workers are affected by COVID-19 while handling wastes of COVID infected patients. This shows awareness about personal protective equipment is still needed. When asked about the necessity to improve waste management plan, almost 79.7% of the respondents answered there is a need to improve waste management technique during the COVID-19 pandemic. 12.5% of respondents answered there is no need and 7.8% of respondents answered it may be needed. It was found that 40.6% of hospitals followed incineration techniques for final disposal. Meanwhile,17.2% of hospitals buried the wastes on hospitals ground. In addition to this, 42.2% took the wastes to municipal landfills. For the treatment of waste 36% of them following biological method. Almost 62.5% answered that the staff are trained regarding waste collection and 17.2% of the respondents said no for the above question. About 20.3% of the respondents don't know whether training is provided or not. When asked about guideline charts displayed near dustbins, 62.5% answered they have noticed and 37.5% answered they never noticed such charts. The segregation results showed that 68.8% of the facilities have separate colour coded bins for collecting COVID patient wastes. The bins used for collection of COVID-19 wastes should be labelled with COVID-19 on it. Almost 56.2% of the respondents answered the have disposal site at longer distance. When asked about laboratory facilities 68% of them have clinical/biomedical laboratory, 15.6% of them have R&D laboratory, 16.4% of them have facilities for animal laboratory in their hospital.

One of the most important method in biomedical waste management is source segregation. Waste segregation at the source has high risk to waste handlers and 84% of the respondents also agreed it. Almost 79.7% of the respondents answered that they follow colour coding while disposing wastes and 9.4% agreed they didn't follow colour coding and nearly 10.9% of the respondents were not aware of colour coding. For the question "How do you dispose used masks?", 65.6% answered correctly that yellow bags are used. When asked about specific category most of the respondents answered wrongly. For the question "which colour bin is used to dispose glassware and metallic body implants?" only 39.1% answered correctly and when asked about pathological wastes and contaminated recyclable wastes only 39.1% and 31.3% answered correctly. These results clearly show they have lack of knowledge.

Almost 75% of them answered their institution had future precautionary plans to avoid complication in waste management. From the survey nearly 82.8% of the respondents considered the use of facemask increased tremendously after COVID-19. Along with facemasks the use of personal protective equipment and testing kid also increased.

DISCUSSION

The huge amount of biomedical waste is generated from the isolation wards, emergency clinics and the home quarantine since the outbreak of Novel Corona virus. Based on the survey, the usage of facemask, testing kits, individual protective equipment and nitrile gloves are the main reason for piling up of biomedical waste. [24] A serious and timely collection, treatment, disposal of COVID patient's waste is the major problems by all medical care workers. Based on the survey, 82.8% considered that at the time of COVID-19 the generation of facemasks increased rapidly.
Proper collection and disposal of biomedical waste is crucial for environment safety and may also give a better solution to bio security risk. In this study, it is found that nearly 40.6% of the facilities are using incineration technique for final disposal of infectious waste which is similar to the study conducted by Mohamed et al where they reported around 40% of the hospitals in Bahrain followed incineration as final treatment of infectious waste.[25]Meanwhile Another study conducted at Karachi Pakistan showed 70% of the facilities are following incineration technique.[26] A study by Francis among the nurses in Christian Mission Hospitals at Madurai, Tamilnadu showed that 77% of the nurses had adequate knowledge and 23% of the nurses had moderate adequate knowledge about waste management and none of them were not aware of medical waste management.[27]

However, in this study, 62.5% of the participant's answered staff were trained, which is better than findings from earlier studies from India [28] and even from Ethiopia.[29] On the other hand, a study in Nigerian settings had better results (81%).[30]

This study reveals that about 35% of the respondents considered all the healthcare wastes are mostly infectious. The previous study conducted by Sood et al at three dental colleges in Delhi reveals that 60% of respondents considered all the wastes are hazardous wastes. [31] Similarly, in a study conducted by Aradhya et al in Himachal Pradesh also showed 88.3% of the respondents considered all the waste are hazardous. [32] But the fact is only 10-15% of the wastes are hazardous.

It is found that about 79.7% said they are following colour coding while disposing wastes. But when asked about exact categories only 39.1% could tell which colour container is used for collecting glassware & metallic body. Similarly, very few could tell correct answers for the questions which colour bins are used to dispose infectious and non-infectious wastes. Our study is similar to a study conducted in a tertiary care hospital, Kanchipuram by Mohan Kumar, that also reported only 34.2% answered correct and the remaining did not answer.[33] But our results are contradicted the result of Kanchi et al in that 86% of the respondents had knowledge of colour coding.[34] However, a study done by Deo et also found lack of knowledge among the medical staff (20%).[35] But a study in Davangere city, Karnataka showed 27.2% were not aware of colour coding. [36]

When coming to record maintenance, 70.3% considered maintaining records are mandatory. This is similar to a study done by Kanchi et al, who reported 72%. But Mohan Kumar reported 94.8% considered record maintenance is mandatory. [37] About 89.1% considered improper waste management cause various health hazards.
When asked about separation of COVID patients wastes 68.8% of the participants answered they had separate bins for collection. Almost 78.2% answered one should not mix COVID-19 infected waste with non-infectious waste. Regarding waste management, 79.7% of the respondents felt improvement is needed to manage wastes during COVID-19 pandemic.

To lessen the volume of PPE and to prevent shortage, it's reuse has been exhorted with legitimate safety measure. [38] N95 masks can be reused for 3–4 times by a similar individual whenever put away in paper packs and kept far from others. [39] The Central Pollution Control Board (CPCB) has made an application called 'COVID19 BWM' for everyday reports on COVID19 waste management and follow-up.[40]

CONCLUSION

This study showed that creating more awareness among healthcare workers for proper handling, treatment and disposal of medical waste generated from COVID patients is necessary. Creating potential strategies to overcome difficulties while handling and treatment of waste during COVID-19 pandemic may reduce the waste generation and minimize environmental problems. Another important factor from this study is that most of the clinics should follow WHO guidelines on healthcare waste management, during this current pandemic situation, many of institutes followed disposal method like safe pit for COVID waste, and

incineration was used as a final treatment method by most of the hospitals. Using double layered bags, mandatory labelling and colour coded bins for the management of waste generated during the diagnostics and treatment of suspected and confirmed COVID-19 patients are the guidelines issued by the Central Pollution Control Board (CPCB).

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RESEARCH ARTICLE

ASSESSMENT OF TRIBAL HEALTHCARE INFRASTRUCTURE FOR DELIVERY OF MATERNAL HEALTH PROGRAM IN BALASORE DISTRICT, ODISHA, INDIA

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ABSTRACT

INTRODUCTION:

There are still large number of maternal deaths in India nearing up to 50,000 deaths in a year which is one sixth of the world. Odisha (India) is also not performing well in maternal health care management despite its commitment to MDG and SDG. Odisha constitute 23% of tribal population, where the maternal mortality is very high and difficult to provide health services, particularly maternal health services. The study aims to assess provision of necessary health services for pregnant women in an inaccessible tribal pocket.

METHODS:

The study was conducted in Balasore district, Odisha (India) where a sizable population consists of various indigenous tribes. The Parijata tool was used to assess various health care facilities which was developed by UNICEF and Action Research and Training for Health (ARTH), Rajasthan. The availability of basic necessities like manpower, drugs and consumables are assessed along with prescribed clinical practices and procedures.

RESULTS:

The study found that there is lack of provisioning of health services in healthcare facilities. Both the district hospital at Balasore and sub-district hospitals lack basic services recommended by WHO for taking care of women. Further, the effort of government to implement a uniform program across the state hinders the tailoring of services for tribal pockets.

CONCLUSION:

The study provides remedial measures for improving the role and functioning of grass roots workers, integrating indigenous medicine with biomedicine, and revamping health information system to incorporate cultural features, thereby improving its utilization in the study area. The study raised critical issues about potential of maternal health program to deliver effective care of pregnant women in tribal dominated areas.

KEYWORDS

Tribal Health, National Health Policy, National Health Mission, Women Empowerment, Hospital management, Quality guidelines

INTRODUCTION

Maternal death is always a cause of concern for wider social development. Mothers usually take care of the family to a great extent for greater benefit of the family. If a mother dies it is not just the loss of the family but also the loss of entire society indirectly. [1] Overall, this will lead to loss of goodwill and potential for the development of society. [2] In India, maternal deaths are still at a high level and are always a point to ponder in government level meetings. [3] Besides the government report of large number of maternal deaths, there is also a lot of talk in media and social life about the death of women during pregnancy or related causes of pregnancy.

These topics are discussed in various forum of gender and women health and the remedial measures thereof. The discussion brings out social, economic and cultural causes along with imminent medical causes of death. Evidence found that the high maternal mortality ratio (MMR) is due to non-availability of obstetricians and skilled birth attendants in rural areas. [4,5,6,7] In India, reports suggests that the skilled birth attendants (SBAs) help only 60% of cases in conducting deliveries as per protocol. [8] This should be 100% as per government target.

The statistics shows the depth and width of maternal deaths across India. There are still large number of maternal deaths in India nearing up to 50,000 deaths in a year which is one-sixth of the world. [2] Most of the maternal deaths happen in India can be preventable with intervention of modern technology and medical sciences. [1] Half of pregnant women do not receive three antenatal check-ups (ANCs) during pregnancy in India leading to high vulnerability. The is similar to the provision of iron and folic acid supplements at least for 100 days during pregnancy. [3] There is always requirement of intersectoral coordination for the development of health. [2] The health systems usually details the inter-relationship between main actors in the health care system for provision of health care services. [9,10,11] A study in the village of Chhainsa, Haryana (India) shows that there are many hindrances of social cultural factors responsible for poor maternal health outcomes. [12] Odisha is not performing well in maternal healthcare management despite its mandate in Millennium Development Goal (MDG) and Sustainable Development Goal (SDG). The SDG 3 clearly has a mandate for good health and well-being of the people. There was a global trend in reduction of MMR. The decline in India has not been sufficient which necessitated more efforts in achieving the global target. [13]

The government of Odisha tries hard to minimize the maternal death and make various programs along with the central government for improvement. However, the result is always not satisfactory in provision of maternal health care services in hard to reach areas. Odisha ranks below Indian states so far as maternal mortality is concerned. Odisha is classifieds as a 'high-focus' state by the National Health Mission for its significantly high maternal mortality. This helps in keeping Odisha as a high priority state while providing fund for maternal health care in comparison to other states. All the schemes of Odisha health care mostly supported by National Health Mission (NHM) in one way or other. National Health Mission was launched by the federal government to enhance the health infrastructure, human resources and fiscal provisions for augmenting the health care delivery system at rural India. The NHM have a focus on a functional referral system, adequate fiscal provision, following a quality standard, ensuring human resource and capacity building at different levels through *janani suraskhya yojna* (JSY), which means to provide required support system for maternal health care. [1]To get the work done, accredited social health activists (ASHAs) are deployed in each village as grassroots level workers. The ASHAs help in changing the behaviour of women towards maternal health care program of government. [1]

The tribal population of Odisha are given the constitutional rights for protection by Article 366 (25) and 342 of the Constitution of India. The 'tribals' have unique features like: distinct cultural traits, geographically isolated habitat, general resistance to acculturation and overall backwardness according to Ministry of Tribal Affairs, Government of India. [14] There are around 600 different tribes across India, of which 66 tribes found in Odisha (Census, 2011). [14] The tribal population of Odisha is around 23% of the population where the maternal mortality is very high and difficult to provide health services, particularly maternal health services. The majority tribes in Odisha are Santhal*, Bhumija, Kohla, and Khond*. [14] Overall, there is problem in providing health services to the tribal communities of Odisha. Evidence also demonstrates poor healthcare infrastructure there is poor trust in government healthcare facilities especially in tribal areas. [15,16] Various natural calamities damage the road network in the tribal majority areas in the study area causing less access to healthcare services. [17]

In this context, the study assess the provision of necessary health services for pregnant women in tribal pockets. The study aims to find out the infrastructural adequacy in the health centres of tribal area along with the referral network.

METHODS

Besides analyzing secondary data, the study adopted cross sectional approach of field survey to understand the healthcare infrastructure in tribal area for provision of maternal healthcare. Both primary and secondary sources of data collection were adopted. Various tools and techniques were used according to the scientific requirement of the study. The following sections specify the locale of the study and source of data collection.

1. LOCALE OF THE STUDY

The study was done in the tribal dominated Jaleswar block due to its overall backwardness and challenges in health infrastructure which is assessed from the district healthcare administration. The study area has scope for assessment of a backward block in a relatively developed district like Balasore according to the district administration.

2. DATA SOURCES

Modified version of the Parijata Tool developed by United Nations International Children's Fund (UNICEF) is used to assess infrastructure in terms of manpower, availability of drugs and consumables, and norms of clinical practices (ARTH, 2009). For this, health facilities were assessed at CHC-Hatigarh and DHH-Balasore (Pregnant women from tribal areas of Jaleswar are usually admitted at CHC-Hatigarh for deliveries and DHH-Balasore is the referral centre for obstructed cases of Jaleswar). All the interviews with respondents were audio-recorded by following the protocol with informed consent. The interviews were conducted with the help of them list during the study period (2014–2015). Key administrative informants at PHC/ CHC and District Health Administration level were interviewed.

3. DATA ANALYSIS

Data analysis had been carried out factoring qualitative and quantitative data on the maternal health program. The quantitative data were used to describe various situation in the district health programs. Especially, the scores of *parijata tool* were gathered and the quality of services in various health facilities were measured with benchmark standards. The qualitative data analysis found different themes in the narrations of care providers, family members, pregnant women and other stakeholders involved in the maternal health program.

Ethical clearance was taken from the committee of the Institute.

RESULTS

The result section mentions details of infrastructural issues for promotion of maternal health programs which affect the care of pregnant mothers in Balasore district especially in tribal areas. The challenges of the labor room during institutional delivery was assessed with mentioning of specific deficiencies compared with the set standards.

1. CHALLENGES IN LABOR ROOM DURING INSTITUTIONAL DELIVERY

The study particularly observed that many harmful procedures are still in practice in government facilities which jeopardize the life of tribal pregnant women. The range of activities is quite big like forceful 'fundal pressure', augmentation of labor to hasten deliveries, poor monitoring of patients post-delivery, and many relevant factors like unhygienic hospital environment, deprived patient nutrition, unscientific management of biomedical wastes in hospital. All these things influence maternal health outcomes even in government facilities. In addition, many beneficial evidence-based practices were not being adopted in the provision of care. This may be due to inadequate training and ineffective monitoring of services and lack of awareness among hospital staff.

For assessment of the quality of perinatal and postnatal services, the *Parijata Tool* developed by Action Research and Training for Health (ARTH, 2009) in compliance with the guidelines of WHO has been used in DHH-Balasore and CHC-Hatigarh. CHC-Hatigarh is considered for evaluation as it provides delivery services to pregnant women in the tribal area of Jaleswar. Further, DHH-Balasore acts as a referral centre to CHC-Hatigarh for the treatment of critical care cases relating to maternal health.

The assessment of equipment and supplies is carried out in the labor room for the appropriateness of their use during delivery. The actual availability of items in the labour room was assessed, rather than assessment by questions to the labor room staff. The functionality of the equipment was assessed, and the expiry date of medicine was observed. Timely supply of the equipment and medicines and the status of missing equipment are also gathered from nurse-

in-charge of the labor room. The assessed scores of DHH-Balasore and CHC-Hatigarh are given in Table 1 and 2 respectively.

TABLE 1 ASSESSMENT OF DELIVERY PRACTICES AND AVAILABILITY OF EQUIPMENT AND CONSUMABLES AT DHH-BALASORE

PRACTICES	SCORES	AWARDED SCORES
Shaving of pubic hair	y=0, n=1	1
Routine Enema	y=0, n=1	1
Partograph chart used	y=1, n=0	0
Foetal Heart Sound heard during labor	y=1, n=0	1
Position of delivery	lithotomy=0, sitting=1	0
Augmentation of labor	y=0, n=3	0
Episiotomy for prima gravid	y=0, n=2	1
Abdominal pressure	y=0, n=1	1
Intra Muscular oxytocin after delivery	y=3, n=0	3
Vaginal packing	y=0, n=1	1
Proper drying and wrapping of newborn	y=1, n=0	1
Routine suction of all newborn	y=0, n=1	0
Equipment used for suction (mucus sucker/ electronic sucker)	mucus sucker=1, electric sucker=0	1
Initiation of breastfeeding within 1 hour	n=0, y=2	2
Timing of discharge	<12 hr=0, >24 hr=2	2
Sterile gloves used for delivery	y=1, n=0	1
Hand washing before conducting delivery	y=1, n=0	1
Post-partum checkup in ward	y=2, n=0	2
Maximum score possible for this facility		**26**
Total score		**19**
% score for practices		**73%**
Equipment and supply		
Ambubag kept ready in Labour Room (LR)	y=1, n=0	1
BP Instrument and Stethoscope ready in LR	y=1, n=0	1
Washbasin and running water in LR	y=1, n=0	1
Autoclave present in working condition	y=1, n=0	1
Labor room clean	y=1, n=0	0
Labor room condition	clean=1,has blood stuck=0	0
Oxytocin available in LR	y=1, n=0	1
Staff in Labour Room SBA trained	all=2, half=1	2
Doctors (who conduct delivery) oriented on Emergency and Basic Care (EBC)	all=2, half=1	2
IEC material (chart) on evidence-based practices displayed in LR	y=1,n=0	1
Maximum inputscore for this facility		**12**
Total score		**10**
% score for practices		**83%**

Source: Modified tools by UNICEF and ARTH, Authors' primary source (2017)

TABLE 2 ASSESSMENT OF DELIVERY PRACTICES AND AVAILABILITY OF EQUIPMENT AND CONSUMABLES AT CHC-HATIGARH (JALESWAR BLOCK)

PRACTICES	SCORES	AWARDED SCORES
Shaving of pubic hair	y=0, n=1	1
Routine Enema	y=0, n=1	1
Partograph chart used	y=1, n=0	0
FHS heard during labor	y=1, n=0	0
Position of delivery	lithotomy=0, sitting=1	0
Augmentation of labor	y=0, n=3	3
Episiotomy for primis	y=0, n=2	0
Abdominal pressure	y=0, n=1	1
IM oxytocin after delivery	y=3, n=0	3
Vaginal packing	y=0, n=1	1
Proper drying and wrapping of newborn	y=1, n=0	1
Routine suction of all newborn	y=0, n=1	0
Equipment used for suction (mucus sucker/ electronic sucker)	mucus sucker=1, electric sucker=0	1
Initiation of breastfeeding within 1 hour	n=0, y=2	2
Timing of discharge	<12 hr=0, >24 hr=2	2
Sterile gloves used for delivery	y=1, n=0	1
Hand washing before conducting delivery	y=1, n=0	1
Post-partum checkup in ward	y=2, n=0	2
Maximum score possible for this facility		**26**
Total score		**20**
% score for practices		**76%**
Equipment and supply		
Ambubag kept ready in LR	y=1, n=0	1
BP Instrument and Stethoscope ready in LR	y=1, n=0	1
Washbasin and running water in LR	y=1, n=0	1
Autoclave present in working condition	y=1, n=0	0
Labor room clean	y=1, n=0	0
Labor room condition	clean=1,has blood stuck=0	1
Oxytocin available in LR	y=1, n=0	1
Staff in LR SBA trained	all=2, half=1	2
Doctors (who conduct delivery) oriented on EBC	y=1,n=0	2
IEC material (chart) on evidence based practices displayed in LR	y=0, n=1	0
Maximum inputscore for this facility		**12**
Total score		**9**
% score for practices		**75%**

Source: Modified tools by UNICEF and ARTH, Authors' primary source (2017)

Table 1 and 2 show that DHH-Balasore and CHC-Hatigarh have low scores than the desired minimum, in evidence-based practices for a labor room and regarding availability of equipment and supplies for conducting successful procedures. The DHH-Balasore is trailing by seven points than the required twenty-six points for 'good practices' and is lagging by two points than the required twelve points in

the availability of essential equipment and supplies. CHC-Hatigarh is lagging by six points than the desired twenty-six points for good practices and is lagging by three points than the desired twelve points in availability for essential facilities. From which, it may be infered that non-adherence to evidence-based practices in the process of labor have a negative impact on the quality of care.

This necessitates effective planning by mutual consultation with district health administrators and medical practitioners. The evidence emerging from the measurement of labor room indicates there is need for improvement of services in CHC-Hatigarh, and DHH-Balasore.

Findings suggest there is lack of training of medical and paramedical staff in the process of preparedness for good medical care to the mothers. There is lack of orientation of nurses and doctors, and SBA trained nursing staff in the caregiving site. The causes for poor training are erroneous pre-service beliefs and knowledge, lack of support from hospital staff and a general resource crunch. During pre-service training, most nurses learn many practices which are not evidence-based (e.g., need for routine episiotomy, need for lithotomy position in delivery), which is reflected in their present handling of patients in the labor room. Sub-optimal functioning of labor room and poor facilities in rural CHC and government hospitals provide little scope for translating knowledge into practices. Unfortunately, these limitations predispose women to risky caesarean section deliveries.

2. POOR ROAD CONNECTIVITY TO TRIBAL VILLAGES

Tribal pockets have serious problems in referral and transportation of pregnant women for emergency medical care. The problems get accentuated in the rainy season due to floods and weak surface transport system. The areas surveyed were found to be severely affected for months making it difficult to reach the community facility at CHC-Hatigarh by ambulance services. A Pharmacist working in a flood-prone area narrated:

> "The roads constructed under (The) Prime Ministers Gramya Swarojgar Yojna (PMGSY) have helped in reaching the interior tribal pockets during the rainy season which was not otherwise possible a few years ago. As these roads are of good quality and made up of concrete, they withstand the effect of floods. However, these concrete surfaces are not continuous throughout the entire length, connecting remote locations to the health care centres. The villagers sometimes repair minor portions of the 'kaccha road'. Such community initiatives create a new dimension in problem solving, rather than wait for government action."

According to an AYUSH Medical Officer working in the Mobile Health Unit (MHU) for the last five years:

> "Prior to concrete roads made by Prime Ministers Gramya Swarojgar Yojna (PMGSY), it was not possible to gain access to tribal villages in the rainy season. During floods, the MHU was parked beside the highway and doctors had to walk up to the village school to attend Village Health and Nutrition Day (VHND) and conduct immunization camps. Due to river embankment, the Jaleswar town is flooded but saved from severe calamities."

3.NON-AVAILABILITY OF MATERNITY WAITING HOME FOR EMERGENCY MEDICAL SERVICES

The program implementation plan (PIP) of NRHM-Odisha mentions *'Maa Gruha'* as temporary homes for pregnant women ideally located near the hospital where they may wait for safe delivery. This helps in providing emergency services through basic emergency obstetric care (BEmOC). However, no post-partum cases are allowed to stay at *'Maa Gruha'*. There are 50 such facilities in the tribal pockets of Odisha which provide care to pregnant women in tribal areas according to NRHM-Odisha.[17] Unfortunately, tribal dominated Jaleswar block was found to have no such provision, thereby depriving tribal women of emergency services. According to health administrators of the block, no alternative support structures exist to redress the problem of inaccessible villages. Ironically, to promote institutional delivery, it is important to reach out to women in an advance stage of pregnancy. This makes facilities like *'Maa Gruha'* conspicuous by their absence during the rainy season.

4. MOBILE MEDICAL TEAM (MMT): OPERATIONAL PROBLEMS

Mobile medical teams have been commissioned to provide preventive, promotive and curative health care in inaccessible and difficult terrains. In Jaleswar too, MMTs are used to provide support to staff for regular field visits and carry medicines and equipment for care of pregnant women. Also, they provide services at the doorstep to augment hospital services.

The MMT consists of a team comprising of a medical officer (often an AYUSH doctor), a pharmacist, an ANM, an attendant and a driver. The team travels for at least 20 days

a month to remote villages as per schedule prepared jointly by the block program manager (BPM) and Medical Officer in-charge of CHC-Hatigarh. MMTs not only look after the curative aspects but also contribute to behavior change through IEC activities.

Despite several such provisions, field observations show that MMTs of Jaleswar block were unable to function properly during the rainy season. Health workers in MMT were attached to CHC-Hatigarh which is located on the opposite bank of the river. So, the unit must cross the river across the lone bridge and travel a long distance, thus making the entire operation both expensive and time-consuming. The flood-affected regions create other problems in access: health workers must walk through muddy water, conduct clinical examinations in open places and manage an unruly crowd. Such circumstances make it difficult to ensure the quality of treatment and care; it is even difficult to ensure the privacy of the women. An AYUSH medical officer recounts the role played by MMTs:

> "Until 2008, care was almost denied to tribal areas. Now the MMTs provide essential maternal health services, family planning and other health promoting services for women in remote tribal pockets. Still, there is an unmet need for emergency care. At present, it solves minor pregnancy related problems."

5. TRANSPORT AND REFERRAL SERVICES

The transport and referral services in Jaleswar need to be strengthened for better provision of maternal health care given the emergency of situation in some cases. Field assessment shows that many pregnant women still use private transport facilities to reach health centres. During field work, it was found that all three ambulances parked at CHC-Hatigarh were off-road and none provided services in Jaleswar which paralyses the transport to a great extent. The vehicles of course need immediate maintenance, repair, or even replacement with newer ones to serve the tribal community. As a result, much of the need was being met by *Janani Express and 108 ambulances*.

The *108* ambulance services is a boon which provide effective pre-hospital emergency medical service by (The) Government of Odisha with funding support from MoH&FW, India. The objective is to provide instant medical care without losing time across rural areas. The service features of the Odisha Emergency Medical Ambulance Service (OEMAS) is designed in such a way that all *108* ambulances are equipped with GPS (Global Positioning System) and MDT (Mobile Data Terminal) and the operation is with a centralized professional call centre. The ambulance is supposed to reach the patient within 20, 25, and 35 minutes in urban, semi-urban, rural areas respectively, after getting a requisition from a patient. The mapping and defining of strategic locations for pick-up of patients are spelled out by the ambulance team. The team also specifies the nearest 'catch points' in the case of non-motorable locations for the convenience of pregnant women. As per record of NRHM-Odisha, among transported patients, nearly 23.11 % of the cases consist of pregnant women (NRHM, 2014).

The issue with the *108* is that it does not have drop-back facility, which undermines effectiveness of ambulance services of the women in returning to their home in Jaleswar. As reported by JSY beneficiaries in the community, *108* ambulances do not respond even after repeated calls; there are refusals on account of inaccessibility, long distance to the tribal villages and un-availability of ambulances.

DISCUSSION

The study found the effectiveness of the maternal health program in the tribal block of Jaleswar is not promising. This is corroborated with the poor maternal health of higher morbidity and mortality among tribal women. The mortality and morbidity figures in Jaleswar are relatively high in comparison to the performance of Balasore district. To achieve the effectiveness in provision of care the study suggest for effectiveness of the ongoing JSY program by enhancing health care infrastructure of the tribal area.

The major issues in implementation of JSY program lies in improvement of geographical and socio-cultural factors in tribal area. This poses special challenges in providing adequate health care infrastructure, connectivity, monitoring through HMIS, capacity building of ASHA workers, and building the trust of the community. These challenges can be addressed by an integrated approach to health care development as suggested by the World Health Organization (2009) in its Social Determinant model. This should also take into consideration governance and policy, culture and social values, health care services at institutional level and influence of family and peer in understanding health of population. However, the study found that JSY has a one-sided focus on biomedically oriented model of care without integrating the cultural

nuances. The one-fit-all protocols and program adopted by JSY across the country is not suitable for the proper implementation of program in tribal communities like Jaleswar.

Assessment of health centres for infrastructural adequacy is discussed very widely in the study. The study suggests that there is lack of training of medical and paramedical staff in the health care facility. Also, it was found that lack of onsite orientation of nurses and doctors and SBAs is there which hinder proper care. Studies also confirm that there if SBAs do not train properly, it would be difficult to achieve effective maternal health care. [17] This sometimes stems from erroneous pre-service beliefs and knowledge, lack of support from hospital staff and general resource crunch. During pre-service training, most nurses learn many practices which are not evidence-based (e.g., need for routine episiotomy, the need for lithotomy position in delivery), which is reflected in their poor handling of patients in the labor room.

Without optimal functioning of labor room there is less scope for translating knowledge into practice. These limitations can mean risky caesarean section deliveries. An analysis of infrastructural adequacy in Jaleswar by using *Parijata Tool* shows considerable deficit in equipment, consumables, and essential drugs in health centers of both Jaleswar and Balasore. These deficits, coupled with practices unsupported by evidence-based medicine reflect poor quality of service delivery. Similar findings have been corroborated by others in Odisha. [17,18]

Understanding of tribal culture and provision of targeted care is important. The tribal culture and beliefs are not taken into consideration in the program guidelines. A study in Purnia District (Bihar) shows that anaemia and malnutrition is very severe in tribal community and many cultural factors in addition to medical factors are responsible. [19] A study in Odisha also corroborate similar finding on anaemia in tribal community which also affect overall development. Local healers and ethno-medicine play an important part in care of pregnant women in tribal district of Odisha and Jharkhand, India. [20,21,22]

CONCLUSION

The paper examined how to improve infrastructure to provide optimal maternal healthcare in the study area of Jaleswar. This has been supported by field observation that poor onsite orientation of nurses and doctors, and lack of SBA training, especially to nursing staff results in less quality of services. Sub-optimal functioning of labor room and poor facilities in rural government hospitals provide little scope for treatment of vulnerable tribal population. The analysis by *Parijata Tool* also brings out the lack of infrastructural facilities in Jaleswar. It shows a considerable deficit in equipments, consumables, and essential drugs in health centres.

Addressing the aforementioned challenges with timely action could help in reduction of maternal deaths in the tribal area. The study raises critical issues about the potential of maternal health program to deliver effective care of pregnant women in tribal dominated areas. The study recommends provision of remedial measures for improving the role and functioning of grass roots workers, integrating indigenous medicine with biomedicine, and revamping health information system to incorporate cultural features, thereby improving its utilization in the study area.

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RESEARCH ARTICLE

PROTOCOL FOR AUTOMATED CONTENT ANALYSIS OF CORPUS TO DETERMINE INFORMATICS COMPETENCIES AMONGST HEALTH SERVICE MANAGERS

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ABSTRACT

BACKGROUND:

Competencies have emerged as being important to develop health professionals, including managers in healthcare. Professional institutions adopted specific competency frameworks to guide designing professional development opportunities for health service managers, in particularly managers working in the area of health informatics. The fast-growing nature of healthcare settings means that the required competencies continue to evolve.

OBJECTIVE:

The aim of this protocol is to outline a reflexive thematic analysis process, including using an automated content analysis approach and identify what is missing in existing health service management competency empirical studies in relation to health informatics competencies.

METHODS:

A rapid literature review has been performed using a PRISMA approach for eligibility screening, with 185 publications meeting the inclusion criteria. The Leximancer natural language processing software was used to transform a large corpus of literature from natural language into semantic themes and concepts. A reflexive thematic analysis was then undertaken using the text mining automated content analysis approach to identify predominant concepts and the co-occurrence between them.

RESULTS:

A search strategy was developed using three primary electronic databases: 1) Scopus; 2) ProQuest; and 3) the Cumulative Index to Nursing and Allied Health Literature (CINAHL); and five secondary electronic databases: 1) Web of Science 2) PubMed; 3) ACM Digital Library; 4) Open Access Theses and Dissertations Database; and 5) Google Scholar. The initial search undertaken on 10 November 2020 resulted in 1,212 publications. The results of the reflexive thematic analysis will be submitted for publication by November 2021.

CONCLUSIONS:

New understanding and knowledge in the area of health management competencies, specifically relating to informatics will be developed. Health informatics competencies will be defined for Australian health service managers. Further, this study helps inform the discourse regarding automated content analysis for the healthcare and informatics industry, healthcare organisations and university course requirements.

KEYWORDS

Healthcare Management, Health Informatics, Competency, Reflexive Thematic Analysis, Automated Content Analysis

INTRODUCTION

The Fourth Industrial Revolution is upon us, and it is recognised that it is broad and is characterised by a fusion of technologies across our physical, digital and biological worlds. [1] In healthcare, this is having profound, transformational effects in the diagnosis, delivery and management of care due to the rapid speed of advances in genomic mapping, synthetic biology, nanotechnology engineering, big data, artificial intelligence and robotic automation.

Global forecasts emphasise that these new technologies and innovations have important workforce implications. [1] Firstly, the system needs health service managers who are equipped to lead and manage such transition and health system transformation. Secondly, health service managers need to develop a sound understanding of these new technologies and innovations in order to inform strategic and operational decision-making. Thirdly, there is an imperative that the management capacity of those working in these new fields (e.g., health informaticians) align their management capabilities with those required for the management of health services.

These have far-reaching repercussions for how health service managers are educated and trained, and how management capacity is developed in the emerging and rapidly developing field. Consideration must be given as to how to transform education for both those entering the workforce as well as reskilling the existing workforce. [2] It is imperative to align these required capabilities with the inexorable march of new technologies and labour force trends.

Competencies for health service managers have been established by professional bodies, for example, the Australasian College of Health Service Management (ACHSM) [3] and researched by academics, including Liang, et al. [4] The range of competencies required by health service managers continues to evolve as the industry changes. Therefore, regular review of the competencies required to be demonstrated in the management of healthcare is warranted.

A competency framework, together with a certification process, have also been developed for health informaticians by the Australasian Institute of Digital Health (AIDH) to enable health informaticians to have their competencies recognised. [5] A competency is defined as the specification of knowledge and skill, and the application of that knowledge and skill, to the standard of performance expected in the workplace. [6]

The term digital health is becoming increasingly prevalent in the literature and healthcare generally. [7] As digital health competencies evolve, the further development of competencies for health informatics and health service management can contribute to this evolving discourse. The aim of this protocol to identify what is missing in existing health service management competency empirical studies in relation to health informatics competencies. The method is now detailed.

METHODS

1. AIM

This protocol outlines a reflexive thematic analysis process, including using an automated content analysis approach, to identify what is missing in existing health service management competency empirical studies in relation to health informatics competencies.

2. METHODOLOGY

A rapid literature review was performed using a PRISMA approach [8] for eligibility screening. A reflexive thematic analysis of selected papers is being undertaken [9] using Leximancer [8] for the text mining automated content analysis approach to identify predominant concepts and the co-occurrence between them. This will then support sense-making of emerging themes for the health informatics competencies that should be adopted by health service managers.

Using a grounded approach, reflexive thematic analysis is being undertaken. [10] Thematic analysis provides the method for systematically identifying, organising, analysing and advancing insight into themes or patterns of meaning across a large corpus of literature. [9] Importantly, reflexive

thematic analysis allows the researcher to accentuate meaning as contextual or situated, whilst concomitantly undertaking analysis of the text for meaning. [10, 11] Further, the validity of the researcher's subjectivity is not just recognised as being legitimate, but it is also an intrinsic resource, as reflexive thematic analysis enables the active role of the researcher in the knowledge generation process. [10]

There is a dearth of literature regarding application of automated content analysis for large literature synthesis in qualitative research fields across a range of disciplines [12-19] and negligible publications specifically identified in the field of health informatics competencies. Leximancer, as an automated content analysis software that performs quantitative content analysis using machine learning, was used to ascertain what the main concepts are in the informatics competencies amongst health service managers corpus and how they relate to each other. [20] Using the reflexive thematic analysis six-phase approach, the text mining automated content analysis approach identifies predominant concepts and the co-occurrence between them. This augments the acquisition of text patterns and key terms, to reveal patterns that were previously unknown, and information with meaning [21] contained in the corpus of literature. This assists in automating and expediting completion of the first three phases of reflexive thematic analysis, as follows:

PHASE	PROCESS
Familiarisation	Moving from data generation to analysis, i.e., appreciating the data, through automated sematic analysis, using semantic classifiers to discover unseen patterns and thematic structures in a body of text [22].
Generating codes	Moving to a more in-depth and systematic engagement with the data, i.e., making sense of the data, by curating a list of terms, filtering out textual noise and generating clear patterns to extract more valuable insights [21].
Constructing themes	Moving from codes into overarching themes that accurately and coherently represent the data, i.e., creating a story about the data, through latent semantic analysis and singular value determination to uncover themes [21].
Revising themes	Moving to candidate themes and reviewing them to see how each theme relates to the others, i.e., telling the overall story about the data.
Defining themes	Moving to clear definitions of each theme by elucidating the essence and scope of each theme, i.e., what is meaningful about the data.
Producing the report	Moving to a final test of how well the themes work, both individually in relation to the dataset, and overall, i.e., a logical story with sufficient evidence that the themes are relevant to the data.

3. RAPID REVIEW

The purpose of this rapid review is to: 1) identify existing core health service management competencies and health informatics competencies; and 2) compare and contrast these two sets of competencies to confirm health informatics competencies that have been incorporated into the health service management competencies. The search was limited to the years 2000 to 2020, as the majority of the management competency studies were conducted in the past 20 years and the purpose of the rapid review was to identify the most up-to-date competencies. Consequently, reviewing studies conducted prior to the year 2000 was considered to be unnecessary.

4. SEARCH STRATEGY

4.1 Logic Grid

TYPE	SEARCH TYPE	SEARCH TERMS		
Peer-reviewed journal articles	SCOPUS	Health informatics	Competencies	Health service manager
	ProQuest	Digital health	Capability	Health care manager
	Web of Science	Electronic health	Proficiency	Health care executive
	ACM Digital Library		Qualification	Health care administrator
	CINAHL		Certification	Health service leader
	PubMed		Governance	Health service administrator
	ProQuest Dissertations		Policy	Health service executive
Grey literature	Google Scholar			

4.2 Key words

The keywords used for the search were: 'health informatics', 'digital health', 'electronic health', 'competencies', 'capability', 'proficiency', 'qualification', 'certification', 'health manager', 'health executive' and 'health administrator'.

String: (health informatics OR digital health OR electronic health) AND (healthcare W2 leadership* OR manage* OR administrat* OR executiv*) AND (competenc* OR capabilit* OR proficienc* OR abilit* OR qualif* OR certif*)

Plain English: health informatics OR digital health OR electronic health AND healthcare leadership* OR manage* OR administrat* OR executiv* AND competenc* OR capabilit* OR proficienc* OR abilit* OR qualif* OR certif*

4.3 Inclusion criteria

The following inclusion criteria were used for the search:

- Articles published in English
- Articles published from 2000 to 2020, to ensure up-to-date literature reflecting the rapidly evolving nature of health informatics, digital health and health service management
- Publications that were peer-reviewed, empirical and from the grey literature, including government white papers and professional institution position papers.

4.4 Exclusion criteria

The following exclusion criteria were applied:

- Publications that were not relevant to the health system context
- Publications that were non-empirical studies, pre-prints and working papers
- Absence of health informatics or health service management competencies.

5. SEARCH METHODS

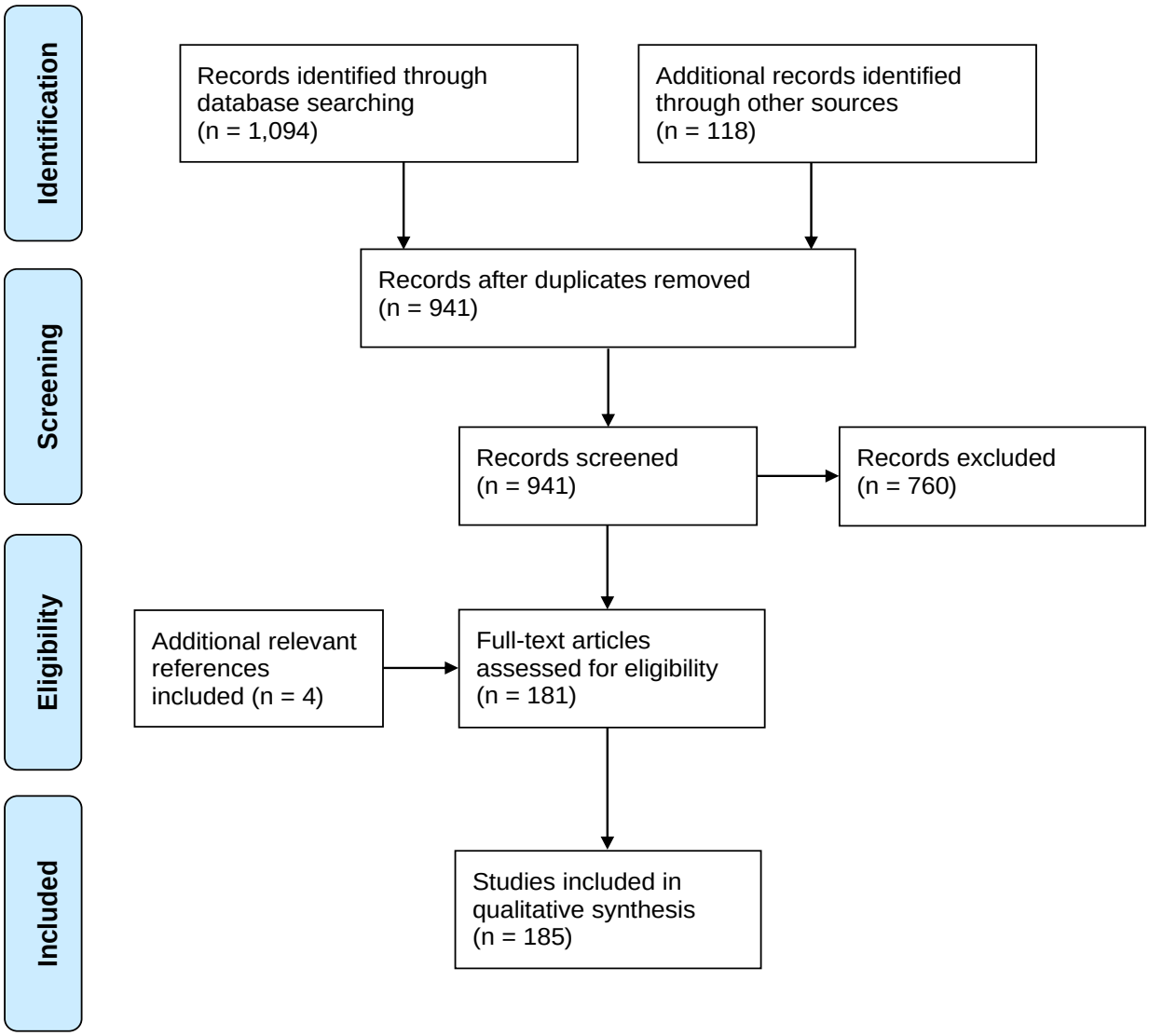
A search strategy was developed using three primary electronic databases: 1) Scopus; 2) ProQuest; and 3) the Cumulative Index to Nursing and Allied Health Literature (CINAHL); and four secondary electronic databases: 1) Web of Science 2) PubMed; 3) ACM Digital Library; 4) Open Access Theses and Dissertations Database. The search was not limited to peer-reviewed literature but also included unpublished grey literature relating to informatics competencies for health service managers, searched

using Google Scholar; this included government white papers and professional institution position papers.

6. EXTRACTION AND SCREENING

1. All publications were downloaded to EndNote (X9.3.3) and saved (n = 1,094).
2. Existing publications identified through other sources were added (n = 118).
3. Total publications were then saved in one EndNote folder (n = 1,212).
4. A removal of duplicates using the *find duplicates* function in EndNote was performed (n = 223).
5. The combined search results data was extracted by author(s), year of publication, title, abstract and key words, into Microsoft Excel (n = 989).
6. A removal of duplicates, using the *duplicate* function in Excel, was performed (n = 48).
7. The corpus (n = 941) was visually screened by publication titles and abstracts for their relevance to determine publications that warranted inclusion.
8. 760 records were removed for not meeting the inclusion criteria, with 181 remaining records.
9. Four additional relevant publications were included, that were identified from the reference lists of the included papers.
10. These publications (n = 185) were then entered into Leximancer software for key word conceptual co-occurrence and relationships visualisation.
11. Full-text assessment for inclusion eligibility was performed on (n = 185) publications

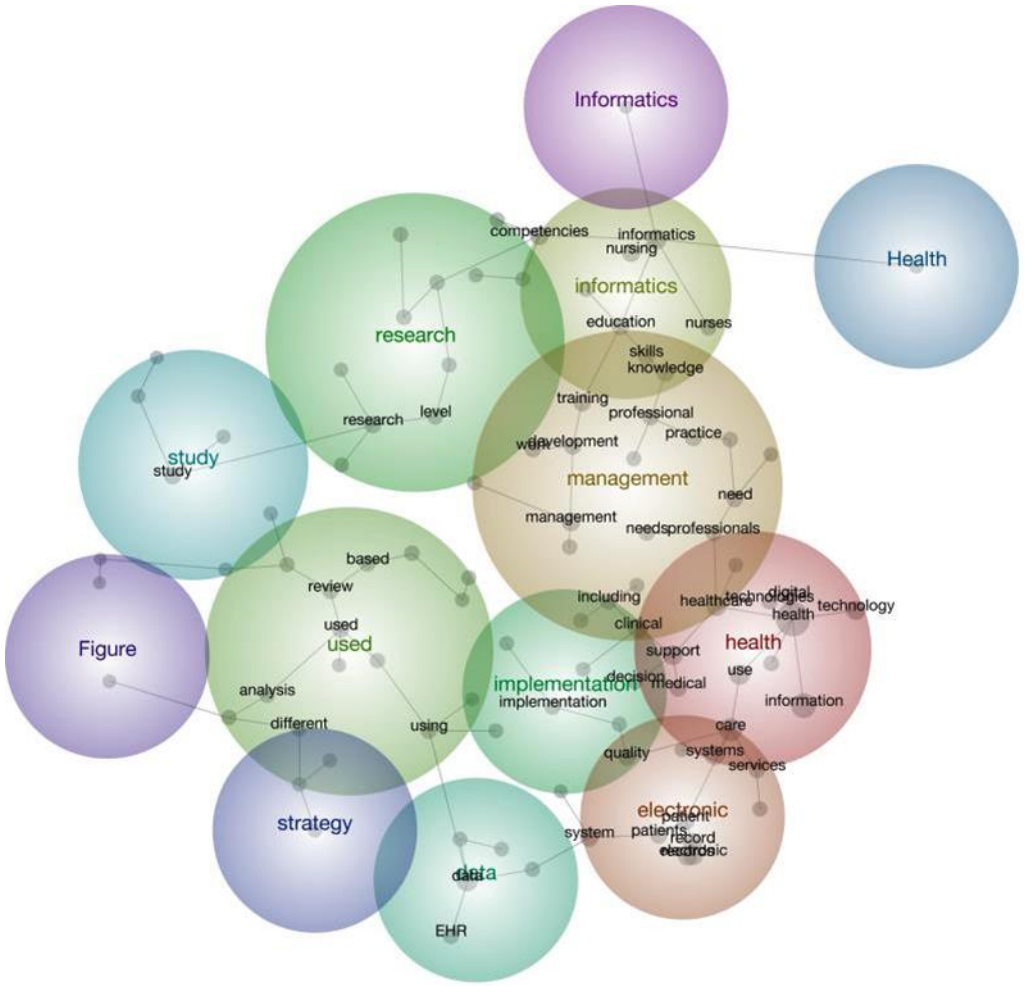
7. PRISMA FLOW DIAGRAM



8. DATA SYNTHESIS

1. The included publications were analysed for applicability, relevance, competencies, context, competence and competency features and characteristics.
2. Reflexive thematic analysis is currently being undertaken to map the themes, including the predominance of the most frequently co-occurring concepts.
3. Following the initial output from the first Leximancer run, concept editing was undertaken to delete labels that were of low semantic meaning and also collapse concept pairs for word capitalisation, pluralisation, and past-tense verbs and prepositions of the same word, that would not impact the analysis and review, e.g., included/including. Based on the semantic and relational extraction algorithms applied, [22] the Concept Map in Figure 1 contained four major themes: 1) health; 2) management; 3) informatics; and 4) electronic; with 31 most frequently co-occurring concepts, as shown in Table 1.

FIGURE 1: CONCEPT MAP REPRESENTING MAJOR THEMES IDENTIFIED FROM THE AUTOMATED CONTENT ANALYSIS WITH "HEALTH", "MANAGEMENT", "INFORMATICS" AND "ELECTRONIC" THEMES HEAT-MAPPED AS (1), (2), (3) AND (4) IN ORDER OF PROMINENCE



RESULTS

The first three phases of reflexive thematic analysis have been undertaken with the 185 eligible publications using Leximancer for the text mining, automated content analysis approach to identify predominant concepts and the co-occurrence between them. This has accelerated the progress to completing the final three phases of reflexive thematic analysis (phase 4. revising themes, phase 5. defining themes, and phase 6. producing the report) to facilitate sense-making sense of and creating a coherence

about the data. This will inform the logical story of the informatics competencies required for health service managers.

1. INITIAL RESULTS OF THE MOST FREQUENTLY CO-OCCURRING CONCEPTS BY FREQUENCY

Automated content analysis of the corpus has provided the following results (Table 1, below):

TABLE 1: MOST FREQUENTLY CO-OCCURRING CONCEPTS

MOST FREQUENTLY CO-OCCURRING CONCEPTS BY FREQUENCY			
Health	Management	Informatics	Electronic
Information	Practice	Competencies	Record
Care	Training	Knowledge	System
Healthcare	Development	Nursing	Patient
Use	Need	Education	Quality
Clinical	Work	Skills	Service
Support	Professionals		
Technology			
Medical			
Digital			
Technologies			
Communication			

DISCUSSION

1. HEALTH INFORMATICS COMPETENCIES FOR HEALTH SERVICE MANAGERS

A review of the available literature highlighted a paucity in the development of health informatics competencies for health service managers. Globally there has been a wide variety of competency frameworks developed for health service managers. [23-26] There is, however, limited available evidence or agreement of specific health informatics competency requirements for health service managers. [27-29] In Australia, 'the needs of health service organisations have outpaced the science, with organisations adopting competency frameworks for which there is limited evidence and no validated and reliable measurement tools. [30, p.157]

1.1 Health Informatics Competencies

Health informatics competencies have been defined by health and informatics organisations in different countries over the last fifty years. Recent development of these competencies has occurred in the United States, United Kingdom and Canada. [5] Collectively, there is a growing consensus that these competency domains include healthcare, biomedical, information and communication technology, information and management science, and human and social context. [5] The United States and the European Union established the EU*US eHealth Work Project (2016-2018) [31] to develop a structured set of health information technology and informatics implementation competencies, the Health Information Technology Competencies (HITCOMP). One thousand competencies were mapped across five domains including direct patient care, administration, informatics, engineering/information, system/information communication technology and research/biomedicine, against five levels of skill (baseline, basic, intermediate, advanced and expert). The competencies were also mapped to over 250 roles impacted by health information technology, though mainly in the acute care setting. The intermediate, advanced and expert levels in the administration domain, within the Administration/General Management/Governance area of competency, describe nineteen competency statements. These will be analysed for potential incorporation into the confirmation of informatics competencies required for health service managers.

To help more clearly define the body of knowledge underpinning health informatics as a discipline, in Australia, health informatics competencies are considered to be 'the core set of information methods, theories and tools which are relevant to healthcare, biomedical research and public health. However, depending on the application domain, different sub-specialities can be identified'. [5,p.2] By completing the reflexive thematic analysis using the

overarching themes identified, health informatics competencies required for health service management will be more clearly articulated.

1.2 Health Service Management Competencies

Unlike other professions, management is complex and broad in scope, and varies between levels and nature of the positions sitting in different parts of the organisational structure. For a large health service, the management hierarchy usually includes senior, middle and lower levels responsible for setting strategic direction, taking charge of day-to-day operation of the organisation, and service provision respectively. Management literature has confirmed the existence of core competencies for managers despite the differing levels and positions. However, competency is also context sensitive, hence, the required competency level varied between organisation types, levels and positions. [32] In Australia and New Zealand, the Australasian College of Health Service Management provides accreditation to the majority of the University Master of Health Administration Programs, against the management competency framework that they developed. The framework is 'to bring together the combination of competencies and the emphasis within these competencies of the skills, knowledge and attributes necessary for leaders and managers in the health industry'. [3,p.6] These health service management competencies 'are intended to apply across all levels of management and for a range of applications with the College'. [3,p.7]

The empirical evidence supporting effective management as being important to successful operations of healthcare organisations is growing. [30] Furthermore, in an increasing number of countries, healthcare management professional organisations are identifying and certifying health service managers against competency frameworks. [33] It is therefore timely to investigate and illuminate informatics competencies required for health service managers, to augment existing competency frameworks, e.g., ACSHM and AIDH.

2. EMERGING THEMES

The overarching themes that are emerging were uncovered through automated content analysis (see Table 1) and the four major themes identified of health, management, informatics and electronic are consistent with the current health service management and informatics discourse regarding the lack of clarity about health informatics competencies for healthcare decision makers [34]. This is further exemplified by the traditional view that a healthcare leader needed competency in clinical services and health management, but now also needs competency in health information technologies [35].

It is well demonstrated that the advantages of text mining include less time and human resources required for analysis, less human bias, along with more reproducible and replicable results for reviewing large corpus of literatures. [21] Further, research across a variety of academic contexts has concluded that when analysing copious data sets, of the various content analysis software technologies available, Leximancer is among the very few that can automate extremely complicated, detailed, and protracted aspects of content analysis. [36] The current study confirms the applicability of Leximancer in developing preliminary understanding of a broad concept, building the foundation of deeper learning and complex analysis.

3. FUTURE RESEARCH

In the next stage of this study, phase 4, the most frequently co-occurring concepts identified will be analysed, using reflexive thematic analysis to see how each theme relates to the others. This will be followed by analysis of defining themes and then production of the final report, to progress the narrative inquiry in support of the informatics competencies required for health service managers, as discussed below.

CONCLUSION

With the ever-increasing cost challenges faced in the provision of healthcare, for an ageing population with a growing burden of chronic and complex needs [37], it is imperative that our health service management workforce is equipped with the dynamic knowledge, skills, values, and competencies required to make evidence-informed business decisions.

The first stage of this research confirmed the general interest in studying competencies in the field of health service management and health informatics. A reflexive thematic analysis conducted on the 185 articles identified, confirmed that using Leximancer to automate content analysis for identification of predominant concepts and the co-occurrence between them is suitable for conceptualising the health informatics competencies required for health service managers.

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DECLARATION OF CONFLICTING INTERESTS

The Authors declare that there is no conflict of interest in preparing this manuscript.

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RESEARCH ARTICLE

ENACTMENT OF SUSTAINABLE TECHNOVATIONS ON HEALTHCARE SECTORS

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ABSTRACT

This article discusses the use of innovative technologies and their potential to assist pan-India surveillance systems, including health initiatives. The key goal is to review prior studies on innovative technology and its use for existing healthcare sectors and identify association strength among the selected variables using Vos Viewer software.

Information gathered from research on randomized controlled trials, cross-sectional studies, review studies and systematic review studies, meta-analysis, sample, and case series. This article discusses the use of innovative technologies and their potential to assist pan-India surveillance systems, including health initiatives to community-based healthcare.

This paper discusses the current usage of Artificial Intelligence, Blockchain, and the Internet of Things (IoT) on health and developments.

The findings of the study state the complexities and opportunities of the mentioned technologies on the pan-India health surveillance system and indicates that data management, safety and security regulation gaps need to resolve before enforcing monitoring practices.

This paper presents an analysis of recent instances of using IoT technologies centred on remote surveillance and indicate a need for an advanced computing architecture for future integrated with pilot and tracking operations.

KEYWORDS

Artificial intelligence; Blockchain; health sector; innovative technologies; Internet of things

INTRODUCTION

Information management, networking technology and technical advances streamlined and improved health and environmental data collection. [1] For instance, the growing cloud storage computing power now currently allows the continuous collection of data via lightweight sensors. However, the information gathered has not always been properly used. Nevertheless, affordable data storage and the increasing technical computing capacity helps to build comprehensive health and environmental datasets of untapped potential. [2] [3]

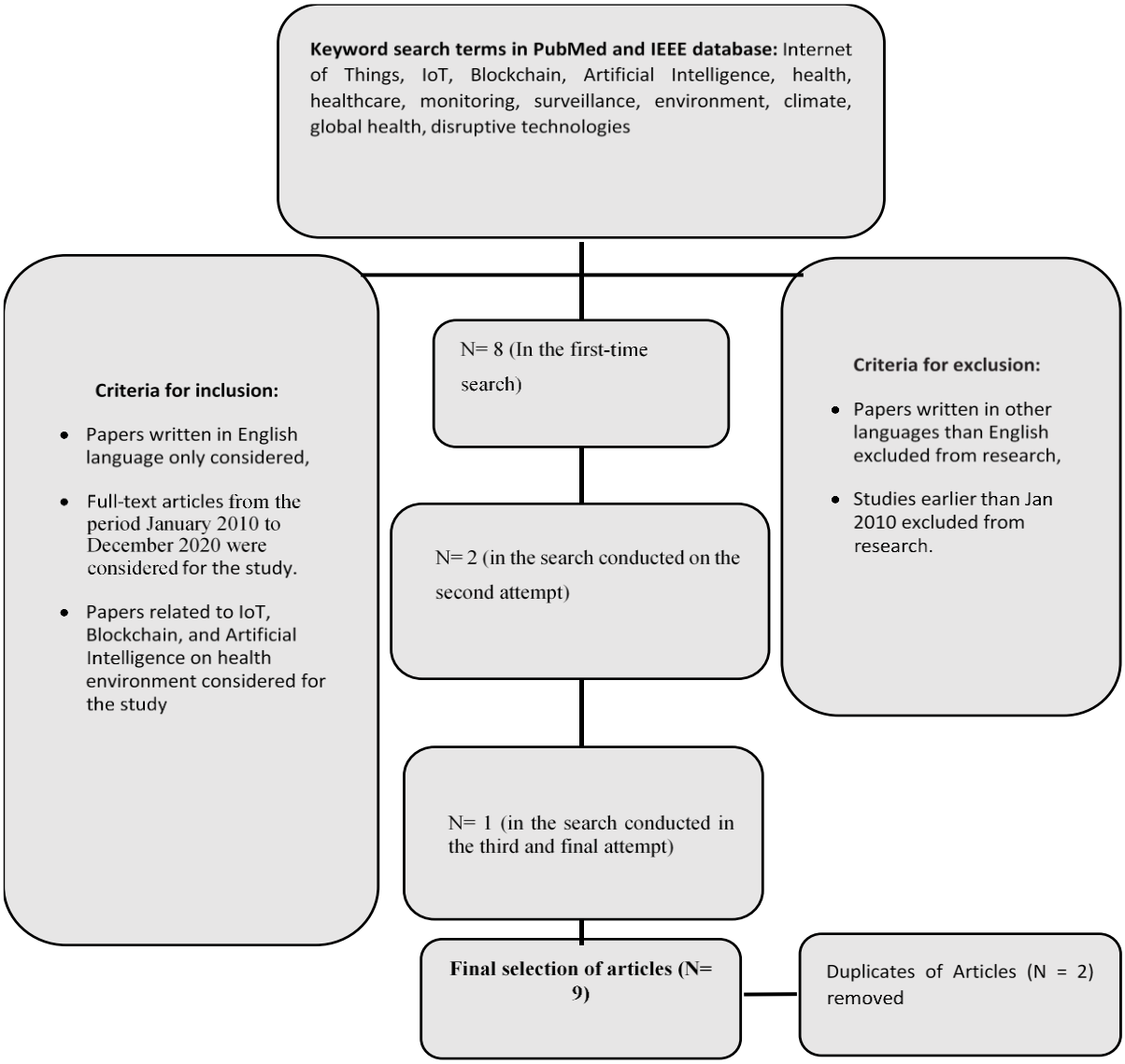
Many investigations and research have recommended the idea of including emerging technology in the scope of climate change and the establishment of pan-Indian surveillance and monitoring practices linked to environmental protection and health system effects. [4] These practices may profit from a variety of emerging innovations, such as "*Internet of Things*," "*cloud computing*," "*Artificial Intelligence*," "*Blockchain*," "*Machine Learning*.", "*Deep Learning*." These groundbreaking innovations commonly utilized in many fields concerned with Comprehensive statistics including "influenza control and air quality monitoring" and demonstrate significant potential to facilitate the introduction of the pan-Indian surveillance mechanism. [5] [6] [7]

As our climate changes quickly and affects human health and welfare, the new health system needs necessitate adaptation and this paper tries to find the gap that is significantly correlated [8]. This paper discusses emerging attempts to address some of the problems using innovative technology. The study provides a review of prior literature and its implementation in the Indian health monitoring framework and a discussion of possible issues needed to incorporate the proposed Pan-Indian Monitoring System components. [9] The research aims to provide several descriptions of the present and potential implementations of these technologies in the healthcare sector.

RESEARCH DESIGN

The present study carried out using descriptive analysis, which practices a conventional literature review. Brainstorming session was performed during the talks to facilitate the usage scenarios concerning "Artificial Intelligence, Blockchain, and Internet of Things" cases. The researchers created a flowchart (mentioned in Figure 1) to show their procedures for selecting papers and to recommend the necessity of creative scope and creation of tracking and surveillance activities by combining the technologies and components of Artificial Intelligence, Blockchain, and Internet of Things. Although this was not a formal analysis of scoping, the present research adopted guidelines [10]. Since our goal is to be more precise. In this methodological context, six steps for the systematic review are suggested (as mentioned in table1).

FIGURE 1- FLOWCHART REPRESENTATION OF SELECTION OF ARTICLES FOR PRESENT RESEARCH



RESEARCH METHODS	
Research Question	In this study, we aimed at explaining "H*ow disruptive technology based on Artificial Intelligence, Blockchain, and Internet of Things will help boost environmental and health research?* "
Articles searching	Articles extracted from Scholarly databases, namely, PubMed and IEEE.
Study design	Information gathered from research on randomized controlled trials, cross-sectional studies, review studies and systematic review studies, meta-analysis, sample, and case series.
Sources of Data collection	The data collection process carried out by studying previous research carried out at different levels concerning the usage of multiple disruptive technologies in health and the climate.
Variables Assessed	Several classes of indicators are gathered after a final literature analysis of the articles. Factor includes: "*Internet of Things", "IOT", "Blockchain", "Artificial Intelligence", "Health", "Healthcare", "monitoring", "surveillance", "environment", "climate", "health".*
The compilation, Results, and monitoring	We address the current innovations and problems in disruptive technology to incorporate and interpret environmental and health data.

RESULT

The intensive review of many academic papers and government studies on innovations, including "Internet of Things, Blockchain, and Artificial Intelligence", can create the tremendous potential to promote health and environmental information [11]. The present study attempted to determine the association strength among the variables studied by the researchers of the selected articles through the Vos Viewer software version 1.6.15. First, the mapping is done for the most occurred keywords used by the various researchers in different articles (Figure 2) and a broader view of network visualization of most occurred keywords in the selected articles also showed in figure 3. Then the formation of clustering was identified through the mapping of most occurred keywords present in the prior studies. The formation of clustering depicted the presence of 3 clusters—the description of the formed cluster through Vos viewer mentioned in table 2.

FIGURE 2- MAPPING OF MOST OCCURRED KEYWORDS IN THE SELECTED ARTICLES

FIGURE 3- NETWORK VISUALIZATION OF MAPPING OF MOST OCCURRED KEYWORDS IN THE SELECTED ARTICLES

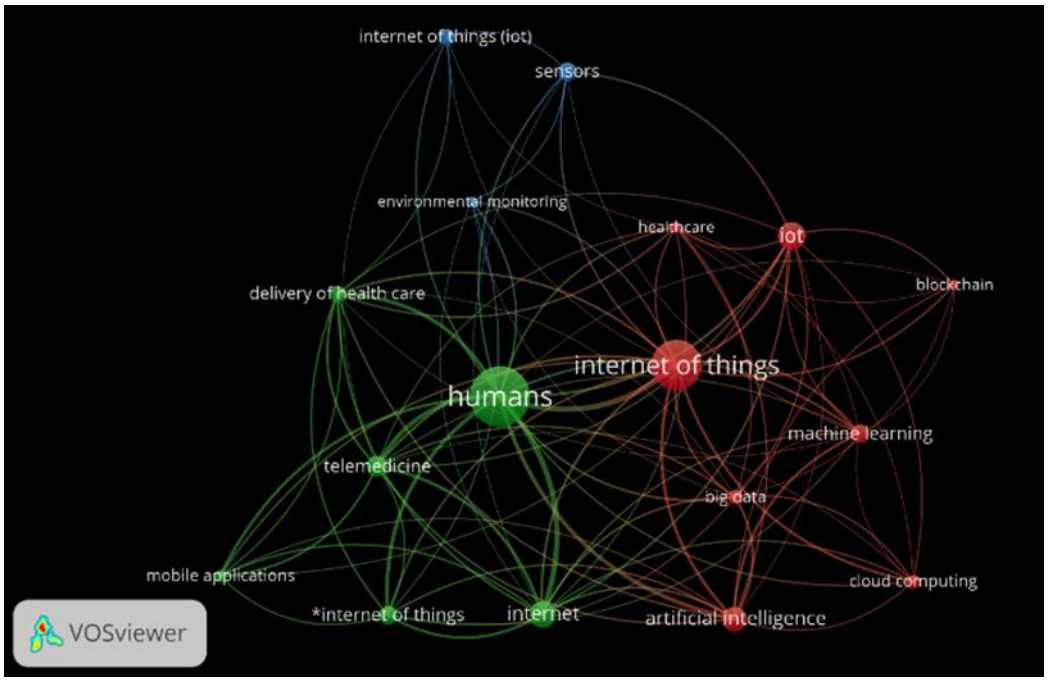
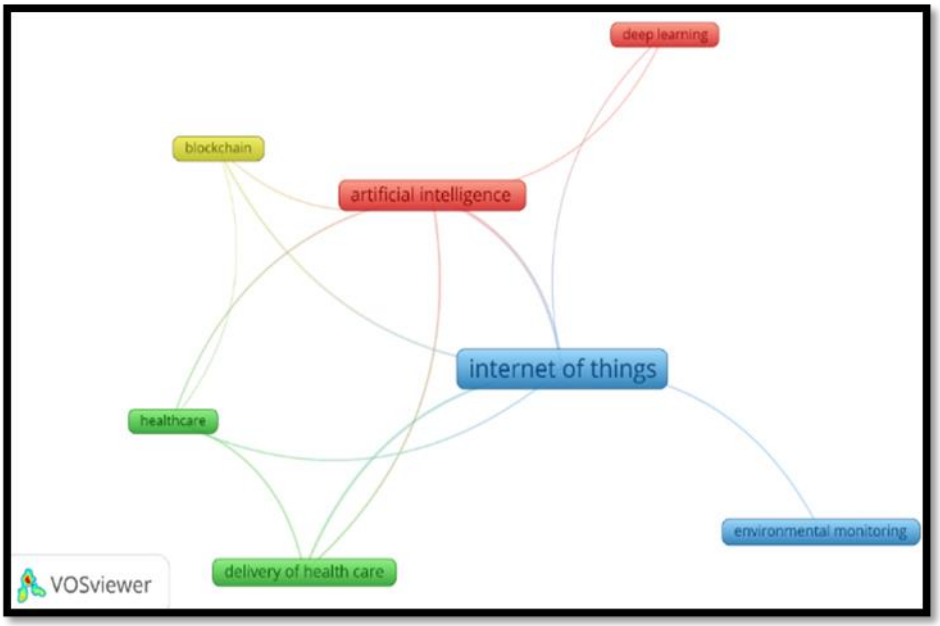


TABLE 2- DESCRIPTION OF CLUSTERS FORMED THROUGH VOS VIEWER SOFTWARE

S.NO.	NUMBER OF CLUSTERS	DESCRIPTION OF CLUSTER
1.	**Cluster 1 (8 items)**	Artificial Intelligence Big data Blockchain Cloud computing Healthcare Internet of things IoT Machine learning
2.	**Cluster 2 (6 items)**	Internet of things Delivery of healthcare Humans Internet Mobile applications Telemedicine
3.	**Cluster 3 (3 items)**	Environmental monitoring Internet of things Sensors

FIGURE 4- NETWORK VISUALIZATION OF MAPPING OF MOST INFLUENTIAL KEYWORDS



After forming clusters from most occurred keywords, the study further identified the presence of mapping of most influential keywords formed in Vos Viewer software (figure 4).

The network visualization depicted association strength among the most influential keywords extracted from the selected articles. Keywords, namely, “artificial intelligence," “deep learning," “internet of things," “blockchain," "environmental monitoring," and "healthcare," and "delivery of health care," showed strong association strength and indicated the relationship among the most influential keywords.

The study made a comprehensive analysis of each innovative technology and assessed their enactment in the health and environment domain as discussed below:

1. INTERNET OF THINGS

The IoT is an evolving heterogeneous idea of networking that aims to influence the modern environment today significantly. IoT's central vision is to combine a vast range of intelligent artifacts towards interconnected and interconnecting networks, rendering the Internet much more all-embracing. [12] [13] It is a modern model in which every system communicates in a seamless world, irrespective of its scale, calculation capital, and network connectivity.

1.1. Internet of Things in Health

The World Health Organization describes surveillance in public protection as "the ongoing compilation, systematic review and assessment of health-related data required for the preparation, execution, and assessment of public health procedure." [14] Monitoring is critical when developing and enforcing public health agencies' preventive and control measures. [15] [16]

Public health monitoring has some ongoing issues that must overcome. These challenges may be technological or non-technical in conjunction with data usage and access. [17] The shortage of technology, competent human capital, and sufficient finance are the key obstacles to public health monitoring. Non-technical problems cover ethics, safety, and protection considerations, but it is deemed essential to gain informed consent to the implementation of healthcare research. [18]

2. BLOCKCHAIN

2.1. Blockchain in Healthcare

Healthcare is a diverse industry comprising various players, including patients, physicians, hospitals/clinics, researchers, insurance providers, and pharmaceutical firms. The sector is progressively digital, creating prospects for development in precision medicine, improved health systems, and quality treatment.

Since providers are the main data administrators and their networks are prone to data exchange and interoperability problems with other providers, patients lose their prior clinical history and therefore hinder a comprehensive health perception.

3. ARTIFICIAL INTELLIGENCE

3.1. Artificial Intelligence in Health

Both the central and state governments are critical in environmental and public health monitoring. Central and state governments, especially environmental regulators, face problems. For example, the limitations on financial and human capital, which may restrict the extent of surveillance activities. The use of technologies, namely, Big Data Analytics, Artificial Intelligence, Internet of Things, Machine Learning can assist in prompt and effective execution of vital activities, such as the management of water contaminants to preserve water ecosystems and drinking water safety. [19] [20] [21]

TABLE 3- COMPREHENSIVE REVIEW OF ARTICLES RELEVANT TO THE CURRENT STUDY

TECHNOLOGY	STUDY AREA	RESEARCH OBJECTIVE	CHALLENGES	OPPORTUNITIES	REFERENCE
Internet of Things	Health	A review of the current research, regulatory, technical, and analytical landscape was the objective of this study in the field of oncology research and treatment for patients provided health data (PGHD).	Electronic integration of patient reporting results and biometrical evidence, review of broad and diverse biometric data sets, and future clinical process overhaul would be among the challenges.	Within the framework of big data and artificial intelligence in medicine, computational possibilities for patient-generated health data are envisaged	[22]

Internet of Things	Health	Identifying and mapping the latest IoT advances in medicine and functional IoT in medicine, the active medical regions, and IoT places.	The healthcare sector is a vast and dynamic entity of active participation by multiple stakeholders, including patients, health care professionals, and insurance agencies. However, IoT currently does not engage in specific medical fields.	IoT apps usually built to save money and allow patients to be inspired at home. This eventually leads to wellness promotion and increased human well-being.	[23]
Blockchain	Health	To assess the blockchain adoption within the food supply chain, thus ensuring the wellness of human beings.	Five future obstacles, including a lack of better understanding of blockchain, infrastructure challenges, raw data management, problems are bringing all stakeholders into it, and regulatory limitations.	The Internet of Things (IoT) may be utilised to enhance food traceability, transparency of knowledge, and recovery quality through Blockchain.	[24]
Artificial Intelligence	Health	Artificial intelligence's role in the research and preparedness of COVID-19 (Coronavirus) prevention and combat is critical.	Medical organizations desperately require artificial intelligence systems to treat coronaviruses and allow them to receive accurate suggestions in real-time to prevent their spread.	Artificial intelligence works conveniently for the emulation of intellect shown by humans. Additionally, it may be important in understanding and creating a COVID-19 vaccine.	[25]
Artificial Intelligence	Health	To investigate artificial intelligence as an advancement in digital healthcare and point out future risks and opportunities.	Technologies in artificial intelligence and different threats involved with their application. It is necessary to understand this before implementing technologies, given the path dependence usually seen in innovation diffusion patterns.	Artificial intelligence can transform healthcare by improving clinical procedures and enhancing workflows. Artificial Intelligence has three main attributes as an innovation: “it is self-referential, programmable and able to achieve marked generativity.”	[26]

DISCUSSION

Many of the literature have studied echoed comments about the need for clarity before a data-sharing infrastructure is effectively implemented since uncertainty in managing private data creates a loss of faith. Several problems for the enactment of health monitoring technologies have appeared in previous studies by different researchers. The fundamental problems were interoperability, data exchange and data administration, and safety, confidence, and protection.

As data gathered from several outlets, various parties need to be interested in developing data sharing policies. This heterogeneity renders data possession and data processing impossible to evaluate.

In health applications, IoT devices' usage impacts privacy even further since the sharing of sensitive details in these technologies is not yet precisely controlled. Problems such as equity often create concern that only mid- to high-income citizens profit from adopting a scheme using high-end IoT tools to boost regular lives. This problem is related closely to the need for improved responsibility including consistency of data ownership and administration.

CONCLUSION

To scope and improve reporting and monitoring programs on environmental effects on health and health networks, the present study recommends multidisciplinary partners, including government, public researchers, different sectors, suppliers of services, or innovators. The current study indicates that data management, safety, and security regulation gaps need to resolve before effective monitoring practices enforced. The public, particularly young people more aware and easily adapt to technical and technological régime. However, There's always an issue of trust and a need for digital literacy education and growth.

Although innovations including "IoT", "Blockchain", and "Artificial Intelligence" have enormous potential to encourage convergence of health and environmental data, still, disadvantages and complexities remain in using these technologies in health monitoring, which should tackle as a priority. The concentrated attempts to review various academic papers and government reports and the recommendations for control and operations by the technical infrastructure provide interesting details for potential research.

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RESEARCH ARTICLE

DISSATISFACTION FACTORS THAT INFLUENCE CUSTOMERS TO GIVE LOW ONLINE RATING TO HOSPITALS

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ABSTRACT

The study attempts to identify factors of dissatisfaction that significantly influence customers to give low rating to the hospital on online platforms, based on the context of India. The study conducts a qualitative analysis of a sample of 669 reviews given to private for-profit hospitals on online platform. Through textual analysis of the reviews, five distinct factors of dissatisfaction were identified. Each factors were statistically tested to identify those that were significantly present in reviews that gave low rating to the hospital. Three out of five factors, inferior medical care, inappropriate behaviour of staff and profiteering attitude, were found to be significant. Within these three factors no significant difference was found in their strength of association with the low online rating.

KEYWORDS

Dissatisfaction of client, Healthcare domain, Hospital assessment, Online rating, Online reviews of hospital, Word of Mouth

INTRODUCTION

Private for-profit hospitals earn revenue from patients and rely considerably upon its image in patient community to sustain and grow their business. Several studies have shown that word of mouth (WOM) plays an important role for rousing publicity and enhancing the business of hospital (1,2). Of late, the image building process was inevitable for the hospitals by using online rating mechanism on established reviewing platforms. The Internet services, social media platforms and world wide web has opened opportunities for active customers to communicate and influence effectively in an open market (3). Overwhelming use of electronic WOM (e-WOM) is found in Indian hospitals arena.

Healthcare in India is delivered by public hospitals, private not-for profit and private for-profit hospitals. While public hospitals and private not-for profit hospitals are free or heavily subsidized for all patients, the facilities and quality of care at these hospitals has been generally considered as poor. [4,5] This has led to a thriving private for-profit hospital industry that provide better facilities and customer services to attract patients. [6] Most people prefer such hospitals for their medical care, if finance is not a limitation. The private for-profit hospitals in India range from low cost small individual owned hospitals to large and expensive corporate run hospitals. Last one decade has seen rapid increase in the number of corporate hospitals in India, specifically in urban areas. This has intensified the

competition and steered the corporate hospitals to utilize marketing tools, including online marketing.

With increase in private hospitals in cities, Indian customers often have a choice when it comes to selecting a private hospital for a treatment. High penetration of internet in urban areas of the country, [7] rating and reviews shared online by other patients, has become a key source of information and decision making for most customers seeking healthcare services in private hospitals. While there is no platform specifically for hospitals, most customers share their reviews and rating of hospital on Google reviews. A check on number of feedbacks about hospitals available on Google reviews system indicates that, there is noteworthy increase of 200% ratings over last five years. The corporate giants in hospital sector like Fortis, Apollo, Narayana Hrudalaya, Yashoda, Global and Continental by and large started to respond online customer review, which usher the new age of publicity and image building. The increasing popularity of online rating force the necessity of hospital chains and standalone quality facilities to understand the customer. They also rectify things based on online reviews.

There are research gaps to understand the details of what impacts low rating of a hospital and how value chain is determined by customers of hospitals. There is need to understand thematically what transpires the rating of the hospitals. This paper is an effort to delineate the determinants for of client dissatisfaction which leads to low rating for a particular hospital. The study adopt secondary research methodology by analysing publicly available online Google reviews. The reviews were analysed by making various themes and understanding the association of various factors.

REVIEW OF LITERATURE:

Evidences across the world confirm that there are strong association of WOM with the business in health sector. According to a study by Fergusen et al. [1] it is confirmed that WOM endorsement found to be an effective marketing strategy for hospitals. Therefore, the hospitals use this strategy widely to attract patients. International medical patients were found to be influenced by friends, family, relatives and doctor's referral in a study conducted in Malaysian hospitals. [2] The study also recommend to act on the analytics of word like WOM. Another similar study by Cheung et al. [8] gives emphasis on the driving forces like physician's referral and WOM as significant factors for attraction of patients. Before several decades WOM cannot reach to masses, it only influence close relatives and family friend. However, with the wide spread use of internet the gap in communication with far off people was minimized to a great extent. This usher to a new era of Online Customer reviews (OCR). The OCR empowers would-be customers to become more informed about various goods and services like medical care. A study exploring effect of e-WOM on sales [9] found that the effect of OCR regarding product, price and brand is heavily influenced by valence and moderated by volume and variance of reviews. In another similar study, [10] it was reported that influential OCR put pressure on customers to purchase goods and services. In a study that looked into how sales of book on Amazon is affected by online reviews, [11] Gao et al. found that the higher volume of OCR and better valence improve relative sales. Another study exploring how brand strength matters in light of positive and negative reviews described that the impact of Positive (negative) reviews help in the effect of increase (decrease) about the sales of relatively weaker brands. [12]

The research gaps galore when there is less studies found on the review of services of healthcare providers. In one study where 5 years data of online rating of physician by their patients was analysed [13] it was found that the electronic physician rating increases and a common place for the public has been created. Another study which looked into patient experience and satisfaction, [14] identified 13 dimension of patients on a platform of physician rating which influence to a great extent. The research in the field of online reviews confirm that valence play an important role in the informed choice of customers. Evidence also emerge that negative and positive review influence differently, with negative reviews having higher impact. [15,16] Hence, negative reviews and rating should be given more attention while assessing OCR.

Least online rating influence valence. There is a need to know the mind of customers for the providing low rating. There are few studies to understand factors that influence online reviews and rating of hospitals. No study reported specific relationship of low rating and OCR which. The understanding of this phenomena may help the hospital to improvise these services to a great extent.

METHODOLOGY

The study was done using qualitative analysis on descriptive feedback provided by customers online about hospitals.

The descriptive feedback were decomposed by coding them into various factors. Frequency of occurrence of each factors was calculated in all feedback. Each factor was tested statistically to examine significant association with feedback that gave low rating to the hospital.

CONTEXT OF THE STUDY:

In India, online reviews and rating of hospitals are largely available on google platform. The platform allows anyone to write a descriptive review about any hospital, available on google platform, and rate the hospital out of five stars, with more stars indicating good feedback. Based on all ratings received, Google provides an aggregate rating of the hospital. While rating the hospital is necessary to submit the feedback, writing descriptive review is optional and a blank space is provided to write in a free form, with unrestricted length. Through a quick observation of 150 random reviews, it was found that there is a high variance in length of description and several feedback submitted did not had any description. Average length of description were 93 words with standard deviation of 57. Since the study aims to identify significant factors associated with lower rating, only those feedback that had description of a sufficient length was considered for analysis.

DATA:

A two-stage sampling was done to select a sample of online reviews that served as data for this study. In first stage a set 39 hospitals were selected. Only private for-profit hospitals, which are operational for more than a year were included in the study, to ensure that they are comparable and their online rating and reviews are minimally affected by confounding factors. The hospitals were stratified across north, south, east and west zones of the country, so that the findings could be generalized. Hospitals which were not present on Google review platform or have received very less ratings (less than 30), were excluded. In second stage, reviews of the selected hospitals were randomly extracted from Google reviews, after excluding reviews that had less than 10 words or are written in language other than English or Hindi. Reviews with corresponding rating of 5 stars were also excluded with an assumption that these customers would be completely satisfied, have no complaints and thus their descriptive feedback cannot be used for identifying dissatisfaction factors. A description of final mix of sampled data is given in Table 1.

TABLE 1: SAMPLE MIX

Total number of hospitals	39
Proportion of hospitals from North: South: West: East	23.1%, 28.2%, 28.2% and 20.5%
Total number of reviews	670
Proportion of reviews from North: South: West: East	24.3%, 39.3%, 17.5% and 19%

ANALYSIS:

Texts in the description of sampled reviews were assessed to identify factors that were suggestive of reason for dissatisfaction of the customer who wrote the review. First round of textual analysis yielded 17 factors, which after assessing for distinctiveness, were combined into final five factors. These were inferior medical care, inappropriate behaviour of staff, system and infrastructure inadequacy, money-mindedness of hospital, and high perceived cost. Table 2 explains the meaning of these factors with illustration of texts that were used to identify them.

TABLE 2: FACTORS SUGGESTIVE DISSATISFACTION IDENTIFIED THROUGH TEXTUAL ANALYSIS OF SAMPLED REVIEWS

DISSATISFACTION FACTORS	EXPLANATION
Inferior medical Care	Reviews suggestive of discontent of the customer with one or more of following • Credentials of healthcare providers, • Medical care given • Outcome of treatment. Illustration: "Nurse didn't know how to apply IV and pricked my baby 4 to 5 times" "Doctor messed it up and finally my father died"
Inappropriate Behaviour of staff	Reviews suggesting that customers were unhappy with any of the following • Behaviour of staff towards patient and/or his/her family members. • Attention given to the patient.

DISSATISFACTION FACTORS	EXPLANATION
	• Level of support provided; • Empathy • Attitude to help Illustration: "They don't even listen and return patient saying that doctor do not meet without appointment" "They don't even tell us what is happening with our patient"
System and infrastructure inadequacy	Indication of problems faced on account of infrastructure, facilities and systems of hospitals, such as • Inconvenient location of the hospital • Poor infrastructure and maintenance of the facility; • Time-consuming and non-user friendly processes • High waiting time • Unreasonable policies Illustrations: "The front staff is inefficient. They should at-least hire someone who is good in speaking English language" "Nobody picks the phone. I had to do multiple rounds to get my investigation reports"
Money-mindedness	Reviews indicating the perception that hospital, or it's authorities are more interested in making money rather than patient's health. Illustration, "They do cheating if patient is insured" "They just see patient as money making opportunity"
High perceived price	Reviews that indicates that the reviewer perceived pricing to be hospital on higher side and difficult to afford. Illustration, "The final bill amount was very high. Difficult to afford" "Looks good externally, but will cut your purse down bit by bit"

To identify which of these factors where significantly associated with low corresponding ratings, each factor was hypothesized to be individually significant enough for causing the reviewer give low rating to the hospital. The hypothesis was statistically tested for each factor, and their strength of association with low rating was compared.

STATISTICS:

To conduct the statistical analysis a frequency count of presence of each factor in feedback with different ratings was done. For hypothesis stating significance of each factor was tested using Chi square test of independence. For each factor, the sample of reviews where classified in two groups, based on whether the factor was present or not. This was done after controlling for presence of rest of the factors, to avoid its effect on rating. Under each group, proportion of reviews that had low rating was calculated. For this purpose only 1 star rating was considered as low rating. The data was plotted on a table with 4 x 2 matrix. p value and residual value was calculated using post hoc chi square test of association.

After identifying significant factors they were compared using Chi square test of association to identify if the effect of factors significantly differ with each other.

FINDINGS

Descriptive statistics of qualitative analysis is presented first followed by inferential statistics to test the hypothesis. The findings are discussed in light of other research evidences, and a conclusion is presented.

DESCRIPTIVE STATISTICS:

Frequency and distribution of all five factors of dissatisfaction was calculated as per the methodology stated. Out of 670 reviews in the sample, 77 reviews were inconclusive as the text written in reviews were meaningless or unrelated to the hospital. Out of remaining 593 reviews, in 19.2% none of the dissatisfaction factors were observed, 53.3% of reviews had more than one and 53.3% had just one dissatisfaction factor. Table 3 present a description of reviews in the sample and Table 4 presents the rating-wise spread of reviews.

TABLE 3: DESCRIPTION OF REVIEWS UNDER SAMPLE

Total reviews in sample	670
Number reviews analysed, after eliminating inconclusive reviews	593
Total count of dissatisfaction factors in all reviews (n)	669
Reviews with 1 star rating	34.90%
Reviews with 2 star rating	17.80%
Reviews with 3 star rating	14.40%
Reviews with 4 star rating	32.90%
Average number of dissatisfaction factor found per review	1.13
Reviews with no dissatisfaction factor	19.20%
Reviews with just one dissatisfaction factor	53.30%
Reviews with 2-3 dissatisfaction factor	36.80%
Reviews with more than 3 dissatisfaction factors	9.90%

TABLE 4: RATING-WISE DISSATISFACTION FACTORS IN ONLINE REVIEWS

		1 STAR	2 STAR	3 STAR	4
		N = 469	N = 83	N = 54	N = 54
Inferior medical Care	n = 105	19.8%* / 88.6%#	9.6% / 7.6%	7.4% / 3.8%	0.0% / 0.0%
Inappropriate Behaviour of staff	n = 157	27.1% / 80.9%	20.5% / 10.8%	9.3% / 3.2%	12.7% / 5.1%
System and infrastructure inadequacy	n = 192	24.1% / 58.9%	39.8% / 17.2%	38.9% / 10.9%	39.7% / 13.0%
Money-mindedness	n = 122	22.6% / 86.9%	13.3%/ 9.0%	9.3% / 4.1%	0.0% / 0.0%
High perceived price	n = 93	6.4% / 32.3%	16.9% 15.1%	35.2% / 20.4%	47.6% / 32.3%

* Percentage with total dissatisfaction factors observed in 1 star rated reviews
# Percentage with total occurrence of the factor in all reviews

The rating-wise spread of dissatisfaction factors indicates that occurrence of dissatisfaction factors are higher in reviews with 1 or 2 star rating. Highest proportion of occurrence of 'inferior medical care', inappropriate behaviour of staff' and 'money-mindedness' were observed in reviews with 1 star rating.

STATISTICAL TESTING FOR ASSOCIATION:

Chi square test of association (post hoc) was used to test if dissatisfaction factor is significantly present in reviews with 1 start rating. As the study intends to examine the association only in cell that describes occurrence of a factor and 1 star rating, the corresponding p value and residual value of that only that cell was considered for drawing inference. In addition, the analysis was focussed only on positive association, the values reflective of negative association was considered as 'no association'. Table 5 presents the statistical values and it's inference for each factor of dissatisfaction

TABLE 5: STATISTICAL VALUES AND INFERENCES FOR EACH DISSATISFACTION FACTOR

DISSATISFACTION FACTOR	STATISTICAL VALUES	INFERENCE
Inferior medical Care	p value 0.00, residual 5.9	Supports significant presence
Inappropriate Behaviour of staff	p value 0.00, residual 5.5	Supports significant presence
System and infrastructure inadequacy	p value 0.273, residual 1.1	Does not supports significant presence
Money-mindedness	p value 0.00, residual 6.6	Supports significant presence
High perceived price	p value NA, residual -4.5	Does not supports significant presence

The statistical analysis show that 'inferior medical care', 'inappropriate behaviour of staff' and 'money-mindedness' are positively associated with the reviewer giving 1 star rating to the hospital. The other two were not found to be significant. In addition, difference in strength of association between significant factors were tested using Chi square test of association. The result shows no significant difference between these three factors (Chi square 8.941, p = 0.177)

DISCUSSION

The present study reports some interesting features of Indian customers regarding their choices and ratings on healthcare organizations. The study put primacy on perception of the clients while considering to avail services based on online reviews. Higher the ratings on clinical services, more is the likelihood to avail the services in future. A study in Bangalore, India [17] shows that similar use of Google review provide edge over other hospitals and maintenance of green hospitals

The study identifies that perception of inferior quality medical care provision, poor behaviour and money-mindedness as significant reason for highest level of dissatisfaction amongst Indian customers of hospitals. These findings are in line with findings of few other studies. A study in Saudi Arabia, [18] identified six components that influences choice of hospital, in which perceived quality of medical care was the most prominent one. Several studies [19–21] on patient satisfaction in Indian hospitals has identified staff behaviour and profiteering attitude as prominent reasons influencing patient's satisfaction or dissatisfaction. Most of these studies are done using primary feedback data, where eliminating bias in response is difficult. Online reviews are completely voluntary, anonymous and hence can be assumed to be free of response bias. The findings from this study reinforce the factors of dissatisfaction, which has also been seen in several studies done individual hospitals.

The study also brings out many facets of cultural and socio-economic parameter while rating the hospitals after

availing the services through online reviews. There are many interesting aspects on rating relating to the services of hospital and cost involved in the entire process. Few factors play significant role when it comes to selection of a hospital for treatment. Since online reviews are the prominent source of information about hospital, and a major influencer of prospective customers, the hospitals need to act on individual customer's review on case to case basis. Organizational reputation and consumer depends a lot on the review of online health communities. [22,23]

The study also reports influence of online reviews on brand value of the hospitals. Unlike traditional hospitals, there is need to be vigilant on the e-WOM in long run brand building process. There is also further need of digging out data by adopting analytics for the improvement of services. Not just Google review but any other review system can be adopted for the analytics purpose regarding the experience of customers. This study also infer that the online systems can be used to notify the reviews to the hospital quality management departments. Hence, decisions regarding market strategy can be taken immediately. It is reported that the private hospitals have to be responsible and adopt new technologies for enhancing their business (23). Further, A study reported from Bangalore that online review help in maintaining the quality of hospital indirectly making the private hospitals responsible. [24]

CONCLUSION

Online reviews of hospital express various types of negative experiences that a customer of hospital faced. However, few types of experiences significantly results in customer giving low or least rating to the hospital on online platforms. The study concludes that experience of being provided inferior quality clinical care, poor behaviour of staff towards patients and their family and being treated with a money minded attitude are strong enough for a customer to attribute least rating to the hospital. The study also concludes that dissatisfaction expressed with inadequacies in systems and infrastructure and expensiveness of the hospital are not strong enough for customers to give least rating. It can be inferred that level of dissatisfaction vary with types of experiences faced by customers. Thus hospitals can prioritize the negative experience for which customers have low tolerance, and by focusing on the same, low online rating can be avoided.

IMPLICATIONS AND LIMITATIONS:

The findings from the study can be useful for private for-profit hospitals that competes in a market for increasing their customer base. As explained in the introduction section, online reviews and rating plays a key role in choice that Indian patients make in selection of a private hospitals. Rising competition, makes it important for private hospitals to ensure that they avoid getting low rating from their patients on online platforms. Literature indicates that negative rating has a higher influence on customer's decision making as compared to positive rating. [16,25] This research identifies components that play a significant role in hospital obtaining least rating by its customers. Private hospitals can lower the chance of getting lower rating by taking care of these components. The findings suggest that by focusing on improving the perceived medical care quality, conduct towards patient by healthcare providers and avoiding attitudes that are suggestive of money mindedness, a private hospital can significantly avoid the chance of getting low rating.

The findings of the study however, should be interpreted and applied with some key limitations in mind. Firstly, it is based upon feedback that was freely written by customers on online platform and comprehensiveness of the reviews cannot be assured. Secondly, the effect of positive experience along with negative experiences on rating decision was not factored in by the study. To overcome these limitations, further research study where structured primary feedback is collected from a random sample of customers who gave low rating, is suggested. Additional research exploring each factors identified as significant, will be needed to further classify them. This can be of help to private hospitals in appropriately addressing them.

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RESEARCH ARTICLE

A STUDY TO ASSESS THE BARRIERS AND FACILITATORS OF BLOOD DONATION AMONG UNIVERSITY STUDENTS OF SOUTH INDIA

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ABSTRACT

INTRODUCTION

Donated blood is very crucial and lifesaving for those who require large volumes of blood in any medical emergency. Many blood donation camps are routinely organized to fill this void of demand and supply. In a university campus associated with a hospital, it is important that student volunteers should contribute towards the increase in demand for blood during times of crisis. This makes it imperative to understand their perception of this noble cause.

METHODS

A descriptive cross-sectional study was conducted among 354 volunteers of a university campus using convenience sampling. The primary outcome was to assess the factors that influence voluntary blood donation among the volunteers. The adjusted association was performed using logistic regression. R Console was used for statistical analysis. Odds ratios and p-value < 0.05 with 95% confidence intervals were calculated to determine the level of significance.

RESULTS

A total of 354 responses were received and analysed. Among these, 38.98%, (n=138) participants had donated blood at least once. Factors that were significantly associated with blood donation were gender, being a member of an NGO, frequency of volunteering activities, fear of needles, and belief that they would acquire the disease during blood donation.

CONCLUSION

Most of the participants had good knowledge of blood donation, but their attitude and practice did not fall along the same lines. The study also highlighted that attitude towards donating blood is high among the participants who are associated with the NGOs or participate in voluntary activities. Voluntary work induces a 'sense of giving something to the society which appears to be facilitating factor and an effective measure to encourage blood donation among youth.

KEYWORDS
Voluntary Blood Donation, practices, volunteerism, NGO, Students

INTRODUCTION

Voluntary blood donation started in 1942 in India, during the second world war when blood was vital in saving the lives of the injured ones. During that time, the blood donors were mainly government employees and the people from the Anglo-Indian fraternity who donated blood for a generous cause. [1] The number of voluntary donors declined after the war and the donors had to be paid for blood donation. [2] The World Health Organization (WHO) states that the safest blood donors are voluntary donors and the non-remunerated ones from low-risk populations. As per the Melbourne declaration, voluntary non-remunerated blood donation (VNRBD) has been globally declared to be the cornerstone of safe and secure blood. [3] In accordance with World Health Assembly resolution, which was adopted in 1975, WHO aims to obtain blood supplies through unpaid voluntary donors in all countries [3]. There is a huge gap between the demand and the supply in developing countries, especially in India due to the high prevalence of nutritional anemia. [4] It is estimated that India needs equivalent to 85 donations per 1000 eligible people, which was found to be equivalent to 31 donations per 1000 eligible people in 2018. Hence, there is a huge deficit that needs to be fulfilled with multisectoral efforts. [5] Blood scarcity is frequently encountered in healthcare settings and is attributable to an imbalance between the increasing demand for safe blood and blood products on the one hand and failure to organize regular blood supply due to misconceptions, perceived harms and risks, and lack of motivation among potential donors. [6]

Donated blood is very crucial in saving the lives of those who require large volumes of blood in an emergency. [7] Factors that promote blood donation include altruism/ humanitarian, personal or family credit, social pressure, replacement, and reward. Fear of needles, contracting an infection, and other adverse effects including medical problems are reasons which demotivate blood donors. [8, 9] Some studies have also shown poor blood donation practice among the students despite relatively good knowledge and favourable attitude toward voluntary blood donation. [10] The prevalence of voluntary blood donation is reported to be even lower among females. [11] Studies have revealed that there is a positive association among knowledge, attitude, and practice on blood donation, which suggests that positive attitude and practice can be improved by inculcating knowledge on blood donation among college students to recruit and donate blood regularly, which will help to achieve 100% of blood donation on a voluntary basis. [12, 13]

In India, the number of blood units collected through voluntary blood donation at the National AIDS Control Organization (NACO) supported blood bank was 84.3% in 2012. [14] Even today, recruiting volunteers for blood donation remains a major challenge. Almost every day around 12000 people die in India due to the lack of availability of donated blood and getting a safe blood supply on time remains a challenge. Over 40 districts in India does not have a single blood bank. [14, 15] Medical college students can serve as a readily available pool of voluntary blood donors for the attached medical college hospitals and help tide away some of the scarcity of blood and blood products. However, different studies involving medical students have expressed concern about the low level of awareness and unsatisfactory voluntary blood donation practices among them. Since student volunteers are potential sources of donated blood in society, it is essential to assess the factors which motivate and demotivate them in terms of blood donation., this study aimed to evaluate the knowledge, attitude, and practice of blood donation and to ascertain the factors which positively or negatively affects blood donation among the students at a university campus.

MATERIALS AND METHODS

STUDY POPULATION

A descriptive cross-sectional study was carried out in the university campus of Manipal from January 2018 to January 2019. A total of 354 students were interviewed who were selected using convenience sampling and met the inclusion criteria of being a current student at Manipal campus. Volunteers from other sister campuses of the university and those not consenting to the study were excluded.

MEASURES

The study questionnaire comprises of two parts: part-A and part-B. The questionnaire was prepared by thorough literature review, then peer-reviewed, validated by two independent senior faculty members, pilot-tested, and administered to all the participants. The primary outcome was to assess the factors that influence the voluntary blood donation among the participants. Part A consisted 7 close-ended questions on background information, such as gender; age; year of study; membership to any NGO/ Rotary/ Volunteer organization/ Volunteer Services Organization (VSO); the number of hours of voluntary services completed so far; type of family; frequency of involvement in voluntary work.

The part B of the questionnaire consisted of questions on knowledge, attitude, and practice of the participants towards blood donation.

KNOWLEDGE TOWARDS BLOOD DONATION

We used six questions to assess knowledge of the participants towards blood donation. These questions were about the "age at which a person can start to donate blood (16 years, 18 years, 21 years, Don't Know); minimum weight required to donate blood (40kg, 45kg, 50kg, Don't Know); the volume of blood drawn out in each session (450ml, 600ml, 650ml, Don't Know); the minimum interval between two donations by a person (3 months, 6 months, 1 year, Don't Know); screening of donated blood prior to transfusion (Yes, No); aware that diseases can be acquired through transfusion of unscreened blood (Yes, No)." A score of one was assigned to each correct response and zero for incorrect response. All correct response results in a total knowledge score of 6. The knowledge score was further classified as below average (if below 4), average (those who scored 4) and above average (above 4).

ATTITUDE TOWARDS BLOOD DONATION

In this study, we used eight questions to assess the attitude of the participants towards blood donation. These questions were, "Are you interested in donating blood (Yes, No); Why do people donate blood (Social Responsibility, Influence of friends, Religious purpose, For incentives/money, Screening for disease, Others); Do you have a fear of needles (Yes, No); Do you think the side effects of blood donation outweigh the benefits of doing so (Yes, No); Will you donate blood if an incentive is provided (Yes, No); Do you think one can acquire diseases while donating blood (Yes, No); Do you believe there will be any side effects to your body after donating blood (Yes, No); Which of the following do you think is the adverse effect of donating blood (Makes you weak, Anaemia, No adverse effects, Don't Know, Others)."

PRACTICES, BARRIER TOWARDS BLOOD DONATION, AND A WAY TO IMPROVE

This section consisted of seven questions to assess practices, barriers towards blood donation and a way to improve voluntary blood donation. The questions were "Have you donated blood before (Yes, No); Are you a frequent blood donor (Yes, No); Do you have any difficulty during the procedure (Yes, No); Will you recommend blood donation to others (Yes, No); If not donate blood before, Why you did not donated blood (Fear of needles, Lack of knowledge, Complicated procedure, No exposure to blood donation, Others)" The open-ended questions were used to understand ways to improve voluntary blood donation. These questions were, 'what will encourage you to donate blood?' and 'How do you think blood donation camps can be improved?'

DATA COLLECTION AND STATISTICAL ANALYSIS

The data on blood donation was collected by the interviewers (Interviewer Administered). The categorical variables were summarized using frequency & percentage. The adjusted association was performed using logistic regression. The response to open-ended questions were coded (in vivo coding), categorised, and represented in the form of themes, and presented as frequency and percentages. A $p < 0.05$ was considered significant. R Console (4.0.1) was used for performing statistical analysis.

ETHICAL CLEARANCE

The study was approved by the Institutional Research Committee (IRC) & Institutional Ethics Committee (IEC-813/2017), of Manipal Academy of Higher Education. No personal identification was collected, and confidentiality was maintained throughout the course of the study.

RESULTS

A total of 354 responses were received and analysed. There were 38.41 % (n=136) male and 61.58 % (n=218) female respondents. Of 354 participants, majority (n= 220, 62.14%) were aged between 20 and 25 years. A total of 38.98 % (n=138) participants had donated blood at least once. Out of 138 participants who donated blood, 55.8% (n=76) were males and 22.84 % (n=62) were females and the majority (n=102, 43.36%) were in the age group of 20 to 25 years.

Participants who were not members of any NGO (Non-Government Organizations) (n=203, 57.34 %), among them 45. 81 % (n=93) donated blood at least once. Even those volunteers who had worked once in the past six months, among them 65.22 %(n=30) donated blood. The majority of the participants having knowledge scores of average, and above-average did not donate blood.

Among the volunteers who did not donate blood were those who said they are not afraid of needles (n=146, 56.15%), they did not require incentive (n=80, 56.34%), and they feel that diseases are acquired while blood transfusion (n=136, 64.15%). Among those who were interested in donating blood, most of them (n=198, 59.28%) did not donate blood. The main reasons for not donating blood among non-donors were that it makes them weak (n=22) and that they did not know they should donate (n=40). The majority (n=210, 59.32%) of the respondents selected other reasons as an option for not donating blood. The other reasons which non-donors (n=126) quoted were low haemoglobin (n=60), underweight (n=35), personal choice (n=22), and medical conditions like diabetes, low BP, on medications, etc.(n=9) for not donating blood. Out of 354 participants, 115 (32.48%) responded to the open-ended question on 'what will encourage you to donate blood?'. Most of the responses were, social responsibility (n=54, 46.95%), feeling of contentment (n=50, 43.47) and proper education (n=11, 3.10%). Two hundred and eight (58.57%) participants responded to the open-ended question on 'How do you think blood donation camps can be improved?'. Major themes that emerged for this are publicity (pamphlets, posters, social media) (n=49, 23.56%), education and awareness (n=76, 36.53%), incentive (attendance, food, certificates, free blood test) (n=33,15.87%), hygiene and sanitation at the collection point (n=20, 9.62 %) and more comforting atmosphere (n=30, 14.42%). Descriptive for other variables are presented in Table I.

TABLE I: DESCRIPTIVE OF VARIABLES UTILIZED IN THE STUDY FOR BLOOD DONATION (N=354)

VARIABLES	NUMBER (PERCENTAGE) N (%)	BLOOD DONATION	
		YES, N (%)	NO, N (%)
Gender			
Male	136 (38.42)	76 (55.8)	60 (44.12)
Female	218 (61.58)	62 (28.44)	156 (71.56)
Age			
Below 20	118 (33.33)	26 (22.03)	92 (77.97)
20-25	220 (62.14)	102 (46.36)	118 (53.64)
25-30	12 (3.39)	6 (50)	6 (50)
Above 30	4 (1.13)	4 (100)	0
Year of Study			
1st year	70 (19.77)	27 (38.57)	43 (61.43)
2nd year	148 (41.81)	44 (29.73)	104 (70.27)
3rd year	110 (31.07)	49 (44.55)	61 (55.45)
4th year	16 (4.52)	8 (50)	8 (50)
5th year	2 (0.56)	2 (100)	0 (0)
Intern	8 (2.26)	8 (100)	0 (0)
Member of NGO			
Yes	151 (42.65)	45 (29.8)	106 (70.2)
No	203 (57.34)	93 (45.81)	110 (54.19)
Volunteering Service Hours			
Hour <5	210 (59.32)	79 (37.62)	131 (62.38)
5-10	48 (13.56)	23 (47.92)	25 (52.08)
10-20	36 (10.17)	14 (38.89)	22 (61.11)
20<hour	60 (16.95)	22 (36.67)	38 (63.33)

Type of Family			
Nuclear	294 (83.05)	114 (38.78)	180 (61.22)
Joint	60 (16.95)	24 (40)	36 (60)
Volunteering Work			
Once in week	61 (17.23)	19 (31.15)	42 (68.85)
Once in month	74 (20.90)	26 (35.14)	48 (64.86)
Once in six months	46 (12.99)	30 (65.22)	16 (34.78)
Once in Year	26 (7.34)	10 (38.46)	16 (61.54)
Rarely	125 (35.31)	47 (37.60)	78 (62.40)
Never	22 (6.21)	6 (27.27)	16 (72.73)
Knowledge Score			
Below Average	81 (22.88)	27 (33.33)	54 (66.67)
Average	107 (30.22)	37 (34.58)	70 (65.42)
Above Average	166 (46.89)	74 (44.58)	92 (55.42)
Why do people donate blood			
Social responsibility	326 (92.10)	130 (39.88)	196 (60.12)
Influence of friends	04 (1.13)	01 (25)	03 (75)
Religious purpose	02 (0.56)	02 (100)	00 (0)
For incentives/money	06 (1.69)	02 (33.33)	04 (66.67)
Screening for disease	04 (1.13)	01 (25)	03 (75)
Others	12 (3.39)	02 (16.67)	10 (83.33)
Fear of Needle			
Yes	94 (26.55)	24 (25.53)	70 (74.47)
No	260 (73.45)	114 (43.85)	146 (56.15)
Side effects of blood donation outweigh the benefits of doing so			
Yes	89 (25.14)	39 (43.82)	50 (56.18)
No	265 (74.86)	99 (37.36)	166 (62.64)
Donate blood if incentive is provided			
Yes	285 (80.51)	119 (41.75)	166 (58.25)
No	69 (19.49)	19 (27.54)	50 (72.46)
Acquire disease while blood donation			
Yes	212 (59.89)	76 (35.85)	136 (64.15)
No	142 (40.11	62 (43.66)	80 (56.34)
Adverse effect of blood donation			
Makes you weak	138 (38.98)	45 (32.61)	93 (67.39)
Anemia	30 (8.47)	12 (40.00)	18 (60.00)
No adverse effect	125 (35.31)	55 (44.00)	70 (56.00)
Don't Know	46 (12.99)	25 (54.35)	21 (45.65)
Others	15 (4.24)	1 (6.67)	14 (93.33)
Are you a frequent blood donor			
Yes	68 (19.21)	61 (89.71)	7 (10.29)
No	286 (80.79)	77 (26.92)	209 (73.08)
Difficulty during procedure			
Yes	65 (18.36)	16 (24.62)	49 (75.38)
No	289 (81.64)	122 (42.21)	167 (57.79)

Reason for never donating blood			
Makes you weak	37 (10.45)	15 (40.54)	22 (59.46)
No adverse effect	55 (15.54)	27 (49.09)	28 (50.91)
Don't Know	52 (14.69)	12 (23.08)	40 (76.92)
Others	210 (59.32)	84 (40.00)	126 (60.00)
Will you recommend blood donation			
Yes	348 (98.31)	138 (39.66)	210 (60.34)
No	6 (1.69)	0 (0)	6 (100)
Encourage blood donation			
Attendance	58 (16.38)	32 (55.17)	26 (44.83)
Half day	62 (17.51)	18 (29.03)	44 (70.97)
Incentive	72 (20.34)	22 (30.56)	50 (69.44)
Gift	14 (3.95)	8 (57.14)	6 (42.86)
Money	31 (8.76)	13 (41.94)	18 (58.06)
Other	117 (33.05)	45 (38.46)	72 (61.54)
Side effect after blood donation			
Yes	260 (73.45)	108 (41.54)	152 (58.46)
No	94 (26.55	30 (31.91)	64 (68.09)

The study revealed that blood donation was associated with various factors after adjusting for confounders: females had 3.3 times odds of donating blood compared to males (OR (95% CI): 3.396 (2.060-5.684); p=0.00). Those who were not a member of any NGO had 53% lower odds of donating blood compared to those who are a member (OR (95% CI): 0.47 (0.251-0.882); p=0.01). Those who volunteer once in 6 months had 68 % lower odds of donating blood compared to those who volunteer once in a week (OR (95% CI): 0.32 (0.118-0.887); p=0.02). Those who were afraid of needles had 46% lower odds of donating blood compared to those who do not have fear (OR (95% CI): 0.54(0.298-0.961); p=0.03).and those who feel that they acquire disease while blood donation had 44% lower odds of donating blood compared to those who feel otherwise (OR (95% CI): 0.56(0.331-0.942); p=0.03).

TABLE II: ADJUSTED ODDS RATIO FOR PREDICTOR VARIABLES FOR BLOOD DONATION.

VARIABLE	ODDS RATIO (95% CI)	P VALUE
Gender		
Male	1	
Female	3.39(2.06-5.68)	0.0000*
Member of NGO		
Yes	1	
No	0.47(0.25-0.88)	0.0199*
Volunteer services hours		
Less than 5 h	1	
5-10	0.87(0.39-1.94)	0.7500
10-20	0.79(0.30-2.13)	0.6501
Above 20 h	0.66(0.26-1.61)	0.3656
Frequency of voluntary work		

Once in Week	1	
Once in Month	0.65(0.27-1.50)	0.3262
Once in 6 Month	0.32(0.11-0.88)	0.0299*
Once in Year	1.15(0.36-3.69)	0.8084
Rarely	0.96(0.39-2.35)	0.9312
Never	2.63(0.70-10.69)	0.1607
Knowledge score		
Below Average	1	
Average	0.77(0.48-1.22)	0.2796
Above Average	0.67(0.42-1.06)	0.0937
Fear of needle		
Yes	1	
No	0.54(0.29-0.96)	0.0392*
Incentive for blood donation		
Yes	1	
No	1.87(0.95-3.80)	0.0740
Acquired disease during blood donation		
Yes	1	
No	0.56(0.33-0.94)	0.0301*
Interested in blood donation		
Yes	1	
No	3.79(0.85-27.36)	0.1153

CI: Confidence Interval, Significant values*

DISCUSSION

Escalating demand for safe blood and its availability in society can be assured only through enhancing voluntary blood donation. The role of volunteers is crucial to meet the demand for safe blood as they have a better understanding of healthcare requirements. The findings of our study are very similar to a study in Iran where 38% of respondents had ever donated blood which is 38.98% in our study. [16] There is also a significant increase in blood donation compared to the earlier study in India where they had only 10% of voluntary donors. [17] However, this proportion is relatively low when compared with studies among students from Nepal (43%), USA (56%) for blood donation. [18, 19] Our study revealed that males were more active in donating blood. There is evidence that women donate less blood mostly due to physiological problems and low haemoglobin count. [20] Several factors were found to be predictors of blood donation. We found a significant association between being an NGO member and donating blood. There are studies that support our findings that being an NGO member provides a sense of social responsibility and community welfare. [21, 22] We found that participants with nuclear families were less likely to donate blood which is in contrast with the study conducted in North India, which concluded that individuals from nuclear families were more likely to donate blood. [17] Even those participants who responded that it is a social responsibility to donate blood, have no fear of needles, and do not anticipate a difficulty during the procedure and agreed that there are no side effects of

blood donation, did not go for blood donation. This might be because of various misbeliefs or social constraints in society towards blood donation. The most cited reason to donate blood was a sense of social responsibility. [23] Most of the studies have evidenced that fear of needles and associated side effects like weakness, the transmission of diseases, etc. are the major reasons for not donating blood. [7] Any associated side effects from blood donation should be properly documented for any medico-legal case and even for research purposes. [24] In the present study, weakness, lack of awareness, low haemoglobin levels, underweight, personal choice, and medical conditions like diabetes, hypotension, under medications were mainly the stated reasons for not donating blood. This could also be attributed to poor knowledge about blood donation in general. Most of the participants who were not donating blood had average knowledge which is indicative of their negative behaviour towards blood donation. Majority of the participants responded that through education and awareness blood donation among students can be improved in the campus.

This study had few limitations too. The sample size utilized was not enough to generalize the findings. The cross-sectional nature of the study which is used may also hinder the cause-and-effect relationship. Future studies using a very large sample size are recommended for generalizing the findings.

CONCLUSION

Majority of the participants had good knowledge of blood donation, but their attitude and practice did not fall along the same lines. The study also highlighted that attitude towards donating blood is high among the participants who are associated with the NGOs or participate in voluntary activities. Voluntary work induces a 'sense of giving something to the society' which appears to be facilitating factor and an effective measure to encourage blood donation among youth. Incentivisation for blood donation proves to be another motivating factor. Innovative methods like health-related incentives such as blood credit, health screening. and economic incentives like a ticket to events, discount coupons etc. should be planned to encourage students for blood donation.

Age and gender are important identifier for those unwilling to donate blood for a noble cause. Educational programs, digital communication material on blood donation and way to mitigate misconceptions towards blood donation and blood transfusion should be prepared for the women in the respective age groups and run through the internet and social media regularly to curb the myths associated with blood donation and to motivate them to become a potential blood donor. Barriers to blood donation among women should be found out through in-depth studies. Government Health Officials should work towards this so that people do not have any misconceptions associated with the procedure. Education Institutions can play an active role in facilitating the youth to become safe blood donors and meet the blood requirement of any country. They should be encouraged to take lead in creating awareness programs, work in collaboration with medical institutions to create a curriculum on the topic of blood donation and impart learnings and motivate the student community to donate blood.

DECLARATIONS

Authors Contribution

AC, PR, and LK were involved in study concept, design, and data collection. AK carried out cleaning of data and statistical analysis. BT and AC wrote the manuscript. AG and PM did critical review of the paper. All authors have read and approved the manuscript.

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Conflicts of Interest

Authors have no competing interests.

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RESEARCH ARTICLE

KNOWLEDGE, AWARENESS AND ATTITUDE REGARDING ERGONOMICS AMONG INTERNS AND POSTGRADUATE STUDENTS: A FOLLOW-UP STUDY

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ABSTRACT

OBJECTIVES:

To assess the knowledge attitude and awareness of interns and postgraduate students regarding ergonomic disorders and, to assess if they follow ergonomic postures following counselling regarding ergonomics among dental students in India

METHODS:

The questionnaire for this study was validated and, a Cronbach's alpha score of 0.84 was obtained. This study was conducted as a two-part study. In the first part, a questionnaire was given to the participants of the study. In the second part of the study, the subjects were observed on the 7th, 15th, and 30th day.

RESULTS:

Over half the participants i.e., 59.6 % (90 participants) preferred to perform the procedures while standing. This data on statistical analyses was found to be significant. (P value 0.041) In this study, 84.1% of participants had experienced symptoms in neck, shoulders, hands or back during working. (P value 0.039).

CONCLUSION:

Ergonomics is an important subject that must be taught to every medical professional.

KEYWORDS

Ergonomics, Ergonomic disorders, Occupation, Dentistry

INTRODUCTION

In our daily practice, dental specialists often work with incorrect postures owing to their working routines, habits and improperly designed workstation. [1] Ergonomics in the recent days has become a commonly used term as; almost all the occupations are associated with some form of risk or occupational hazard. Ergonomics mainly deals with the modifying of the workplace to better fit the person working in it, rather than compromising and sustaining with the existing conditions. [2]

Dentistry involves skilful preparation of the tooth with great degree of precision and control. In performing various dental treatments often, the muscles that are associated with the posture get strained and this leads to a lot of discomfort for the dental specialist. [2] If ergonomic postures are not followed by the dentist it leads to ergonomic disorders which are mostly musculoskeletal in nature. [3] Dental students both undergraduate and postgraduate students are at increased risk of various ergonomic disorders owing to the improper postural habits they follow during training at dental schools. [4]

There are various studies on ergonomics and related disorders in the literature, but these studies do not observe the dental students after they have been counselled about various ergonomic postures. Hence, this study was conducted as a two-part study. In the first part a questionnaire was given to the dental students in India which assessed their knowledge, awareness, and attitude regarding ergonomic disorders, following which, they were explained about the correct postures to be followed to avoid ergonomic disorders. In second part of the study the subjects were observed on the 7th, 15th and 30th day to check if they followed correct ergonomic postures during dental procedures.

MATERIAL AND METHODS

1. ETHICAL CLEARANCE:

Ethical clearance was obtained from the institute's ethical committee board.

2. SAMPLE SELECTION:

A pilot study was conducted initially and following which the questionnaire of the study was validated. The questionnaire for this study was validated and, a Cronbach's alpha score of 0.84 was obtained. Using the data obtained from pilot study a sample size of 151 was calculated and used for the study. [ANNEXURE-1]

3. METHODS:

The study included 151participants, 76 interns and 75 postgraduate students in India. The study was explained to the dental students and only after obtaining a written consent they were included in the study. Inclusion criteria for the study was subjects currently in their internship or are doing post-graduation studies, must be willing to give a written consent and they must not have a diagnosed musculoskeletal disorder. The participants were excluded if they were not willing to be observed and give a written consent. The participants were initially given a questionnaire to assess their knowledge, awareness and, attitude regarding ergonomic disorders. The questionnaire consisted of 15 questions assessing the aforementioned factors. Following this, they were given information regarding ergonomics and ergonomic positions for dental treatment.

In the second part of the study, over a period of one month, 3 observations were made on day 7, 15 and 30 randomly during a dental procedure by 2 dentists trained in ergonomics and associated disorders. The participants ergonomic posture during dental procedures was noted. During the dental treatment it was noted if the subjects maintained a correct ergonomic posture or not. [Figure -1] These observations were then tabulated and subjected to statistical analyses.

4. STATISTICAL ANALYSES:

Statistical analyses was done using SPSS software version 20.0

RESULTS

In this study a total of 151 dental students were included. The participants were asked 15 questions based on ergonomics. The 151 participants were divided into 4 groups based on age. (Table-1) This data when subjected to statistical analyses was found to be statistically significant. (P value 0.010) There were 40 males and 111 female participants in the study and this data on statistical analysis was significant. (P value 0.049) Right hand was the dominant hand in 94% (142) of the subjects of the study.

The participants of the study were asked if they were aware of the term ergonomics and 92.1% (139) participants said that they were aware of the term and this data when subjected to statistical analyses was not significant statistically. When asked regarding if they followed ergonomics in their practices 53% said they followed it sometimes while 8.6 % subjects said they never followed ergonomics in their practice. This data was statistically insignificant among the two groups. (P value 0.198)

Over half the participants i.e., 59.6 % (90 participants) preferred to perform the procedures while standing. This data on statistical analyses was found to be significant. (P value 0.041) About 56.3 % of the participants did not take any breaks during the procedure and this data was similar

in both groups. (P value0. 689) A little over three quarter of the participants said that they assumed an awkward position sometimes in both the groups and 7.9% and 12% individuals in postgraduate and intern groups respectively said that they never assume an awkward position. (P value 0.048) Most of the participants 88.1% said that their workplace was adequately lit and this data on statistical analyses was found to be statistically significant. (P value 0.041)

About 56.6 % (43 participants) of the postgraduates were aware of ergonomic stools as opposed to only 37.3% (28 participants) in the intern's category. (P value 0.018) The participants in both the groups were aware about posture related musculoskeletal disorders as 89.9 % of the participants said they were aware of the disorders. (P value – 0.578) Furthermore, 84.1% of participants had experienced symptoms in neck, shoulders, hands or back during working. (P value 0.039). 99 participants were also aware of muscle strengthening exercises. (P value 0.777) Additionally, 32 participants in each group also performed muscle strengthening exercises. (P value 0.944)

When the participants were asked if they had a medical consultation for their symptoms 30 postgraduates and 4 interns had a consultation for their musculoskeletal symptoms. (P value 0.028) However, when the participants were asked if they had undergone treatment for the symptoms only 19 participants had undergone treatment. (P value 0.208) All but 2 participants felt that ergonomics should be included in curriculum of dentistry. (P value 0.152) The participants were asked to report any conditions that predispose them to workplace injuries, 41 participants had a condition that predisposed them to such injuries. [Figure-2]

Following the questionnaire, the participants were informed of their ergonomics as they were observed on 3 instances on the 7th,15th and on 30th day. It was noted that 40 and 36 participants followed correct ergonomic posture on first assessment in postgraduates and interns respectively. (P value 0.370) There was a slight improvement in the second observation with 44 and 39 subjects following the correct posture among postgraduates and interns respectively. (P value 0.572) On the third observation there was a significant decline among interns with only 20 following the ergonomic posture while 47 postgraduates followed the ergonomic postures on day 30. (P value 0.048)

DISCUSSION

The study compromised of 151 participants which were divided into two groups of 76 interns and 75 postgraduate students respectively. More than half the participants in our study did not take any breaks between patients, this is in accordance with the results obtained in Mumtaz et al [5] study where they found that 52.2% of interns did not take any breaks during procedures. Females had a higher incidence of musculoskeletal disorders when compared to male participants. This result is similar to the results obtained by Ovia et al, [6] Ayer et al,[7] and is contradicting the results of Gopinath et al. [8] This difference can be due to the fact that, more female participants were part of the study.

The present study noted that 59.6 % (90 participants) preferred to perform the procedures while standing which is contradicting to study conducted by Hille et al, [9] In which the maximum participants preferred to use siting position for dental treatment. This difference can be attributed to the dental training at various institutes across India wherein, procedures such as impression making are thought while the dentist or the dental student stands. In our study 88.1 % of participants thought that their workplace is adequately lit. In a study done by Martin et al, [10] it was noted that adequate lighting can reduce the incidence of ergonomic disorders.

Furthermore, 84% of participants reported that they had some form of disturbance in their neck, back, shoulder or hand while performing procedures. This data is similar to results that were noted in Parkali and Jowkar's [11] study where 73% of the participants reported symptoms due to work related disorders. In the present study postgraduate students showed more acceptance of following ergonomic postures than interns. This is in accordance to the study conducted by Kalghatgi et al [12], who showed that postgraduates had better acceptance than interns regarding ergonomics. This can be attributed to the fact that over the undergraduate years, the postgraduates might have experienced musculoskeletal pain associated with posture or might have observed the same with their colleagues.

In this study all but 2 participants were of the opinion that ergonomics should be included in the curriculum of dental students. This is in accordance with a study conducted by Rajeshwari et al, [13] where 83 % of the postgraduate

students and 90 % of the interns shared the same opinion as the results of our study. This is probably due to fact that a significant number of dentist's in their lifetime experience musculoskeletal disorders or pain associated with their work. If ergonomics is taught and reinforced in the curriculum the incidence of such disorders might reduce significantly.

The dental curriculum currently does not include ergonomics and its related disorders and hence it is of utmost importance that this be incorporated into the curriculum so as to reduce the incidence and increase the awareness regarding ergonomic disorders. The authors of the paper strongly recommend the inculcation of ergonomics into the dental curriculum. The limitation of the study is that a longer follow-up of the participants would have given a better idea on long term acceptance and adherence of reinforcing ergonomics and related disorders.

CONCLUSION

Ergonomics is an important subject that must be taught to every medical professional. The present study showed that the knowledge, awareness and attitude can be improved to a great extent among both interns and postgraduate students of ergonomics were to be incorporated into the curriculum.

ACKNOWLEDGEMENT:

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ETHICAL APPROVAL:

Was obtained from institutes ethical clearance committee

CONSENT TO PARTICIPATE:

A written consent was obtained from participants before beginning the study

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APPENDIX

TABLE -1: AGE DISTRIBUTION OF PARTICIPANTS OF THE STUDY

		AGE				TOTAL	P VALUE
		BELOW 25YEARS	25-30 YEARS	30-35 YEARS	ABOVE 35 YERAS		
YEAR OF STUDY	INTERNS	46	26	3	1	76	0.010
	% within Year of study	60.5%	34.2%	3.9%	1.3%	100.0%	
	POSTGRADUATES	25	44	4	2	75	
	% within Year of study	33.3%	58.7%	5.3%	2.7%	100.0%	
	TOTAL	71	70	7	3	151	
TOTAL	% within Year of study	47.0%	46.4%	4.6%	2.0%	100.0%	

FIGURE -1 STUDY DESIGN

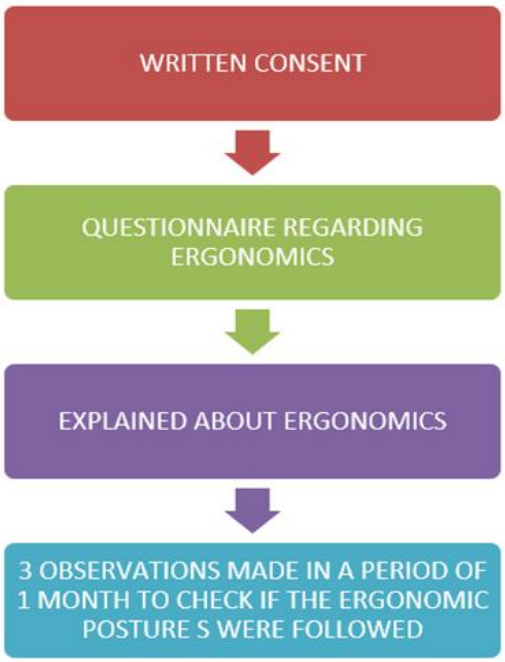
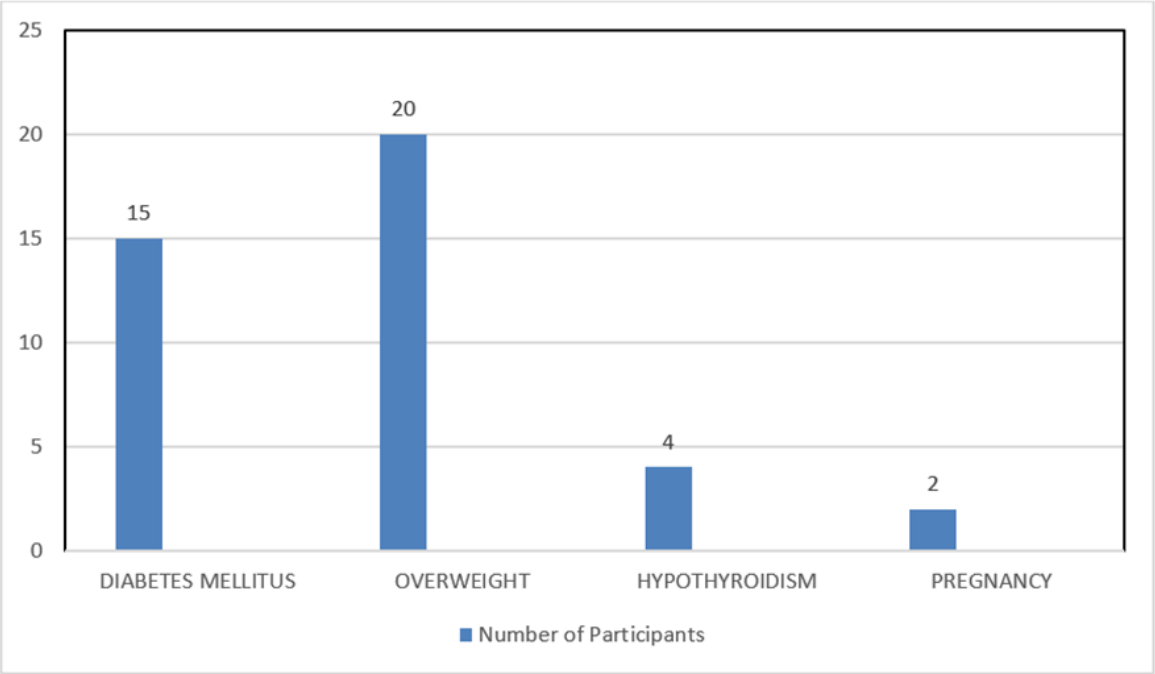


FIGURE -2 PARTICIPANTS WITH DISORDERS PREDISPOSING THEM TO WORKPLACE INJURIES



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RESEARCH ARTICLE

RELIABILITY AND VALIDITY OF THE MALAY VERSION OF MINDFUL ORGANIZING SCALE AMONGST NURSING STAFF

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ABSTRACT

AIM:

This study tested the reliability and validity of the 9-item Mindful organizing scale and safety performance scale in the sample of private hospital nurses in different states of Malaysia.

METHODS:

Mindful Organizing scale and safety behavior scale were translated into Bahasa Malaya. To accomplish this task, the survey was conducted of 475 registered nursing staff in different states of Malaysia in 2020 through a self-administered questionnaire. For convergent and discriminant validity of our research variables, we used the Structural equation modeling (SEM) technique with the help of SPSS AMOS 21. A confirmatory factor analysis (CFA), reliability analysis, and analysis of aggregation through intra-class correlation coefficients indices were also carried out.

RESULTS:

Our results testified the unidimensional structure of the mindful organizing scale as well as for safety performance both indicators and exhibited satisfactory internal consistency for both mindful organizing and safety performance. Also, the aggregation of scores to the team level was well under the prescribed limit.

CONCLUSIONS:

We are confident to establish that the Malay version of the mindful organizing and safety performance scales has shown to be a reliable and valid measure that can measure collective mindfulness and safety behavior amongst nursing staff. Our translated version can be used in other high-reliability organizations (HROs) in this cultural context and other industries that also want to achieve reliability in their operational performance.

KEYWORDS

Mindful Organizing, Collective mindfulness, Safety performance, Scale validation, Nursing Staff.

INTRODUCTION

All firms, but especially those in the healthcare field, should pay close attention to the safety and wellness of their employees. There is a higher risk of occupational risks being encountered by healthcare workers, such as chemicals and blood-borne diseases as well as psychological and biological dangers as well as other anomalies in ergonomics when executing jobs. Because of this,

workplace health and safety are a worldwide issue. There were 548,100 reported injury cases in 2017, according to the U.S. Department of Labor. [1,2]

Nurses had the greatest incidence rate at 10.9 per 100 full-time employees since it is one of the most important aspects in healthcare. [1] An annual statistical review from the Social Security Organization (SOCSO) Malaysia confirms that the healthcare industry in Malaysia had 1549 occurrences last year, which is relevant to the issue at hand. There have also been 1365 cases of temporary impairments, 463 cases of permanent disabilities, and 20 cases of death overall. To add insult to injury, a total of 1344 people were exposed to hazardous chemical, physical and biological substances, [3] while 1350 people were affected by respiratory, skin, and musculoskeletal diseases/conditions [3] throughout different industrial sectors. These figures show that healthcare safety is also a concern. As a result, our study focuses on ways to improve workplace safety in the healthcare industry with the proposed benefits of mindful organizing (a collective and social construct) in connection with the safety behavior of employees in the Malaysian cultural context.

Mindful organizing was first conceptualized by Karl E. Weick [4] while evaluating the ability of high-reliability organizations e.g. (nuclear power plants, air traffic control, and military establishments) as to how they operate much safer over longer periods despite the inheritance of the catastrophic danger in their operations. Mindful organizing is the collective ability of the workforce to foresee and detect anomalies with enough details and act swiftly. [5,6] Mindful organizing is a social process in high-reliability organizations (HROs), where employees forestall, detect, and even recoup from those anomalies. [4] The sensitivity of such organizations (HROs) can be witnessed through the fact that a tiny mistake can be the reason between life and death.

As a rule, safety behavior refers to the actions that employees do to comply with and adhere to specified safety requirements. [7,8] Many writers have defined two aspects of safety performance: safety compliance and safety participation. [7,9] This is in keeping with the past research and keeping in mind the distinction between task and contextual performance. Performing work while following specified safety standards, protocols, and procedures [7] constitutes safety compliance. Compliance with organizational rules also includes following SOPs, wearing personal protective equipment, and attending training sessions as well as following particular procedures in certain situations. To put it another way, safety behaviors that require official enforcement and acknowledgment fall under the category of safety compliance. [7] As a second point, safety participation is more of an extra-role behavior, in which an employee supports overall safety procedures, systems, and regulations by voluntary engagement. [7] As a consequence of intrinsic motivation and self-initiated activities, employees' contributions to overall safety performance in a company are most typically unrelated to official recognition or awards. [9] Such actions might include speaking out for safety in meetings, expressing concern for safety while performing tasks, and urging others to learn about safety, as well as supporting the general safety policy of the organization [9] are all instances of safety participation. As a result of current healthcare procedures, prescription, diagnosis, and treatment are more focused on patient safety [10] rather than on variables that may affect staff safety performance. As part of our research, we will add knowledge to the predictability variable for healthcare workers' safety behavior in order to overcome this literature bias.

In general, research on mindful organizing has prospered, but the Healthcare sector is the one that has witnessed true benefits of mindful organizing practice e.g., reduced accidents and enhanced safety performance of the sector in which mindful is practiced. [11] Amongst the nursing staff, groups that practiced mindful organizing had lesser occupational safety errors and omissions. [12,13] Prior literature also stated that mindful organizing has a positive impact on firefighters' safety performance as well as air traffic controllers. [4,14] Quantitative evidence for mindful organizing research is still not abundant as this construct is still in its infancy phase. [15] There is an emerging need for more empirical evidence of the mindful organizing construct for establishing its strong and distinct theoretical standing amongst different team-level constructs. [11]

To extend the empirical evidence of mindful organizing an assessment and validation of this scale would be of great help for organizations to opt for mindful organizing. In past literature, certain pieces of evidence tried to validate mindful organizing measures in different contexts, but end up with insufficient psychometric properties of their scales . [11] There are few different versions of the mindful organizing scale in languages like Spanish, [15] English, [16] French, German and Italian, [12] but no Malay version of mindful organizing exists in the literature. English version of mindful organizing scale has already been tested in

hospital settings. [16] Mindful organizing concerning safety was observed in the healthcare sector especially in hospitals and care centers. As expected, quantitative evidence is also very limited in this domain. [7,18] According to the findings of one research, [17] variables like reliability enhancing work practices (REWPs), respectful interactions, affective commitment, organizational citizenship behavior, and mindful organizing were positively related to patient safety and medication errors.

Aforesaid does not solely imply that Malay-speaking organizations in more than 07 countries including Malaysia, Indonesia, Brunei, Singapore, East Timor, and Christmas island, etc., where the Malay language is native, as well as official, do not possess a validated mindful organizing scale to be utilized in empirical researches, but it also provides us the opportunity to see the manifestation of mindful organizing in the Malaysian cultural context as it has been studied or practices in first world countries i.e. the USA. In past literature, validation of mindful organizing scale is performed mainly in high-reliability organizations (HROs), where validation of mindful organizing will be valuable in non-traditional HRO context as to how mindful organizing embodiment can be observed in this sector.

In doing so, to specify the objectivity of this study, firstly, we will translate the English version of the "mindful organizing [19]" scale as well as its antecedent i.e., safety behavior scale [9,20] to the Malay language, and validate their new version in the Malaysian cultural context. Secondly, we will be assessing the convergent and discriminant validity for both scales. By doing so, we will provide empirical evidence through the validity and reliability of the Malay version of the scale by testing its unidimensional structure as well as its internal consistency. Further, we will also try to justify the aggregation of responses to a group level to see if there is a consensus amongst team members for mindful organizing.

METHODS

1. TRANSLATION OF SCALE

We followed the translation established in the guideline. [21] Primarily, two individual translators (freelancers and also a member of local linguistic society) translated the English version of the safety organizing scale and safety behavior scale into the Malay language. We then compared both translated versions and discussed them with the translators leading to the production of the final scale. Further, with the help of two professionals (bilingual persons), one holding a doctoral degree and one holding a master's degree translated back the scale into the English version. Later, both the original English version of the "safety organizing scale and safety behavior scale" as well as the reverse-translated versions scales were compared and some of the minor corrections were made accordingly. This initial version of the mindful organizing scale went through a pilot study with 40 participants working in different hospitals. All of the respondents well-understood the questionnaire and no difficulty was faced by them. However, two of the respondents recommended few words be replaced for better comprehension.

2. PARTICIPANTS AND DATA COLLECTION

This research was done in accordance with the American Psychological Association's worldwide criteria (APA). For this study, we collected data from nursing staff from ten private hospitals located in different states of peninsular Malaysia (northern, western, eastern, and central regions). Participation was voluntary and participants were ensured about the anonymity and confidentiality of their responses. Participants were provided with a consent form before filling the questionnaire. Moreover, there were no educational tests (cognitive, diagnostic, or aptitude) used in our study. Instead, we used a cross-sectional questionnaire, which did not require any procedures or observation of public (respondents') behavior, and did not collect any identifiable private information, so no ethical review was required. Further, our research does not cause any foreseeable risk or harm to participants at any level. A convenience sampling technique was used, where nursing staff who is permanently employees in private hospitals were invited to participate in the study. Data collection was conducted in accordance with all ethical principles and norms. The data was collected in the year 2020. The sample in the present study comprises 475 workers from 53 different teams working in different hospitals with an average team size of 9 individuals. Overall, 590 questionnaires were disbursed, where after an initial assessment of the responses, few of the questionnaires were excluded because of the reason like missing values, unclear responses. The final response rate for this study was 80.5% (n=475/590). For this study, a team is defined as if two or more individuals working toward a mutual objective (22). Demographic information of the respondents is shown in Table.01

TABLE.01 RESULTS OF THE DEMOGRAPHIC INFORMATION OF RESEARCH RESPONDENTS

CATEGORY	SUB-CATEGORY	NUMBERS
Gender	Female	340
	Male	135
Age	18-25	89
	26-35	162
	36-45	179
	45 & Above	45
Work Experience	<5 Year	55
	6-10 Years	117
	11-15 Years	221
	20 & Above Years	82
Education	"Foundation, Diploma"	189
	"Bachelor's Degree"	199
	"Master's Degree"	87
Number of the hospitals included in the study from different states	Perak	02
	Johor	02
	Kelantan	02
	Negeri Sembilan	01
	Penang	01
	Selangor	02

3. MEASURES

3.1 Mindful Organizing

The original scale of Mindful organizing developed by Weick and Sutcliffe and Timothy Vogus was translated from English to the Malay language (16,19). This scale is unidimensional in its structure and is comprised of a total of nine items. This scale helps researchers to see the extent to which groups and the team pay attention to the forthcoming issue/anomalies and act accordingly to overcome them (4,5). To gauge their team's efforts, respondents used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). An example item is "When discussing emerging problems with coworkers, we usually discuss what to look out for". A complete set of the original and translated version is available at Exhibit-A at the end of this research paper.

3.2 Safety Behavior

Safety behavior was assessed using one of the renowned instruments developed by Neal & Griffin (9). This scale contains six items representing three items for "safety compliance" and three statements for "safety participation". Example statements for safety compliance are "I use all the necessary safety equipment to do my job," "I use the correct safety procedures for carrying out my job, "and "I ensure the highest levels of safety when I carry out my job", where statements for safety participation are "I promote the safety program within the organization", "I put in extra effort to improve the safety of the workplace" and "I voluntarily carry out tasks or activities that help to improve workplace safety".

4. DATA ANALYSIS

We used SPSS version 21 for descriptive and reliability statistics. Further SPSS AMOS 21 was used to test the internal factor structure, confirmatory factor analysis (CFA), convergent and discriminant validity of mindful organizing, and safety behavior scales. For convergent validity, standardized factor loading (SFL), composite factor loadings (CR), and average variance extracted (AVE) were utilized commonly used in prior researches (23–25). To test the model fit aspect we used goodness of fit indices i.e. CMIN (chi-square X^2 /degree of freedom), chi-square X^2, comparative fit index (CFI), root-mean-square error of approximate (RMSEA), normed fit index (NFI), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), Tacker-Lewis index (TLI) (26,27). Further, the reliability of the

mindful organizing and safety behavior scale was assessed via the Cronbach alpha coefficient. For mindful organizing, which is a team-level construct we used aggregation indices i.e. intraclass correlation ICC (K).[28]

RESULTS

1. RELIABILITY AND VALIDITY ANALYSES

To test the internal consistency of each construct of the questionnaire, a reliability test was performed. To achieve acceptable reliability in responses, the acceptable value of Cronbach's alpha is .70 (29). Through our findings, Cronbach's alpha values varied from 0.81 to 0.92 for all scales i.e. 0.92 for mindful organizing, 0.818 for safety compliance, and 0.813 for safety participation, indicating good reliability for all scales utilized. Findings in this study confirm the strong psychometric characteristics of our modified instruments, as well as their reliability or suitability for application in a given situation.

2. CONVERGENT AND DISCRIMINANT VALIDITY

There are common indicators like construct reliability (CR), standardized factor loadings (SFL), and average variance extracted (AVE) with the acceptance criteria of; SFL > 0.6, CR > 0.7, and AVE > 0.5, that are used to assess the convergent validity of the constructs. Convergent validity indicators are also shown in table-2 which reflects the suitable power of items in association with variables and all variables met those criteria demonstrating acceptable convergent validity. For discriminant validity, the square root of the average variance extracted (AVE) value was compared with the correlation coefficient of other variables (30). Whereas, if the outcome value is greater than its correlation coefficient, then the discriminant validity is achieved (table-02). All of the constructs met this criterion and are depicted in table-03.

TABLE-02 RESULTS OF THE CONVERGENT VALIDITY TESTS

CONSTRUCTS	ITEMS	SFL	CR	AVE	A	MEAN	STD. DEVIATION
Mindful Organizing	Minf-Org-1	0.754	0.925	0.577	0.924	4.1453	1.36
	Minf-Org -2	0.73				4.1684	1.37
	Minf-Org -3	0.745				4.1389	1.38
	Minf-Org -4	0.796				4.1326	1.36
	Minf-Org -5	0.759				4.2105	1.36
	Minf-Org -6	0.805				4.0926	1.37
	Minf-Org -7	0.769				4.1958	1.34
	Minf-Org -8	0.761				4.1579	1.35
	Minf-Org -9	0.716				4.1537	1.37
Safety Compliance	Saf-com-1	0.764	0.819	0.602	0.818	3.8126	1.37
	Saf-com -2	0.815				3.8800	1.37
	Saf-com -3	0.746				3.8000	1.40
Safety Participation	Saf-part-1	0.795	0.814	0.593	0.813	3.8211	1.33
	Saf-part -2	0.762				3.8400	1.32
	Saf-part -3	0.751				3.7663	1.31

"Note: SFL = standardized factor loadings; CR = construct reliability; AVE = average variance extracted; a = Cronbach value".

TABLE-03 RESULTS OF THE DISCRIMINANT VALIDITY TESTS

CONSTRUCTS	AVE	MSV	MAXR (H)	MINDFUL ORGANIZING	SAFETY COMPLIANCE	SAFETY PARTICIPATION
Mindful Organizing	0.58	0.036	0.926	0.76		
Safety Compliance	0.6	0.002	0.823	-0.043	0.776	
Safety Participation	0.59	0.036	0.815	0.191***	-0.039	0.770

"Note:*** =p < 0.001"

3. MEASUREMENT MODEL

To evaluate the measuring models for mindful organizing and safety behavior, indices such as CMIN (chi-square X2/degree of freedom), chi-square X2, comparative fit index (CFI), root-mean-square error of approximate (RMSEA), normed fit index (NFI), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), Tacker-Lewis index (TLI) (26,27) were utilized. Through aforesaid, the quality of two measurement models was confirmed, whereas, all of the values for each index were well under the criteria. To make the comprehension easy for the readers, table-04 represents the measurement models fit statistics against the confirmatory factor analysis (CFA), which shows that our results are acceptable and goodness of fit was achieved for mindful organizing and safety behavior.

TABLE-04 RESULTS OF THE FIT INDEXES FOR THE MEASUREMENT MODELS.

CATEGORIES OF STATISTICS	STATISTICS	FITNESS CRITERIA	MINDFUL ORGANIZING		SAFETY BEHAVIOR	
			VALUE	DECISION	VALUE	DECISION
Absolute fit indices	RMSEA	<0.08; <0.05 is excellent and <0.08 is good	.036	Accept	.06	Accept
	GFI	>0.90	.980	Accept	.996	Accept
Incremental fix index	AGFI	>0.90	.967	Accept	.988	Accept
	NFI	>0.90	.983	Accept	.994	Accept
	TLI	>0.90	.991	Accept	1	Accept
	CFI	>0.90	.993	Accept	1	Accept
Parsimonious fit indices	χ2/DOF	<2.00	1.59	Accept	.789	Accept

"Note: RMSEA = root-mean-square error of approximation; GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index; NFI = Normed fit index, TLI = Tacker-Lewis index, CFI = Comparative fit index; = Parsimony normed-fit index; NC = normed X^2 (i.e., X^2 /degree of freedom)".

4. STRUCTURAL MODEL

We tested the overall structural model with the SEM technique. To assess the Goodness-of-fit, we tested if the responses were fitting the measurement as well as a structural model. Concerning the criteria for structural model fit, [30] primarily model fit was seen to see if there are any abnormal variables, where all variances were significant with a value greater than zero, standard errors were well under the limit and all standardized factor loading were significant with the value ranging from 0.71 to 0.81. Our results exhibit strong empirical evidence for the good primary fit of the data. For the overall model fit for all variable, we opted indexes such as; absolute, incremental, and parsimonious, [26] whereas all the indices met the criteria, i.e. ($\chi2$ = 99.783, RMSEA = 0.018; GFI = .973, AGFI = .962, NFI = .972, TLI = .996, CFI = 0.996; $\chi2$/DOF = 1.147, $p <$ .01;) demonstrating an acceptable overall model fit. Lastly for aggregation analysis, IRR + IRA [28] technique was used commonly known as ICC(K) for the mindful organizing scale (collective construct). According to the literature, the value of ICC (K) above 0.7 suggests considerable acceptability. [28] Our findings reported sizeable ICC (K) which justifies aggregation of data to the team level. Results of ICC (*K*) ranged from .91 to .93, which shows the level of agreement between respondents for mindful organizing.

DISCUSSION AND CONCLUSION

Through this study validation and reliability of the Malay version of the mindful organizing scale (16,19) and safety performance scale of Neal & Griffin (9). We translated the English version of the mindful organizing as well as safety performance scale to be utilized not only for high-reliability organizations (HROs) of Malaysia but for other less hazardous operations nature organizations that are operating in a less tiring environment. Through this research, we provided empirical evidence for the sound psychometric properties of the Malay version of the mindful organizing and safety performance scales. We achieved this by attaining internal factor structure validity, reliability of the scales, their convergent and discriminant validity alongside their association with each other. Through this research, we also provided empirical evidence to see the teams' in-between agreement on mindful organizing,

which certifies the notion that mindful organizing is a social construct that comes into the existence through mutual efforts of the teams i.e. constitution through the actions and interactions.

Reference to the psychometric properties (the internal structure) of the mindful organizing scale, our findings are in harmony with the recent empirical evidence of mindful organizing researches in the context of occupational safety. For instance, standardized factor loadings for mindful organizing in different studies were reported as; ranged from 0.79 to 0.91 with the reliability of .95,[31] from 0.89 to 0.96 with the reliability of 0.94, [15] highly significant factor loading at ($P < 0.001$) with the reliability of 0.88. [16] Whereas, some of the studies have only reported Cronbach alpha value of the unidimensional scale of mindful organizing e.g. a=.090, [32] a=.093. [20] A greater reliability score ie. Cronbach alpha value a=0.092 offered incremental validity for the original scale of mindful organizing. In comparison to aforesaid, all of the factor loadings for mindful organizing scale raged from 0.716 to 0.805, and for both safety compliance and safety participation, factor loading ranged from 0.746 to 0.815 with Cronbach alpha value of a=0.813 and a=0.818. An organization's ability to reap future advantages from this team-level construct is bolstered by the consistency and harmony of our findings. Our data also supported the aggregation of responses for mindful organizing at a team level, and organizations can assess the individual teams' mindfulness practice by assessing them individualy. [19] It is possible that by looking at ongoing behaviors and interactions on the unit, the mindful organizing scale might assist distinguish between safe and potential unsafe teams.

Considering that our findings are in line with previous research, this adds to the predictability of mindful organizing for safety performance. The healthcare sector may exploit mindful organizing to pursue enhanced safety objectives that can contribute towards the creation of a more safe workplace for nursing staff as well as for the patients. Health care professionals face a wide range of risks at work, including chemical, biological, radioactive, and physical threats. Consequently, not only is the safety of the healthcare workers at their workplace is crucial for them, but also for the patients they are caring for.[33] Although we have provided the empirical evidence of reliability and validity of mindful organizing scale in the healthcare sector, this is not the perennial evidence or eventual outcome, as the ability to anticipate and detect anomalies when they are weak and act swiftly to eliminate bigger consequences is not limited to the nursing staff. The phenomenon can be generalized or tested at the top-level executives and the management of hospitals to assess the organizational mindfulness to the external and ever-changing environment. Further mindful organizing can further be tested with other safety-related constructs be it individual or team level to see its discriminant aspect to further exploit its fruitfulness, as the research on this construct has still not reached maturity.[34]

1. PRACTICAL IMPLICATIONS

Our study's outcome i.e. validation of the Malays version of mindful organizing scale has made noteworthy practical implications. The Malay language is native to more than seven countries including Malaysia, Indonesia, Brunei, Singapore, Thailand, East Timor, etc. with the language speakers of about 215± million. Keeping in view this huge amount of Malay language speakers formally and casually, our developed scale may be helpful to be utilized in Malay speaking countries and organizations to investigate the existence of mindful organizing among their teams, which has proved to be enhancing operational safety and reliability in the past. [4,12,14,16] In connection with aforesaid, some self-audits for high-reliability organization principles are described by Weick and Sutcliffe [19] in their book (HROs). For example, an enterprise can start with a broad assessment of its mindfulness and go on to group-level mindful organizing to determine if this phenomenon is prevalent amongst its personnel. Discussing such nuances is essential to the adaptation of the Malay mindful organizing scale, which requires significant attention and thoughtful consideration when adapting this phenomenon in any organization since the cultural environment would be new to it.

Healthcare is the one sector that comes under the group of reliability-seeking organizations, [15] where the Malay version of the mindful organizing scale would a valuable tool for an organization to measure mindful organizing in their teams to anticipate, detect and mitigate the forthcoming issues. Our developed scale is not only limited to be utilized in healthcare setup, but it can be utilized (after the initial self-assessments proposed earlier) in an actual high-reliability organization (HRO) i.e. Nuclear power plants, aviation, air transport controlling units, and oil and gas operations throughout the region wherever the Malay language is spoken read, or written. Managers of hospitals can use this translated version of the mindful organizing scale to evaluate their nursing teams' collective ability in terms of error anticipation as well as recovering from them,

which ultimately will enhance their safety performance (patient safety, reduced medication error, better healthcare, etc.). Our translated version is also of reasonable length which also helps respondents to provide their response with ease and minimize the risk of any bias or reading fatigue. Since the mindful organizing scale helps to identify the prevalence of mindfulness amongst team members, thus managers can utilize this construct not only for safety improvements but for general performance improvements as well. Organizations can also observe through this social construct the nature of social interaction amongst their team, as to how much they are heedful and cohesive when performing tasks in the group (35). Mindful organizing also relies upon the respectful interaction of employees as it helps them involve in mindful organizing, [17] thus opting for mindful organizing may yield interesting insights about this social interaction aspect amongst employees. Mindful organizing is the higher-order construct that emerged from the principles of high-reliability organization (HROs), that can be distinctively and separately measured. [19] It's all sub-dimensions (if measured separately) i.e. preoccupation with failure, sensitivity to information, reluctance to simplify, commitment to resilience, and deference to the expertise can provide a vivid and clear picture about the social interaction of employees, thus leading to a better understanding and operational control of the organization as well as manager. Healthcare managers may discover training needs for their employees by using a mindful organizing scale, as well as evaluate which aspects are lacking in order to improve safety performance.

STUDY LIMITATIONS

The fact that every study has some limitations is undeniable. Using cross-sectional data, which is time-dependent, as opposed to longitudinal research covering many periods of time, is one of the study's first drawbacks. As a result of prior research that has tested mindful organizing in high-reliability organizations (HROs) over several time periods, a future longitudinal study in the healthcare setting will be necessary. Usually, it has been found that respondents' responses to a self-reported instrument influenced how honest they were while responding to the survey.[36] As all of our respondents were from private hospitals, and normally, in healthcare occupational settings, personal as well as patient safety is the prime concern, participants may have fallen to "social desirability bias" and exaggerated their levels of mindful organizing, which is especially important in this case. This bias has also been highlighted in the past concerning mindful organizing.[37] In addition, our findings are applicable to the Malaysian cultural setting, which will need to be validated worldwide in the future. The nurses who responded to our survey are directly involved in the provision of healthcare in different teams primarily performing on an operative level, but in the future, the participation of higher hierarchy and top management from the healthcare industry might offer fascinating insights. Lastly, through this study, we have only attained the evidence of validity and reliability between three distinct variables one at team-level (mindful organizing) and two at an individual level (safety compliance and safety performance) but couldn't attain the path or nomological evidence by assessing the predicting and outcome role. This urges the needs of future study to test mindful organizing and safety performance in an antecedent and outcome form to validate their further nomological structure.

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APPENDIX – EXHIBIT-A

ENGLISH AND MALAY VERSION OF MINDFUL ORGANIZING AND SAFETY BEHAVIOR SCALES

MINDFUL ORGANIZING SCALE
"Apabila membincangkan masalah yang timbul dengan rakan sekerja, kebiasaannya kami membincangkan perkara yang perlu diperhatikan". "When discussing emerging problems with co-workers we normally discuss what to look out for".
"Kami meluangkan masa untuk mengenal pasti aktiviti yang kami tidak mahu salah". "We spend time identifying activities we do not want to go wrong".
"Kami membincangkan alternatif bagaimana untuk menjalani aktiviti kerja normal kami". "We discuss alternatives as to how to go about our normal work activities".
"Kami mempunyai tanggapan yang baik bagi setiap bakat dan kemahiran individu". "We have a good map of each person's talents and skills".
"Kami membincangkan kemahiran unik kami di antara satu sama lain supaya kami mengetahui siapa yang mempunyai kemahiran khusus dan pengetahuan yang relevan". "We discuss our unique skills with each other so that we know who has relevant specialized skills and knowledge".
"Kami bercakap tentang kesalahan dan cara-cara untuk belajar darinya". "We talk about mistakes and ways to learn from them".
"Apabila berlakunya kesalahan, kami bincangkan bagaimana kami dapat mencegahnya". "When errors happen, we discuss how we could have prevented them".
"Apabila mencuba untuk menyelesaikan masalah, kami memanfaatkan kemahiran unik rakan sekerja kami'. "When attempting to solve a problem, we take advantage of the unique skills of our colleagues".
"Apabila krisis berlaku, kami segera mengumpulkan kepakaran kami untuk cuba menyelesaikannya". "When a crisis occurs we rapidly pool our collective expertise to attempt to resolve it".

SAFETY BEHAVIOR SCALE
"Saya menggunakan semua peralatan keselamatan yang diperlukan untuk melaksanakan tugasan saya". "I use all the necessary safety equipment to do my job".
"Saya menggunakan prosedur keselamatan yang betul untuk menjalankan tugas on saya". "I use the correct safety procedures for carrying out my job".
"Saya memastikan tahap keselamatan tertinggi semasa menjalankan tugas". "I ensure the highest levels of safety when I carry out my job".
"Saya mempromosikan program keselamatan di dalam organisasi". "I promote the safety program within the organization".
"Saya berusaha sedaya upaya untuk meningkatkan keselamatan di tempat kerja". "I put in extra effort to improve the safety of the workplace".
"Saya secara sukarela menjalankan kerja-kerja atau aktiviti yang membantu meningkatkan keselamatan di tempat kerja". "I voluntarily carry out tasks or activities that help to improve workplace safety".

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RESEARCH ARTICLE

RELIABILITY TESTING OF SELF-CARE OF HEART FAILURE INDEX V6.2 CHINESE INSTRUMENT AMONG HEART FAILURE PATIENTS

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ABSTRACT

OBJECTIVE:

Self-Care of Heart Failure Index (SCHFI) v6.2 Chinese is an instrument used to assess the ability of self-care behaviour among heart failure patients. It has been validated in Taiwan; however it is yet to be validated in Malaysia. As a multi-ethnic country, Chinese language has been one of the major languages in Malaysia. Therefore, this study was conducted to examine the reliability of Self-Care of Heart Failure Index (SCHFI) v6.2 Chinese among Malaysian population.

DESIGN:

A successive independent sample design was used throughout a 4-months data collection period.

SETTING:

Eighty heart failure patients from University of Malaya Medical Centre and National Heart Institute were recruited through purposive sampling. The two hospitals were chosen because they have specialized heart clinics that eased the data collection. The out-patients were screened by the cardiologists for their eligibility to participate in this study.

MEASURES:

The samples were administered with SCHFI v6.2 Chinese. The item endorsement index, internal consistency and item-total correlation of SCHFI v6.2 Chinese was examined.

RESULTS:

The maintenance subscale of SCHFI showed a low internal consistency (Cronbach a = .52) while the management and confidence subscales showed an acceptable internal consistency (Cronbach a = .67 and .90 respectively).

CONCLUSION:

SCHFI v6.2 Chinese is a reliable instrument to be used to be used among Malaysian population.

KEYWORDS

heart failure, reliability, self-care

INTRODUCTION

According to World Health Organization, cardiovascular diseases (CVDs) is the number one cause of death globally.[1] In 2016, there were approximately 17.9 million of people died from CVDs. This makes up the 31% of the global death. In Malaysia, heart disease is an important cause of morbidity and mortality. Due to the ageing of Malaysia population, the burden of coronary heart disease is estimated to multiply in the future.[2] In fact, about 6% to 10% of all acute medical hospitalization are due to heart failure in Malaysia.[3]

In Malaysia, there are 8% of heart failure readmission within 30 days of discharge.[4] According to Star2.com, Malaysia is still lack of patients' support outside hospital setting.[5] There is also limited data on psychometric characteristics of self-care among local Malaysian heart failure population.[6] In fact, it is important for the healthcare professional to understand the ability of the heart failure patient to perform a proper self-care. Therefore, the healthcare professionals need a standardized tool to evaluate the heart failure patients in performing self-care.

The commonly used tools to assess the self-care of heart failure patients are European Heart Failure Self-Care Behaviour Scale (EHFScBS) and Self-Care of Heart Failure Index (SCHFI). EHFScBS is a brief and practical measure to assess the self-care behavior while SCHFI provide information about the deficiency area in self-care.[7] Through the assessment of self-care, the healthcare professional can have a better understanding on the patients and hence improve the quality of treatment.

The original Self-Care of Heart Failure Index (SCHFI) v6.2 was developed in English language by Riegel et al.[8] However, Malaysia has a multi-ethnics population with diverse languages. The average age of heart failure patients in Malaysia is 58 years, which may face language barriers.[9-10] During doctor-patient communication, language has become a challenge. One of the populations that is affected is Chinese population. This study focused on the Chinese version of SCHFI because Chinese population was the second major population with heart failure in Malaysia.[11]

Previous study has been conducted in Taiwan using Self-Care of Heart Failure Index (SCHFI) v6.2 Chinese, showing that Cronbach's alpha of self-care maintenance, self-care management and self-care confidence subscale were .635, .716 and .860 respectively.[12] Besides, confirmatory factor analysis supported the model fit of SCHFI v6.2 and this is similar to the previous version of SCHFI v4.[8] In Malaysia, SCHFI v6.2 Chinese has yet been validated. Therefore, this study was aimed to determine the reliability of Self-Care of Heart Failure Index (SCHFI) v6.2 Chinese among patients with heart failure admitted to University of Malaya Medical Centre (UMMC) and National Heart Institute (IJN), Malaysia.

METHODS

RESEARCH DESIGN AND SAMPLE

A successive independent sample design was conducted in this study over four months. A total of 80 participants from University of Malaya Medical Centre (UMMC) and National Heart Institute (IJN), Malaysia were recruited by purposive sampling. The inclusion criteria of participants are:

I. heart failure patients with New York Heart Association (NYHA) functional classification I, II or III
II. patients with reduced left ventricular ejection fraction of ≤ 55% or mild diastolic dysfunction,
III. participants should also be able to understand Chinese language.

Whereas the exclusion criteria are patients with cognitive impairment, for example Alzheimer's disease, Parkinson's disease and dementia.

INSTRUMENTS

The Patient version – Self-Care of Heart Failure Index (SCHFI) was first developed in English version by Riegel et al.[13] The instrument used in this study was translated into Chinese version by Yu et al.[7] The SCHFI v6.2 Chinese consists of 18 items. The instrument consists of 3 domains, which are maintenance (6 items), management (6 items) and self-confidence (6 items). The first self-care process is maintenance, which is defined as the medical adherence and engagement of healthy behaviors. Secondly, the management process involves patients' response to the symptoms. Lastly, the self-care confidence scale represents the confidence level of patients in performing self-care.[14] The instrument utilizes a 4-point Likert scale ranged from 1 (never or rarely) to 4 (always or daily).

PROCEDURES

The ethical approval for this study was sought from the UMMC Medical Research Ethics Committee (MREC) (Ethic No.: 2019618-7526) and IJN Research Ethics Committee (IJNREC) (Ethic No.: IJNREC/420/2019). The initial

recruitment was conducted by the clinical investigator from UMMC and IJN respectively according to inclusion and exclusion criteria of the study. After the clinical investigator grants the informed consent from the patients, they were introduced to the researchers. Patient information sheet was given to the patients once the participants agreed with the participation, they signed an informed consent form. Since some patients were unable to read or write, the instruments were administered orally. The researchers read the questions for the patients and the patients answered orally. In order to maintain the confidentiality of the participants, each administered questionnaire data will be coded as anonymous without identify any particular participants, then the survey data will be kept in secure computer with encrypted password. Whereas the informed consent form sheet and hard copy data such as the questionnaire and demography questionnaires that contain participant information will be kept in locked cabinet under Psychology and Counselling Department, University Pendidikan Sultan Idris, Malaysia. The data will be kept for 7 years before its termination. Only the researchers and ethics reviews board as necessary will have access to the data.

DATA ANALYSIS

The data was analysed using The R Project for Statistical Computing version 3.6.1. Three analysis were run that are item endorsement index, Cronbach's Alpha and item-total correlation. Item endorsement index was computed in order to examine the level of endorsement of each item by the participants. An index of below .30 will show a low level of endorsement while an index of above .80 will show a high level of endorsement in that particular item.[15] The internal consistency of the SCHFI v6.2 was examined by calculating the Cronbach's alpha coefficient and item-total correlation. Hair et al. suggested an acceptable Cronbach's alpha of .60 to .70.[16] Item-total correlation of .30 to .70 is considered acceptable.[17]

RESULTS

The participants recruited in this study aged between 25 to 88 years. The mean age of the participants was 61.39 (SD = 15.39). Most of the participants were male (60.00%) and more than half of the participants were married (72.50%). Since a large portion of the participants had an older age, most of them were retired or unemployed. The common comorbidities of reported by the participants include hypertension, diabetes mellitus, high cholesterol, kidney failure and cancer. Most of them were diagnosed with heart failure for more than one year. Therefore, they were doing regular appointment to have their medical check-up. On average, the participants spend about three days per year at hospital that is once in four months. Two participants were excluded in calculating the mean and standard deviation for "time spent at hospital" because of the outliers data. The demographic characteristics of the participants were shown in Table 1.

TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF SAMPLES (N = 80)

CHARACTERISTICS	NO.	%
Gender		
Male	48	60.00
Female	32	40.00
Marital Status		
Single/Widowed/Divorced	22	27.50
Married	58	72.50
Education		
Primary	24	30.00
Secondary	32	40.00
Tertiary	23	28.75
Postgraduate	1	1.25
Working Status		
Employed	29	36.25
Unemployed	51	63.75
Comorbidity		
None	48	60.00

One	22	27.50
Two	9	11.25
Three	1	1.25
Ejection Fraction (%)		
Reduced (HFrEF)	27	33.75
Mid-range (HFmEF)	18	22.50
Preserved (HFpEF)	35	43.75
	M	SD
Age (years)	61.39	15.39
Time Spent at Hospital (days/year) (n = 78)	3.71	3.26

Abbreviation: M, mean; SD, standard deviation

ITEM ENDORSEMENT INDEX

Each item was analysed first to examine the level of endorsement of each self-care behavior by the participants. Table 2 showed the item endorsement index of each item in each subscale in an ascending order. In maintenance subscale, item 6 (Receive a flu shot yearly) showed the lowest level of endorsement (Item difficulty = .30). This meant getting a flu shot was not a regular practice by the participants. Item 3 (eat low salt diet) showed the highest level of endorsement with item endorsement index of .71, showing that most of the participants were having a low salt diet. In management subscale, item 11 (Call your doctor or nurse for guidance) showed a high level of endorsement (Item difficulty = .91). This showed that calling doctor and nurse for guidance was a common practice among the participants. On the other hand, item 9 (Reduce fluid intake) showed the lowest endorsement with item endorsement index of .68. Lastly, item 14 (Recognize changes in your health if they occur) in confidence subscale showed the lowest confidence level with item endorsement index of .65 while item 18 (Follow the treatment advice you have been given) showed the highest confidence level with item endorsement index of .71. All the items in SHCFI v6.2 Chinese showed an acceptable range of endorsement (.30 - .71) except item 11.

TABLE 2: ITEM ENDORSEMENT INDEX OF SCHFI V6.2 CHINESE

ITEM	ITEM ENDORSEMENT INDEX
Maintenance subscale	
Item 6	.30
Item 1	.50
Item 2	.56
Item 5	.59
Item 4	.65
Item 3	.71
Management subscale	
Item 9	.68
Item 7	.73
Item 10	.76
Item 8	.78
Item 12	.78
Item 11	.91

Confidence subscale	
Item 14	.65
Item 13	.66
Item 15	.67
Item 16	.67
Item 17	.68
Item 18	.71

Reliability Test of Self-Care of Heart Failure Index (SCHFI)

The items were further examined by calculating the Cronbach's Alpha and item-total correlation. The Cronbach's Alpha of maintenance subscale was .52. Deletion of item 6 (Receive a flu shot yearly) would increase the Cronbach's Alpha by 0.04, whereas deletion of other items would lower it. The item-total correlation for item 1 to 6 ranged between .04 - .63, indicating all items in maintenance subscale were homogeneous except item 6. For management subscale, the Cronbach's Alpha was .67. Deletion of any item in management subscale did not raise the Cronbach's alpha of the subscale. The item-total correlation of item 7 to 12 was .48 to .67 which was in an acceptable range. Therefore, item 7 to 12 were retained. The Cronbach's Alpha of confidence subscale was .90. Deletion of any item would lower the Cronbach's alpha of the subscale. The items in confidence subscale were homogeneous because the item-total correlation of all items was greater than .70. Thus, all the items were retained. Item statistics of each subscale was shown in Table 3.

TABLE 3: ITEM STATISTICS OF EACH SUBSCALE IN SCHFI V6.2 CHINESE

ITEM	CORRECTED ITEM-TOTAL CORRELATION	CRONBACH'S ALPHA IF ITEM DROPPED
Maintenance subscale		
Item 1	.39	.49
Item 2	.34	.49
Item 3	.51	.42
Item 4	.36	.49
Item 5	.63	.39
Item 6	.04	.56
Management subscale		
Item 7	.48	.65
Item 8	.55	.62
Item 9	.48	.65
Item 10	.45	.64
Item 11	.67	.60
Item 12	.58	.61
Confidence subscale		
Item 13	.71	.89
Item 14	.75	.88
Item 15	.71	.89
Item 16	.81	.87
Item 17	.83	.87
Item 18	.80	.88

The Cronbach's alpha of maintenance subscale was low. However, the Cronbach's alpha of management and confidence subscale were acceptable. This suggested that the management and confidence subscale of SCHFI showed an acceptable internals consistency between items. An internal consistency implied that the items in the subscales were measuring the same construct and reliable to be used to measure the self-care behavior.

DISCUSSION AND CONCLUSION

Heart failure is a complex clinical disease that require multidisciplinary approaches. Therefore, the patients have to undergo psychometric assessment to ensure optimal clinical outcomes.[18] Self-care Heart Failure Index (SCHFI) v6.2 Chinese is an instrument that can achieve that purpose. Because it covers three aspects of the self-care behavior, that are self-care maintenance, self-care management and self-care confidence. Overall, SCHFI v6.2 Chinese showed an acceptable internal consistency.

However, there are some items that need specific attention. In maintenance subscale, item 6 (Receive a flu shot yearly) showed a lower item endorsement index than in SCHFI v6.2 English.[13] This showed that getting a flu shot as a mean of avoiding sick less common practiced by the participants in this study. The current study was conducted among the Malaysian population whereas the original study was conducted in Western country, thus this item was perceived differently by different population. Besides, item 6 also had the lowest item-total correlation. This showed that item 6 was heterogeneous to the other items in the subscale. Most of the participants did not receive a flu shot yearly. Therefore, it is suggested to drop this item in the SCHFI v6.2 Chinese to be used in Malaysia.

Item 4 (Do some physical activity) showed a low item-total correlation. Most of the patients in this study did not do physical activity to maintain a healthy lifestyle. Since heart failure patients may experience shortness of breath depend on their heart failure severity, they have to get advice from healthcare professional on the type of exercise that is suitable with their health condition.

On the other hand, item 11 (Call your doctor or nurse for guidance) showed a higher level of endorsement than in the SCHFI v6.2 English.[13] It can be concluded that seeking advice from healthcare professionals was a common response to heart failure symptoms by the patients in this study. Item 11 also showed the highest item-total correlation. In line with Yu et al. who conducted a study using the same instrument, Chinese patients in Hong Kong regard seeking medical help as self-care behavior.[7] However, the authors also found that item 11 did not fit into any factor in SCHFI v6.2 Chinese. Further examination on the factor structure of SCHFI v6.2 Chinese need to be conducted.

All the items in management subscale were found to be homogenous indicating these items were measuring the ability of patients to recognize heart failure symptoms (item 7), implement treatments (item 8-11) and evaluate the effectiveness of treatment (item 12) in line with the definition of self-care management. As for confidence subscale, all the items were found to be homogenous in this study. Looking into each item, it measured the confidence level of the patients in doing self-care maintenance and self-care management. Item 13, 17 and 18 concerned about the confidence level of patients at symptom monitoring and medical adherence (self-care maintenance) while item 14, 15 and 16 measured the confidence level of patients at recognizing symptoms, responding to symptoms and evaluating the effectiveness of treatment (self-care management).

CONCLUSION

This study has proven the reliability and validity of Self-Care of Heart Failure Index (SCHFI) v6.2 Chinese among Malaysian population. The internal consistency of SHCFI v6.2 Chinese was acceptable and its discriminant validity with WHOQOL-BREF was shown. In Malaysia with a diversity of languages, a Chinese language instrument is important for the use of Chinese patients especially those who cannot communicate in other language except in their mother tongue which is Chinese. In providing a good service in healthcare setting, communication should not be a barrier that could affect the quality of treatment given. Therefore, developing an instrument in the language that can be understood by the patient is the responsibility of healthcare professionals. Healthcare professional can utilize SCHFI Chinese to assess the heart failure patients in order to identify the capability of heart failure patients in performing a proper self-care. This enables the healthcare professional to have more information and understanding about the heart failure patients. Based on the result from the assessment of SCHFI Chinese, healthcare professional can provide appropriate education to the heart failure patients so that they are able to recognize and handle the symptoms of heart failure effectively. Eventually, this

prevents and lowers the rate of readmission after the patients are discharged.

Since the number of samples in this study was limited, factor analysis cannot be conducted to identify the factor structure of the Self-Care of Heart Failure Index (SCHFI). Additionally, the samples recruited in this study were heart failure patients with ejection fraction ranged from reduced to preserved. The result of this study cannot be generalized to entire heart failure population. In future research, it is recommended to conduct a confirmatory factor analysis with a larger sample size to confirm the three-factor structures of SCHFI.

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RESEARCH ARTICLE

INVESTIGATING PERCEPTIONS OF PATIENTS ON HEALTHCARE PRICING WITHIN THE PRIVATE HEALTHCARE SECTOR IN SRI LANKA

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ABSTRACT

Demand for private sector healthcare services in Sri Lanka is on the rise. This is very evident from the increase in the number of registered private healthcare institutions from 1990 to 2017. [1,2]

With the increasing utilization of private sector healthcare services, various qualitative factors, and service-related issues associated with the healthcare delivery system have become common debates. A major concern, patients have expressed, is about the fees charged by doctors and hospitals.

Principle aim of this study was to investigate the perceptions of patients on healthcare pricing within the private healthcare sector in Sri Lanka.

The target population of the study was defined as Sri Lankans who have been inpatients in private hospitals within the past year. The focus districts were Colombo, Kandy, and Galle. These 3 districts represented nearly 60% of the total private sector bed capacity.

From each district, three main private hospitals were selected. Over 700 patients were invited to participate, 246 surveys were completed, and 215 were retained as 31 had excessive missing and/or unclear data.

In all 3 districts the majority of patients were either dissatisfied with or remained neutral (69%) on the hospital fees, (66%) on doctor's fees, (74%) on the overall price they ended up paying, (76%) on whether they think the healthcare services they received are value for money.

This study did not investigate the reasons or the factors that may affect the satisfaction or dissatisfaction of patients towards the fees they paid.

Multiple factors can affect patient's perception on the fees they paid. With negative perception on the above it can be concluded that there is sufficient evidence to challenge private sector healthcare satisfaction level vs price/fees equilibrium in Sri Lanka.

KEYWORDS

Patient perception, value, pricing, private healthcare, fees

INTRODUCTION

The total number of private hospital beds in Sri Lanka has increased from an estimated 2000 in 1990 to 4200 in 2011.[1] In 2017 it stands at 4686. [2] The registered number of private healthcare institutions had gone up from 656 in 2013 to 1103 in 2017. [2] These figures provide ample evidence that demand for private sector healthcare services in Sri Lanka are on the rise.

The public sector in Sri Lanka carries the bulk of the burden on delivering healthcare services to a population of nearly 22 million people. A total of 628 public sector hospitals facilitated almost 7 million (6,910,249) inpatient admissions in 2017, whereas 141 private hospitals accounted for 135,000 inpatient admissions during the same year [2] . However, studies done in 2011 state 266,000 inpatient admissions in the private sector. [1]

Bed capacity in public hospitals stands at 83,275, and 4686 in the 141 private hospitals, which is 5.62% of the total government bed capacity. [2]

With the increasing utilization of private sector healthcare services, various qualitative factors, as well as service-related issues associated with the healthcare delivery system within the private sector have become common debates among the general public. One of the concerns patients have expressed, is about the fees charged by doctors and hospitals.

Several studies have been conducted in Sri Lanka to ascertain the quality of inpatient and outpatient care in private and public sectors. [3,4] However little information exist on understanding the perceptions of patients on the fees they pay on obtaining private sector healthcare services.

While the plethora of approaches to studying patient satisfaction represents intense interest in giving voice to the patients in the developed world, in developing countries, patients face limited interest. Few studies have sought patient views and there is little effort to involve them in measuring satisfaction or defining health service standards. [5,6,7,8]

It is the belief of many researchers that a patient who endures the physical, psychological, social and economic experience during the overall health service delivery process would be able to make an appropriate evaluative judgment of how they were treated, as reflected in their overall satisfaction or dissatisfaction measures. [5]

It has long been regarded that as part of assessing the quality of healthcare services, the process, structure, and outcome all play vital roles. Patient perceptions, satisfaction and acceptability of the healthcare process have become an important part of the assessment process. [9]

In Sri Lanka more can be done to understand patients perceptions on health care pricing and the association between price paid by the patients and the perceived quality of the services received. There is room to challenge the price–quality connection as both health care prices and health care quality can be difficult to interpret [10]. The fact that there is a debate among consumers on healthcare pricing in Sri Lanka indicate that patient perceptions on healthcare pricing and the perceived opinions on quality of care received should be scientifically investigated. It can also be argued that any negativity on the overall healthcare experience can adversely affect patient perceptions on the price paid on obtaining the healthcare service.

Studies done by [10] suggest that consumers of healthcare services, at all levels, have justification in challenging the pricing of healthcare services considering the quality scores available in the public domain.

Against this background the aim of this study was to investigate the perceptions of patients on healthcare pricing within the private healthcare sector in Sri Lanka.

METHODS

ETHICS:

A permission letter was obtained from the Ministry of Health and Indigenous Medical services, Sri Lanka to approach private hospitals (AD19/02/42). In Sri Lanka, all private hospitals come under the direct purview of the private sector health regulatory council operating under the Ministry of Health. Ethical approval to conduct the study was also obtained from the Ethics Committee of the University of Western Australia (RA/4/20/5489), and local ethical clearance was obtained from the International Institute of Health Sciences, Sri Lanka (BI/ERC/265).

PARTICIPANTS AND PATIENT CONSENT:

The target population of the study was defined as Sri Lankans who have been inpatients in private hospitals in Sri Lanka within the past year. The focus districts were Colombo, Kandy, and Galle. These 3 districts represented nearly 60% of the total private sector bed capacity. [2]

Stratified sampling was carried out, to randomly select 15 patients (5 from each district) who had undergone private sector health care treatment within a period of one year. Interviews were conducted with these patients with the primary objective of planning the questionnaire.

Secondly, a preliminary questionnaire was first developed in English and then translated into Singhalese and Tamil, the mother tongues of Sri Lankans. The questionnaire was pre-tested several times to arrive at proper wording, presentation, format, length and the order of questions. Initial feedback received from participants in a small pilot survey were used to improve the questionnaire.

From each district three main private hospitals were selected, and the letter of permission obtained from the Ministry of Health was forwarded to obtain the support and cooperation of each hospital in conducting the survey. These hospitals informed their in-house patients who were either discharged, or about to be discharged within a period of 2 months and provided them with information about this survey and invited them to take part. The patients who gave their consent was contacted and interviewed for the purpose of the research. While the interview was conducted predominately by telephone, patients who indicated that they preferred a home visit was visited at home and the survey was conducted accordingly. Social media (Facebook, and WhatsApp) were also used to invite recently discharged patients to complete questionnaires via Survey monkey. Respond rates through these channels were very low, however. Overall, across the three districts over 700 patients were invited to participate, 246 surveys were completed (35%), and 215 were retained as 31 had excessive missing data and/or unclear data. Response rates were Colombo 36%, Galle 33% and Kandy 36%

QUESTIONNAIRE:

The following four questions were asked:

1. In my opinion, the hospital fee was reasonable.
2. In my opinion, the doctor's fee was reasonable.
3. Overall, I was satisfied with the price I paid.
4. I think the amount I paid for the services I received was value for money.

Responses were provided on a Likert scale, and for each statement options were Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA). Categories of SD and D, and A and SA were combined, in order to determine significant differences between districts in terms of responses.

STATISTICAL ANALYSIS:

Data were collected using Excel 2019, for descriptive analysis determining means and standard deviations, SPSS version 27 were used. Chi-square tests were used to compare categorical data between hospitals. Statistical significance was set at 95%, with p-values < 0.05 considered statistically significant.

TABLE 1: DIFFERENCES IN RESPONSES BY DISTRICTS IN RELATION TO EACH QUESTION.

VARIABLES	DISTRICT	N	MEAN (SD)	SA+A(%)	N(%)	D+SD(%)	P* (VARIABLE VS DISTRICT)
Hospital fee	Colombo	80	3.14 (1.06)	20(25)	25(31)	35(44)	0.040
	Kandy	70	3.14(1.04)	24(34)	18(26)	28(40)	
	Galle	65	3.15 (1.09)	22(34)	17(26)	26(40)	
	All	215	3.14 (1.06)	66 (31)	60(28)	89(41)	
Doctor's fee	Colombo	80	3.19 (1.10)	26(33)	20(25)	34(43)	0.628
	Kandy	70	3.10 (1.08)	27(39)	16(23)	27(39)	
	Galle	65	3.02 (1.01)	22(34)	24(37)	19(29)	
	All	215	3.11 (1.07)	75(35)	60(28)	80(37)	

Overall satisfaction of fees paid	Colombo	80	3.40 (1.17)	19(24)	26(33)	35(44)	0.073
	Kandy	70	3.23 (0.98)	18(26)	24(34)	28(40)	
	Galle	65	3.19(1.03)	20(31)	16(25)	29(45)	
	All	215	3.28 (1.07)	57(27)	66(31)	92(43)	
Value for money	Colombo	80	3.49 (0.97)	11(14)	32(40)	37(46)	0.183
	Kandy	70	3.21 (1.08)	22(31)	20(29)	28(40)	
	Galle	65	3.14 (1.04)	21(32)	18(28)	26(40)	
	All	215	3.29 (1.03)	54(25)	70(33)	91(42)	

*Chi-square, p<0.05 deemed significant

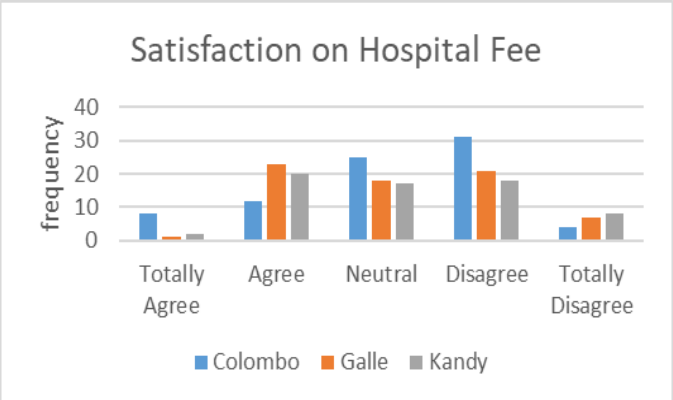
TABLE 2: FREQUENCIES OF RESPONSES TO INDIVIDUAL QUESTIONS ACROSS ALL DISTRICTS.

		SA	A	N	D	SD	TOTAL (%)
Hospital fee	Colombo	8 (10%)	12 (15%)	25 (31%)	31(39%)	4 (5%)	80 (100%)
	Kandy	1 (1%)	23 (33%)	18 (26%)	21(30%)	7 (10%)	70 (100%)
	Galle	2 (3%)	20 (31%)	17 (26%)	18(28%)	8 (12%)	65 (100%)
	All	11 (5%)	55 (26%)	60 (28%)	70(32%)	19 (9%)	215 (100%)
Doctor's fee	Colombo	3 (4%)	23 (29%)	20 (25%)	24(30%)	10 (12%)	80 (100%)
	Kandy	1 (1%)	26 (37%)	16 (23%)	19(27%)	8 (12%)	70 (100%)
	Galle	2 (3%)	20 (31%)	24 (37%)	13(20%)	6 (9%)	65 (100%)
	All	6 (3%)	69 (32%)	60 (28%)	56(26%)	24 (11%)	215 (100%)
Overall satisfaction on fees paid	Colombo	3 (4%)	16 (20%)	26 (32%)	16(20%)	19 (24%)	80 (100%)
	Kandy	1 (1%)	17 (24%)	24 (34%)	21(30%)	7 (10%)	70 (100%)
	Galle	2 (3%)	18 (28%)	16 (25%)	24(37%)	5 (7%)	65 (100%)
	All	6 (3%)	51 (24%)	66 (31%)	61(28%)	31 (14%)	215 (100%)
Value for money	Colombo	1 (1%)	10 (13%)	32 (40%)	23(29%)	14 (17%)	80 (100%)
	Kandy	1 (1%)	21 (30%)	20 (29%)	18(26%)	10 (14%)	70 (100%)
	Galle	2 (3%)	19 (29%)	18 (28%)	20(32%)	6 (9%)	65 (100%)
	All	4 (2%)	50 (23%)	70 (33%)	61(28%)	30 (14%)	215 (100%)

RESULTS

In all 3 districts the majority of patients were either dissatisfied with or remained neutral (69.3%) on the hospital fees they have paid. In Colombo 75% of the patients were either dissatisfied or remained neutral, whereas the corresponding figures were 66. % and 66%in Galle and Kandy. (Figure 1, Tables 1 and 2)

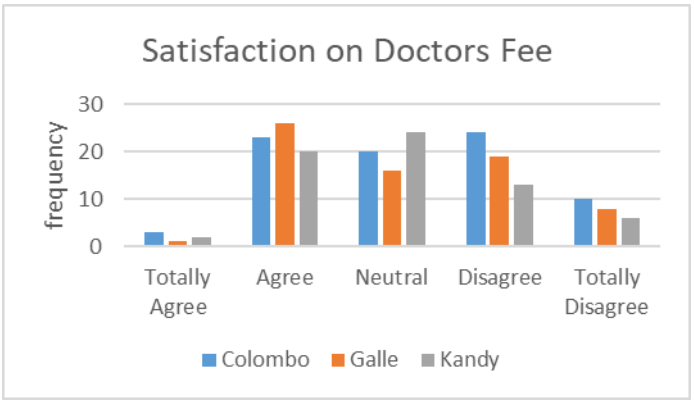
FIGURE 1: RESPONSES OBTAINED FOR SATISFACTION ON HOSPITAL FEE



There was a significant difference on patient satisfaction (p = 0.016) between Colombo and Kandy, and between Colombo and Galle (p=0.033) on hospital fees. Galle and Kandy patients were comparatively more satisfied than Colombo district patients on the price they paid as hospital fees. This finding does not eradicate the notion of overall dissatisfaction or remaining neutral on hospital fees across these three districts.

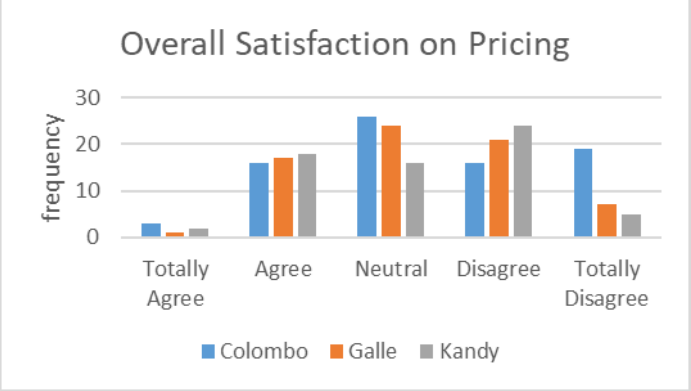
In all 3 districts a majority of patients were either dissatisfied or remained neutral (66%) on doctor's fees. In Colombo district (68%) of the patients were either dissatisfied or remained neutral on doctor's fees, whereas in Galle (69%) and in Kandy (61%) were the corresponding figures. There were no significant differences between the districts on doctor's fees. Thus, clearly establishing the notion that the majority of patients were not satisfied on the price paid as doctors' fees across the 3 districts. (Figure 2, Tables 1 and 2)

FIGURE 2: RESPONSES OBTAINED REGARDING SATISFACTION ON DOCTOR'S FEE



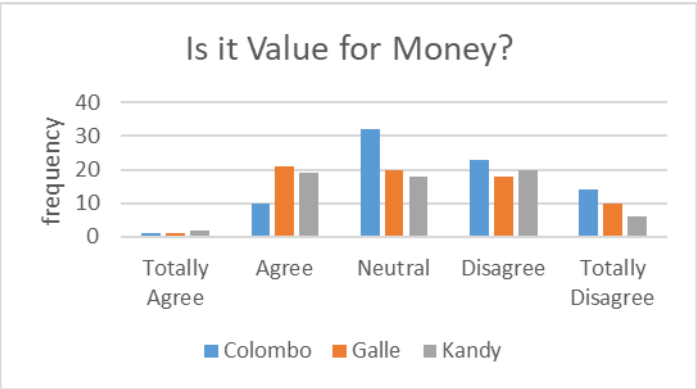
Almost three quarters (74%) of patients across Colombo, Kandy and Galle districts either remained neutral or were dissatisfied with the overall price they ended up paying when they were hospitalized. In Colombo (76%), Galle (71%) and Kandy (74%) most participants were clearly dissatisfied or remained neutral with the overall fees they have paid to obtain healthcare services. There were no significant differences between the districts on the opinion of patients on the overall fees they paid to obtain healthcare services. (Figure 3, Tables 1 and 2)

FIGURE 3: RESPONSES OBTAINED ON OVERALL SATISFACTION ON PRICING



Three quarters (76%) (75.82%) of patients remained either neutral or dissatisfied when questioned whether they think the healthcare services they received are value for money. In Colombo district 86%of the patients were clearly dissatisfied or remained neutral whereas in Galle 71%and Kandy 69% were the corresponding figures. There were no significant differences between the districts on patient opinions on whether the healthcare services they received were value for money. (Figure 4, Tables 1 and 2)

FIGURE 4: RESPONSES OBTAINED ON VALUE FOR MONEY



The mean values across all four variables (Hospital Fee, Doctor Fee, Satisfaction on overall fees paid by patients and Value for money), for all three districts were between 3 and 4 (between neutral and disagree) which indicates average respondents' opinion are between neutral and disagree. (Table 1)

DISCUSSION

In this study patient perceptions on doctors' fees, hospital fees, overall fees paid and whether fees paid were value for money in comparison to the health outcome, were investigated. The majority of patients were either dissatisfied or remained neutral on all the above elements. Many studies have been conducted internationally to understand patient perceptions on healthcare quality, patient satisfaction with health services, how healthcare quality can be assessed and the choice factors of healthcare services. [5,11,12,13]

Research identified many factors that can affect patient satisfaction: reliability, responsiveness, assurance, tangible factors such as physical infrastructure, communication, empathy, orderly management of healthcare services, cost and availability/access are some of the main facets. [5]

The principal focus of this study was to establish patient perceptions towards healthcare pricing/fees across three main districts (Colombo, Kandy and Galle), which represents nearly 60% of the private sector bed capacity in Sri Lanka. It can be argued that perceived satisfaction with quality of healthcare can influence patient perception on the fees they paid. This research revealed that the patients' perceptions on fees paid by them to obtain the healthcare services were predominantly neutral or dissatisfied.

This study did not investigate the reasons or the factors behind the satisfaction or dissatisfaction of patients towards the fees they paid, the principal aim was to establish the perceptions among patients towards healthcare pricing/fees. However, the reasons behind why patients are remaining neutral or dissatisfied towards pricing should be further investigated using a larger cohort of patients.

In Sri Lanka transparency of healthcare pricing or obtaining an estimated healthcare pricing before treatment in private sector is not very well established. To this extent developing a mechanism through the private sector healthcare regulator on measuring service quality and patient satisfaction would be the starting points towards establishing a better system on maintaining healthcare pricing transparency.

DOCTOR'S FEE

This study revealed patient perceptions on the doctor's fee was between neutral and dissatisfied. Even though this study or any other Sri Lankan study had not investigated the exact reasons for the dissatisfaction, some of the international studies have revealed the service orientation of doctors is a strong influencer in patient satisfaction. [5] In the Sri Lankan private sector most of the specialist doctors serve multiple hospitals, as a result there may be a chance of doctors' service orientation towards patients getting affected due to high workload. Studies done by [11] and [14] also identified long waiting times and insufficient consultation time as factors contributing to patient dissatisfaction towards doctors. Even though not investigated directly in this study the above factors may hold true in Sri Lanka as well.

International studies reveal when patients decide to obtain private healthcare services, price is not a primary concern, [13] but patients do expect a higher level of service from private sector healthcare, and this phenomenon may hold true in Sri Lanka as well. However, in the more affluent western world [15] and [16] suggest that healthcare consumers have become much more sensitive to costs, despite health insurance coverage.

Affordability among the patients who seek private sector healthcare is definitely higher than the patients who access free public sector healthcare in Sri Lanka. Regulators and policy makers must recognise the fact that patients who patronize private sector healthcare may expect a higher quality of service.

Studies reveal that there is room to challenge the price to quality connection, as both healthcare fees/prices and quality of care can be difficult to interpret. Healthcare costs, prices/fees and quality can often be difficult to isolate and measure [10] In Sri Lanka healthcare regulators should play an important role in investigating whether there are any instances of overpricing and establishing a better framework to address any complaints from patients who are dissatisfied with the fees they paid.

HOSPITAL FEES

This study revealed that the majority of patients, in all three districts, were either dissatisfied or remained neutral on hospital fees. Sri Lankan private sector hospital fees comprise of nursing care, facility utilization fee, medication fees and investigation fees. Nursing care remains a vital component among the above. International studies reveal

nursing care plays a significant contribution towards patient satisfaction [5] Even though scientifically not proven in Sri Lanka, international studies reveal patients can become very dissatisfied with poor behavior and inefficiency of nurses. [11]

It is very important that the regulator establishes a proper framework to ascertain quality of care provided by the nursing staff within private sector healthcare in Sri Lanka. With less regulation for nursing care within private sector nursing, nurses training and further education opportunities can become compromised. This problem can become a major limitation factor to improve private sector healthcare in Sri Lanka to challenge international competition coming from neighboring countries to attract patients from Sri Lanka.

The mechanisms on which hospitals charge patients on facility utilization, differs from hospital to hospital. There is no evidence to suggest in the public domain that the exact costs incurred by hospitals are properly investigated by the healthcare regulator and more scientific research should be carried out to establish a proper pricing mechanism to guide hospital operators to arrive at pricing. Lack of transparency in this area leaves room for patients to become suspicious on the fees charged by the hospital authorities. There is a high likelihood that all the above factors contribute to the dissatisfaction on hospital fees by patients.

Laboratory investigations, other investigations and medication fees also contribute towards patient's dissatisfaction with hospital fees. Lack of transparency and patient's lack of understanding on scientific terms and limited efforts made by the hospital authorities to explain facts to the patients can contribute to dissatisfaction. Here again the role of the private sector healthcare regulator is vital to improve the transparency. However more scientific research is needed to identify exact areas of concerns among the patients.

Interestingly this study also reveals that Colombo district patients are comparatively more dissatisfied than Kandy and Galle district patients ($p<0.04$) on hospital fees. This finding should be investigated further since hospital fees represents many facets such as nursing fees, medication and investigation fees and hospital facility utilization fees. Whether this difference is due to over pricing in Colombo or due to better service levels in Kandy and Galle should be further investigated. However, it's a common observation that Colombo attracts a larger patient's number than the two other districts and as a result the quality of care delivered from comparatively busy hospitals have the potential to vary.

VALUE FOR MONEY AND PERCEPTION ON OVERALL FEES PAID ON OBTAINING HEALTHCARE SERVICES

In all three districts 76%of patients believe that the healthcare services they received from private sector were not value for money in comparison to the health outcome. 86% of patients in Colombo district thought the same. In any industry, consumers tend to correlate the price with the quality of the product or the service they consume/receive. The common notion being higher the price better the quality, and this may hold true in healthcare as well

LIMITATIONS OF THE STUDY

This study did not investigate the reasons or the factors that may affect the satisfaction or dissatisfaction of patients towards the fees they paid, the principal aim was to establish the perceptions among patients towards healthcare pricing/fees. However, the reasons behind why patients are remaining neutral or dissatisfied towards pricing should be further investigated using a larger cohort of patients and questioning more deeply into the multiple areas of concern among patients on the quality of care they received and on the overall service orientation of healthcare workers.

Low response rates resulted in a smaller than anticipated sample size, and subsequent work to establish reasons for perceptions should include larger samples of patients.
The mechanisms on which hospitals charge patients on nursing fees, facility utilization, Laboratory investigations, other investigations and medication may differ from hospital to hospital. There is no evidence to suggest that the exact costs incurred by hospitals are properly investigated. More scientific research should be carried to identify exact areas of concerns among the patients on the above factors and to investigate the mechanisms or the pricing formulas used by hospital authorities on pricing.

CONCLUSION

This study found patient's perception was either dissatisfaction or remaining neutral, on doctors' fees, hospital fees, overall fees they paid and whether they thought the fees they paid were value for money in comparison to the health outcome.

Multiple factors can affect patient's perception on the fees they paid. With negative perception on the above it can be concluded that there is sufficient evidence to challenge private sector healthcare satisfaction level vs price/fees equilibrium in Sri Lanka. Private sector healthcare regulators should play an important role in investigating whether there are any instances of over pricing and establishing a better framework to encourage patients to complain if they are dissatisfied with the fees they pay

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RESEARCH ARTICLE

PREDICTING ELECTRONIC CIGARETTE USE AMONG ADULTS IN THE PHILIPPINES

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ABSTRACT

BACKGROUND:

The Philippines has one of the highest cigarette smoking rates in Southeast Asia. Tobacco prevention and control efforts should not be a one-size-fits-all approach. One of the most recent and highly marketed way of cutting down smoking is the use of E-cigarettes. But its use may also have potential harmful effects which would be similar to cigarette smoking.

PURPOSE:

This study aimed to determine the factors predicting electronic cigarette use among adults in a large metropolitan area in the Philippines.

METHODS:

The study used a descriptive-correlational multivariate research design. Adults who are at least 18 years of age, who are electronic cigarettes users, dual users (electronic cigarette and cigarette users), and non-smokers were chosen for this study. The researchers utilized a researcher- made questionnaire based on the Theory of Planned Behavior (TPB) in gathering the data.

RESULTS:

Multiple regression analysis suggests that positive attitude and high perceived behavioral control significantly predict intent to use electronic cigarettes. Moreover, intent to use is a significant predictor of actual e-cigarette use.

CONCLUSION:

People who have positive attitudes and high perceived behavioral control towards e-cigarette use are most likely to have higher intent to use e-cigarettes. Further, people who have high intent to use e-cigarettes will most likely use e-cigarettes. With reverence to the findings of this study, health managers and professionals should look into how e-cigarettes are being marketed to the public which may shape their attitude and behavior. Lastly, further studies should be conducted on other variables that may predict electronic cigarette use and measure health outcomes.

KEYWORDS

electronic cigarettes, predictors, adults, vaping, health behavior, health promotion, Filipino adults

BACKGROUND

The Philippines has one of the highest cigarette smoking rates among countries in Southeast Asia [1]. According to a survey in 2015, there are 13.1 million Filipino adults ranging from 15- 34 years old who engage in tobacco smoking. Tobacco cigarette users smoke an average of eleven cigarette sticks per day. The average age when people start smoking is 18 years of age for both men and women. [2] Additionally, tobacco cigarette is the only product taken that could destroy and deteriorate the human body when used directly. The United States top cause of preventable death is tobacco cigarettes, killing 480,000 people annually having increase deaths than HIV, substance abuse, and traumatic casualties combined. Smoking increases the risk of neurovascular, cardiovascular, neurovascular, oncologic and endocrine disease. The average life span decreases at least 10 years in tobacco cigarette smoking. [3] There are many smoking cessation programs being implemented to be able to address this health problem. But tobacco prevention and control efforts should not be a one-size-fits-all approach due to various factors that determine its effectiveness. One of the most recent and highly marketed way of cutting down cigarette smoking is the use of E-cigarettes or commonly known as vaping. This has increased in popularity especially among adults. But its use may also have potential harmful effects which would be similar to cigarette smoking. The U.S. Food and Drug Administration (FDA) even initiated implementing control of marketing sales and electronic cigarette production rules in 2016 [4].

Studies found out that electronic cigarettes use leads to potential risks in health due to the presence of a number of potentially toxic substances that can directly affect people's health. Evidence on the use of electronic cigarettes among the youth suggests that they have a higher risk of cardiovascular, neurological and respiratory disease. [5-7] There is an increasing number of Asian governments that are currently taking reasonable efforts to protect the health of users by regulating the sale, marketing and electronic cigarettes use, to decrease exposure on youth to products consisting tobacco and nicotine, and tobacco-free laws reinforcement strategies. [8] Further research must be done about this topic to provide quality evidence as basis for policies and programs related to e-cigarette use. There is limited evidence on several areas related e-cigarette use. Some areas that could be explored would be the effects of converting from smoking tobacco cigarette to vaping and its potential to reduce future negative health outcomes; behavioral studies customizing electronic cigarette products and its role in cessation effort; toxicity and exposure studies; and flavor preferences and its role in smoking cessation among adults [8-9]. Among all the research areas that can be explored, studying the factors affecting health behavior of people is one of the most common but significant research that can be undertaken to understand e-cigarette use. [10] There may be several possible factors why people use electronic cigarette. It may be because they want to look for smoking cessation alternative, taste a new flavor, relieve their stress, quit tobacco smoking, join a new smoking trend, and feel that it is readily available and accessible. Unfortunately, most studies only focus on factors influencing tobacco or cigarette smoking. It is crucial for health professionals to understand the factors of a behavior that might have long lasting implications to a person's health. This would be beneficial as basis for planning health policies and recommendations.

OBJECTIVE

The study aimed to determine the factors predicting electronic cigarette use among adults in a large metropolitan area in the Philippines.

METHODS

The study used a descriptive-correlational multivariate research design. This design included three variables (attitude, subjective norm, and perceived behavioral control) together to determine if they predict behavioral intention of electronic cigarette use. Furthermore, the study determined if behavioral intention is a predictor of actual e-cigarette use.

The research was conducted in Metro Cebu, which is the main urban capital of Cebu province in the island of the Philippines. The researchers utilized consecutive sampling for 1 week. The researchers' criteria were adults aged 18 years of age and above, at least high school graduate, who are current electronic cigarettes users for at least 1-year, dual users (electronic cigarette and cigarette users), current smokers and non-smokers. The researchers recruited the participants in the community and local vape or e-cigarette shops. The estimated sample size was determined using G Power Software Version 3. Computed sample size is 120 respondents (medium effect size [0.15];

[a=0.05]; power [0.95], number of predictors is 3). There was a total of 124 respondents that were included in the study.

A researcher-made questionnaire based on using Theory of Planned Behavior was used to gather the data. This questionnaire includes the respondent's years of smoking electronic cigarettes and measures attitudes, subjective norm, perceived behavioral control, behavioral intention using a four-point Likert scale measuring agreement (4- Strongly Agree, 3- Agree, 2- Disagree, 1-Strongly Disagree). Attitudes measure the degree to which a person has a favorable or unfavorable evaluation of using e-cigarettes. Subjective norms measure the belief about whether most people approve or disapprove of e-cigarette use. It relates to a person's beliefs about whether peers and people of importance to the person think he or she should use e-cigarettes. Perceived behavioral control measures a person's perception of the ease or difficulty of using e-cigarettes. Behavioral intention measures the motivation of the person to use e-cigarettes. The actual e-cigarette use was determined by asking the respondents the average amount of e-juice, e-liquid or vape juice used per week as measured in milliliter (ml).

The research tool was validated by three experts in the fields of public health, nursing, research methodology, and health professions education. The tool was also translated to local dialect using a back-translation process by two individuals who are bilingual. Pilot testing of the researcher-made questionnaire was conducted on 20 respondents. The overall reliability of the tool is Cronbach's alpha (a) = 0.91. The Cronbach's alpha (a) for the attitude subscale is 0.84, subjective norm subscale is 0.79, and perceived behavioral control subscale is 0.70.

In order to provide the necessary protection for the respondents, the research proposal was submitted to the Ethics Review Committee (ERC) of the Cebu Normal University. The data gathering was done with utmost care, confidentiality, and anonymity. The rationale of the study was presented to the respondents as well as the explanation of the informed consent. One of the researchers was present for any clarifications and answer queries about the instrument. The questionnaires took about 10 to 15 minutes to finish and were collected on the same day.

The data collected was analyzed using IBM SPSS statistical software version 23. Descriptive statistics including means and standard deviations were calculated for the continuous variables and percentages and frequencies for categorical variables. Multiple regression was utilized to determine the predictors of behavioral intention and electronic cigarette use

RESULTS

Table 1 shows the respondents are mostly male (82%), single (81%), and electronic cigarette user (48%). Furthermore, the average age of the respondents is 27 years old (SD = 5.83). The youngest respondent is 18 years of age. The oldest respondent is 49 years of age. The mean electronic cigarette use is 3 years (SD = 3.17). The mean amount of use (ml) of vape liquid/juice is 58 milliliters (SD = 55.54).

TABLE 1. PROFILE OF THE RESPONDENTS

PROFILE	FREQUENCY	PERCENTAGE
Sex		
Male	102	82 %
Female	22	18 %
Civil Status		
Single	101	81 %
Married	22	18 %
Widow	1	1 %
Current Users		
Electronic Cigarette User	60	48 %
Cigarette Smoker	20	16 %
Dual Smoker	18	15 %
Non-Smoker	26	21 %

	Mean	SD
Age	27.23	5.83
Years of Electronic Cigarette Use	3.24	3.17
Years of Cigarette Use	7.96	6.62
Amount of use (ml)	57.93	55.54

Table 2 shows the prediction model 1 is statistically significant, F (150.16, p< .001) and presents that the regression model has an R^2 of .71. This means that about 71% variability of behavioral intention, is predicted by attitude and perceived behavioral control. There may be extraneous variables not included in the model that can account for the remaining 29% of the variability

TABLE2. REGRESSION ANALYSIS OF VARIABLES

MODEL	R^2	F	B	SE (B)	95% CI	B
Model 1: DV = Behavioral Intention	.71***	150.16				
Path a: IV = Attitude			.92***	.09	[0.74, 1.11]	.65***
Path b: IV = Subjective Norms			.13	.14	[-0.14, 0.39]	.08
Path c: IV = Perceived Behavioral Control			.54***	.14	[0.26, 0.82]	.25***
Model 2: DV = Actual Use	.22***	45.79				
Path d: IV = Behavioral Intention			19.82***	3.38	[13.12, 26.51]	.47***

Note. n = 124. B = unstandardized beta. SE = standard error. CI = confidence interval. β = standardized beta. DV = dependent variable. IV = independent variable.
***p < .001.

Table 2 also shows the unstandardized and standardized regression coefficients of the predictors using the regression analysis to predict electronic cigarette use. It indicates that the independent variables—attitude (β = .65, p<.001) and perceived behavioral control (β = .253, p<.001) are significant predictors to the dependent variable, behavioral intention. Both attitude and perceived behavioral control have positive coefficients, which means that an increase or decrease of its value will subsequently increase or decrease the level of behavioral intention, respectively. The results suggest that adults having increase value of attitude and perceived behavioral control are more likely to have a higher intention to engage in electronic cigarette use. Moreover, subjective norms is not a significant predictor (β = .08, p>.05), which may due to multicollinearity effect. Table 2 also shows the prediction model 2, which is statistically significant, F (45.79, p< .001) and shows that the regression model has an R^2 of .22. This means that about 22% of the variability of behavioral intention is predicted by actual cigarette use. The remaining 78% of the variability is unaccounted for and may be due to other variables that were not included in the study.

DISCUSSION

Most of the respondents who are e-cigarette smokers are male and single. According to Perikleous and colleagues, [11] the increased vaping prevalence among males can be influenced by marketing strategies or sociocultural characteristics and recent trends. In most cases, males are most probably adopting the technology early, and have effortless accessibility of the product. Furthermore, the study demonstrated that higher risk of electronic cigarette use in men may exist, partly, because men view lower in harm perception on electronic cigarette meanwhile females tend to appraise lower risk and avoid risky behaviors only when they recognize severe risk. [11]

In a study of Perialathan and colleagues [12] in Malaysia, there is a higher prevalence of singles that used electronic cigarettes. In a study by Alanazi and colleagues, [13] single status respondents were significantly greater than other status groups to have positive attitude, subjective norm, perceived behavioral control, and behavioral intentions toward cigarettes.

In the regression analysis of the study, attitude and perceived behavioral control are significant predictors of behavioral intention. Moreover, subjective norm is not a significant predictor of behavioral intention. This is similar to the study of Alanazi and colleagues that showed behavioral intention's strongest predictors were attitude and perceived behavioral control, meanwhile subjective norm had not directly influence in the intention to use cigarettes. [13] It is found to be consistently utilized in some TPB researches that subjective norm were the weakest predictor and non-significant predictor in predicting an intention. [13] Although, the study showed subjective norm was not the intention's strong predictor, subjective norm however had indirect effects on intention through attitude and perceived behavioral control. [13]

These possible factors could be affected by the information that people get due to the limited scientific evidence and marketing strategies related to e-cigarettes. Since electronic cigarettes is a relatively new product in the market, there is insufficient data on its safety and would warrant extensive research on scientific information about its potential harmful effects and toxicity. [14] This will affect not only electronic cigarette users but also those who inhale secondhand "vaping". [14] Electronic cigarette use as a lifestyle on social media can lead viewers to develop positive social norms about electronic cigarette use, thereby increasing their susceptibility to electronic cigarette use. In particular, social media users may come to view electronic cigarette use as a socially acceptable behavior after observing electronic cigarette companies' discourse on social media. Individuals may become open to electronic cigarette use when electronic cigarette companies' social media posts are shared by their in-group members, such as friends or acquaintances on social media. [15] On the other hand, the actual behavioral control's importance affected by a person's available resources and opportunities. In the theory of planned behavior, perceived behavioral control plays an important part and considering it in the prediction of intentions and actions. [10] However, intentions are influenced by other factors and due to these added factors, two persons with different insights of behavioral control can have equally strong intentions. This is apparent in the regression model that there are still variables that cannot account for the variability of the outcomes such as intent and actual use. Furthermore, behavioral intention is expected to influence the motivational factors influencing a behavior and indicates how much of an effort a person is planning in order to perform the behavior. E-cigarettes are readily available due to the increase in stores and shops that sell these products. There are no strict regulations in the marketing and selling of e-cigarettes which could contribute to the ease in access as well as availability of these products to the general public. As a general rule, the stronger the behavioral intention the more likely the behavior will be performed. [10]

Another study by Bierman, [16] showed that the only significant variable was perceived behavioral control and proposed that quitting intention would be better by increasing a person's sense of control over believing to quit. The study findings supported other studies related tobacco cessation in which the most significant predictor of intention was perceived behavioral control.

In a study done in Zahedan University of Medical Sciences, predictors toward smoking were willingness to smoke, and unfavorable attitude. [17] The willingness to smoke was a positive predictor of smoking experience and unfavorable attitude toward smoking cigarette and intention to not smoke were negative predictors. The smoking willingness compared to other variables was a stronger predictor for smoking experience. [17]

CONCLUSION

Attitude and perceived behavioral control influence behavioral intention and subsequently behavioral intention influence actual use. People who have a positive attitude and high perceived behavioral control towards e-cigarettes use are most likely to have a higher intention to use electronic cigarettes. People who have high behavioral intention to use electronic cigarette will most likely use electronic cigarette. Understanding the factors that would determine e-cigarette use would be important for policy makers and program planners to address concerns related to potential harmful effects of its use. It is important that the public is presented with quality information and evidence so that people may be able to make more informed decisions since this could potentially

shape their attitude towards e-cigarette use. Limiting the access and availability of the public to e-cigarettes may reduce its use and subsequently any future negative outcomes to public health. Future studies should investigate other variables that may predict electronic cigarette use and measure health outcomes of electronic cigarette use.

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RESEARCH ARTICLE

IDENTIFYING FACTORS AFFECTING OF COOPERATION MANAGEMENT BETWEEN CHARITIES AND THE TEACHING HOSPITALS OF SHAHID BEHESHTI UNIVERSITY OF MEDICAL SCIENCES

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ABSTRACT

OBJECTIVES:

One of the most important issues in the provision of health services in every country is providing the necessary resources for presenting these services. Cooperation between charity organizations and public hospitals is especially important as it can increase charity participation, facilitate public participation in the treatment area and develop hospital units. This study aimed was to identify factors affecting of cooperation management between charities and the teaching hospitals of Shahid Beheshti University of Medical Sciences.

METHODS:

This applied, and analytical study was conducted in hospitals of Shahid Beheshti University of Medical Sciences in 2019. The statistical population consisted of 411 people including managers, chiefs and deputies, contracting hospital experts and social workers, managers and lawyers of the university, trustees and managers and charity experts. The research sample consisted of 330 people who were selected through the stratified random sampling method. Data was collected using a researcher-made questionnaire. The SPSS 18 and AMOS software were used to analyze the data.

RESULTS:

The most effective contract pattern determinant had a path coefficient of 1.177, while a least effective current consumption expenditure determinant had the path coefficient of 0.530.

CONCLUSION:

The following steps are ways in which costs related to an inpatient department are guaranteed to be covered by a charity during the term of the contract: defining the criteria for selecting a charity to operate in a hospital, choosing a cooperative method and a contract template, determining the share of capital and current costs, and selecting the department type in the contract.

KEYWORDS

Cooperation Management, Contract Pattern, Charity, Teaching Hospitals.

INTRODUCTION

In today's world, it is very difficult to have a dynamic and growing society without an efficient health system. While health systems in both developed and developing countries struggle to provide health services in the face of scarcity of resources, physicians and patients demand newer technology and equipment for more accurate and rapid diagnoses. [1-3] this has significantly increased the cost of health care services, especially hospital care services. Since resources allocated to the health sector in most countries do not meet most of the existing needs, countries around the world seek to expand their health system funds so as to ensure that all citizens have access to health services. [4] Charities can be very efficient because of their inherent abilities if they manage scientifically and follow their instructions properly.[5] Non-governmental organizations and charities can help governments and the growth of nations efficiently in various fields and can play a major role in the country and in international relation. [3]

In all countries, charities should be considered the first spontaneous and effective support institutions in the process of poverty alleviation and social harm. In New Jersey, teaching hospitals of members of AAMC provide 35% of the country's total hospital charitable care. [6] Also at the Mayo Clinic, which has been established in 1889 and is one of the most prestigious educational and medical centers educational and medical centers in the world, providing charitable care is only one part of the charitable duties of this center. [7] Charities in Iran, also have a long history that can be considered at the same time as the formation of social nuclei and family population units. In the database of the Social Deputy of the Ministry of Health until 2018, 814 health charities have been identified, of which about 407 charitable medical centers, 37 charitable hospitals, and 370 health charitable clinics operate throughout the country, and until 2019, there were independent representatives of the health donors association in 56 the university and faculty. Research has shown that in Iran, the main contribution of donors and charities is in the field of hospital construction and their participation in the current costs of hospitals and medical centers is less. [8] By the end of 2019, 2,800 joint projects between donors and charities, the ministry of health, and the governorates have been put into operation that with a value of 72,000 billion Rials.[8]

According to the Harton survey, approximately 75% of the world's population wants transparency in managing non-profit organizations. Public trust is considered to be one of the most important and vital factors for the development and attraction of charities in charity.[9] Considering the importance of public participation in promoting the society health, and given that public assistance has recently played an important role in providing health services to people, especially at the university hospitals, it is necessary to establish a charity next to each public hospital in order to support that hospital, increase the role of charities, facilitate public participation in the field of treatment and welfare of patients and develop hospital units. [10] Concerning charities, harms and important issues must be identified and prioritized while regulating the relationship between the governmental and non-governmental sections. [11-12]

The health system reform plan emphasizes organizing the participation of health charities. It also states that the intervention of charities in the health service system as well as in the educational, research and student system, the exchange of legal agreements with provincial health charities under the high supervision of the coordinating unit at the national level and the legal registration of these agreements and their Rial figures in the national budget seem necessary.[10,13] Therefore, for greater productivity, it is better to develop the joint activities of the governmental and non-governmental sectors in order to use the public capacities.[1,11]

What is certain is that NGOs continue to work as spontaneous and organized forces, whether the public sector agrees or not. For greater productivity of governmental and non-governmental sectors, it is better to use these public capacities with the aim of sustaining developmental goals of effective interactions between these two sectors and to design and implement a model of interaction between governments and the health sector with the related factors. [2]

The government must take steps to coordinate the activities of charities with ministries and universities and to prevent the loss of resources to coordinate the activities of health charities and other components of the health system. [9-12]

Therefore, the aim of the present study was to identify factors affecting of cooperation management between charities and the teaching hospitals of Shahid Beheshti University of Medical Sciences.

METHODS

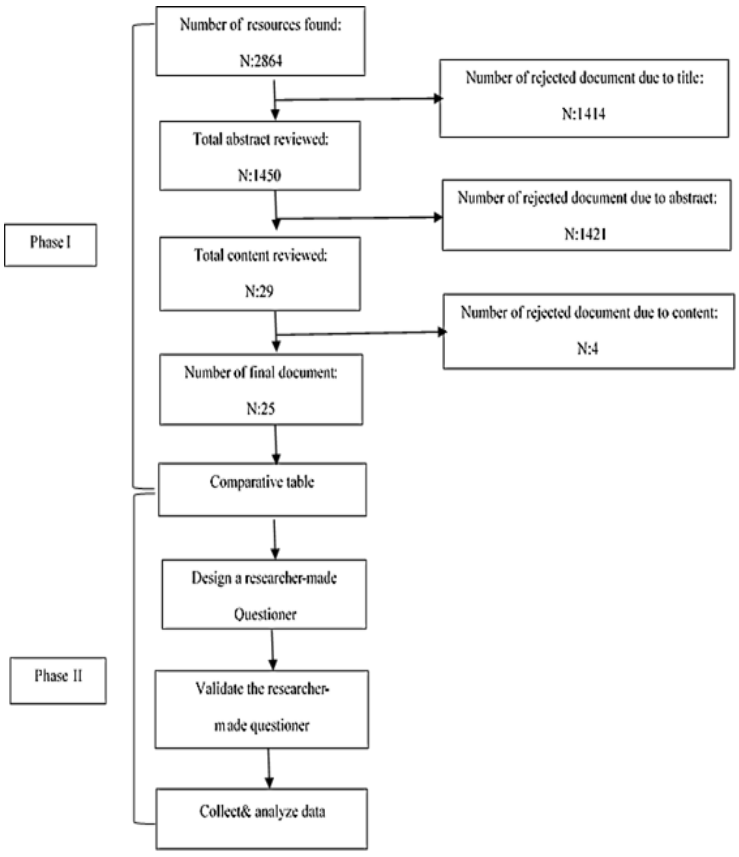
This is an applied, analytical study, conducted in hospitals of Shahid Beheshti University of Medical Sciences.

The present study was carried out in two phases. (Figure 1) The first phase was a library study and a literature review. Data was collected from a series of references including databases, reference books, reports published by the World Health Organization, universities and research centers, lectures and articles presented at scientific conferences, articles published in the last 10 years, valid quarterlies and publications, documents and information banks such as Medline, PubMed, Elsevier and other sites related to the Ministry of Health, charity organizations, and other authorities including governmental and non-governmental organizations and theses available at the National Library, Shahid Beheshti University of Medical Sciences and Islamic Azad University (Science and Research Unit).

Then, comparative tables were used to analyze the collected data. Similarity and difference points were shown in the comparative table. A researcher-made questionnaire was designed according to the comparative tables, the world health report 2000 and Chiesa model [14-15]. The researcher-made questionnaire in six dimensions (the selection of supporting organizations, different ways of attracting cooperation, determination of the contract pattern, the share of current and consumption expenditures, determination of capital expenditures, and the selection of hospitalization sections) was designed.

In the second phase of the research, the researcher-made questionnaire was given to 20 experts to validate. Among the experts were hospital managers, authorities from Shahid Beheshti University of Medical Sciences and charity institutions; All experts had Ph.D. and M.A. degrees in the fields of either health and management, contract affairs and charity. Using the opinions of experts in these areas, important items within the scope of research were included and other items were excluded in the researcher-made questionnaire. The face and content validity of the questionnaire was confirmed in two phases. The first phase was performed using the Delphi method and the second phase was of content type. In the face validity approach of this questionnaire, it was asked whether the appearance of the questionnaire was designed to evaluate the intended purpose or not. Spelling and grammatical errors are also controlled in this section. In content validity, the content validity ratio (CVR) and the content validity index (CVI) were evaluated using the judgment of a panel of experts. Several items whose CVR was less than 0.6 (based on the number of experts) were also eliminated; overlapping components were merged. Based on the results, the number of components was reduced to 42 items, and thus the questionnaire items were 42.

FIGURE 1



Reliability was examined using the Cronbach's alpha coefficient, first separately for each studied dimension and then for all dimensions. The Cronbach's alpha coefficient was used to examine the reliability of each studied dimension, first separately and then together. Cronbach's alpha coefficient of the questionnaire was obtained at 0.932. The questionnaire items were measured using the Likert 5-point scale (1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high).

The statistical population of the study was the managers, chairman and deputies, and experts of contracts and hospital assistance experts, managers and legal experts of the university headquarters, the board of trustees of charities and managers and experts of charity centers. A stratified random method was used for sampling. The statistical sample size was considered using Cochran's formula. The research sample was calculated to be 300 people (Table 1). To complete the number of samples, the possibility of non-cooperation or elimination of nom-completed questionnaires, 330 questionnaires were distributed. Finally, 300 complete questionnaires were collected. Also, Bartlett and KMO tests were used to examine the adequacy of the sample for each variable in the model and the complete model. Inclusion criteria of the research are the organizational position of individuals and their employment in management departments, medical units and charity institutions.

Demographic data were analyzed using descriptive statistical methods and Kolmogorov-Smirnov test was used to check the normality of data, and Levene's test were used to check the homogeneity of the data. To identify the effective factors, three indices of eigenvalue, ratio of variance explained by each factor and the rotated scree diagram and varimax rotation were used for exploratory factor analysis. Then, to confirm the factors extracted from the questionnaire in the factor analysis stage, confirmatory factor analysis model was used in SPSS 18 and AMOS software. The results provided the suggested purchase management model of hospitals affiliated with Shahid Beheshti University of Medical Sciences.

TABLE 1: SAMPLE RESEARCH SEPARATELY IN EACH CATEGORY

	TARGET POPULATION	QUANTITY OF TARGET POPULATION	THE COEFFICIENT OF DIVISION	SAMPLE RESEARCH	
1	the managers, chairman and deputies of hospital	138	0.34	90	101
2	hospital contracts experts	91	0.22	60	66
3	managers and legal experts of the university headquarters	30	0.07	20	22
4	board of trustees of charities	24	0.06	16	18
5	experts of charity centers	128	0.31	84	93
Total		411	1	270	300

RESULTS

Of the 300 participants, 144 (48%) were male and 156 (52%) were female. The results showed that the mean (standard deviation) age for women was 39.97 (8.73) and for men was 41.31 (8.39). In addition, women had a somewhat lower median (age) than men. Moreover, the mean (standard deviation) years of service for women and men was 14.34 (7.26) and 11.76 (8.05) years respectively. Overall, the mean and standard deviation of the participants' years of service was 13.00 (7.78) years. Using factor analysis, the questionnaire questions were summarized into few factors to be used for modeling. To examine the exploratory factor analysis, questions 1 to 42 were included in the analysis. Table 2 shows the sampling adequacy criterion test and the Bartlett test. The KMO test measured sampling adequacy of each variable in the model and the complete model; it means that the amount of intra-data variance explained by the factors is acceptable. The null hypothesis of Bartlett test (zero covariance's between factors) is rejected at significance <0.001.

TABLE 2: SAMPLING ADEQUACY STANDARD TEST AND BARTLETT TEST

KMO TEST	BARTLETT TEST		
	CHI-SQUARE STATISTIC	DF	P-VALUE
0. 84	4361.15	703	0.001>

Table 3 (appendix 1) shows the variance explained by the factors. Accordingly, 6 factors accounted for more than 50% of the total variation of the research variables. In general, seven factors had an eigenvalue of more than 1 (the minimum eigenvalue required to form a factor). The seventh factor didn't change the value of the cumulative variance, so six factors were ultimately selected as the final factors.

In exploratory factor analysis, using the matrix of rotated factors with varimax rotation, it was shown that each factor includes which variables, six factors were finally selected, which confirmed the results of table 3. After rotation, the factor load matrix showed which variables were included in each factor. Based on the questionnaire, six factors were selected for this research as follows: the selection of supporting organizations, different ways of attracting cooperation, determination of the contract pattern, the share of current and consumption expenditures, determination of capital expenditures, and the selection of hospitalization sections. According to table 3 included in appendix 1, questions 1 to 10 comprised the first factor, questions 15 to 21 the third factor, questions 22 to 30 the fourth factor, questions 31 to 35 the fifth factor, and questions 38 to 42 the sixth factor. Questions 11, 13 and 14 had a noticeable presence in the second factor, and due to the similar nature of question 12 to these three questions, it was also categorized in the second factor.

After studying the measurement model and the confirmatory factor analysis, the structural model was examined. This model was estimated after stipulating the parameters of the relationship of the University of Medical Sciences with the methods of attracting the cooperation of supporting organizations to determine the capital contribution. The multivariate normality (Mardia coefficient) was 19.02 indicating that this model was not normal. Therefore, the bootstrap method was used to evaluate the coefficients. The model fit indices are presented shows that the fit indices were desirable in almost all cases and the fit of the model could be considered appropriate and adequate (Table 4, 5).

TABLE 4. STRUCTURAL MODEL FIT INDICES AFTER APPLYING CORRECTION INDICES

INDEX	INDEX VALUE	ACCEPTABLE VALUE
CMIN/DF	1.43	<3
GFI	0.86	>0.8
AGFI	0.84	>0.8
CFI	0.92	>0.9
IFI	0.92	>0.9
TLI	0.91	>0.9
RMSEA	0.04	<0.05 or <0.08

TABLE 5. STANDARDIZED PATH COEFFICIENTS AND BOOTSTRAP STRUCTURAL RESEARCH MODEL

PARAMETER	STANDARDIZED ESTIMATE	BOOTSTRAP				
		STANDARD ESTIMATE	ESTIMATE	UPPER BOUND	LOWER BOUND	SIGNIFICANCE
indicator of selecting supportive organizations	Universities of Medical Sciences	0.825	1.158	2.569	0.308	0.032
Cooperation method	Universities of Medical Sciences	1.000	1.000	1.000	1.000	-
determining the contract model	Universities of Medical Sciences	1.177	1.677	2.967	0.669	0.041
indicators of selecting inpatient sections	Universities of Medical Sciences	0.824	1.313	3.648	0.192	0.021
determining the share of current consumption costs	Universities of Medical Sciences	0.530	0.549	1.020	0.146	0.010
determining the share of capital costs	Universities of Medical Sciences	1.000	1.000	1.000	1.000	-

DISCUSSION

According to the research findings, in cooperation with support organizations should be considered the dimensions of indicators of selecting a supportive organization, determining the method of cooperation, determining the contract model, determining the share of current consumption costs, the share of capital costs, and indicators of selecting inpatient ward. In the first step, managers of governmental hospitals should select competent charities for transfer health services and departments to cooperate. The right choice of charities with an initial financial capacity and an accounting system and a certificate of good history is very important. Then, will determine the transferable department. Due to the evaluation of the income and cost status of the transferable department, the cost-effectiveness will be evaluated and then contracts are made with charities using the outsourcing cooperation model. It is time to choose the type of contract. According to the research findings, the type of partnership contract can be the most appropriate option. By determining the type of contract, special accuracy must be taken in setting the provisions of the contract. At first, to be determined the department's consumption costs accurately that charities pay these costs in a partnership contract. The most important point is related to the payment of salaries. According to the present study, the best proposal for the transfer is the radiotherapy and oncology, dialysis, and burn departments. With the spread of economic problems and in order to ensure a stable income in the future, this model of cooperation will help governmental hospitals in various crises.

The present study showed that in the First dimension; Indicators of selecting supportive organization with Standard Estimate of 0.825, the most effective variable is "having a standard accounting system" with a path coefficient of 0.78, and in contrast, the least effective variable of this dimension is "resources of agency offices and branches should be spent at agency site" with a path coefficient of 0.41.

This ensures that communities, foundations, and charities operate in accordance with the established plans and policies and that correcting potential deviations require supervision and control. [5] Lack of an integrated and systematic supervisory system for charities has in some cases led to financial abuse and violations. [16] A standard accounting system with financial transparency in the areas of income, expenditures, number of clients and type of

provided services could, however, prevent such discrepancies in charities. [17] In "The Regulations on Public Aid Collection by Charity Organizations" has also highlighted the establishment of a workgroup (consisting of provincial and local supervisory bodies) that organizes and supervises the activities of charity organizations. [18] Moreover, Article of "the Guidelines on the Establishment and Operation of Branches and Representatives of NGOs" [19] addresses the appointment of an independent auditor for the independent evaluation of the financial and executive performance of charities in different branches and agencies. [20] A charity sponsoring a public hospital is a wholly independent charity with an independent bank account. [21] According to the survey conducted by Global Tolerance Company, about 75% of the world's people tend to see transparency in governance, business and nonprofit organizations. Public trust is considered one of the most important and vital factors for improving charities and encouraging people to support charities. [22] Much attention should, therefore, be given to forming annual general assemblies in supporting charity organizations, having allocated bank accounts, in which all deposits and withdrawals are made under the name of the supporting organization, having a certificate of good service record, clarifying the amount of the capital of the supporting organization (movable and immovable) and paying all the resources from the offices and branches.

In the Second dimension of determining the type of contract with Standard Estimate of 1.177, the most effective variable was "participation contract with the non-governmental sector" with a path coefficient of 0.72, and the least effective variable of this dimension was "contract of purchasing of services from the non-governmental sector" with a path coefficient of 0.41.

There are 3 types of contract pattern: 1- the contract pattern of purchasing services from the non- governmental sector (using non-governmental capacities by paying per capita of services provided by a governmental organization in accordance with existing laws and regulations), 2- the contract pattern of cooperating with a non-governmental sector (providing non-governmental real and legal persons with units owned by a governmental organization) and 3- the contract pattern of delegating management to a non-governmental sector (delegating the management of governmental organization to qualified real or legal persons, as mentioned in the regulations with the protection of state ownership). [23-24]

Owing to their natural capabilities, NGOs can be very effective if properly managed [14], and the government should strive to attract these organizations. [25]

Different studies have confirmed that governments alone are not able to provide the money they need. Various factors can account for the lack of resources in the government, including limited resources in providing services, inadequate management, time and money inefficiencies and poor quality of services. Given that the quality of services provided by governments is not favorable and that the services of the private sector are very costly and do not meet the necessary social benefits [26], public-private partnership models are the next best alternative. [27] Partnership contracts have also been tested and used in US infrastructural projects and are considered to be the best type of contracts. [28]

In the Third dimension of consumption and current costs with Standard Estimate of 0.530, the most effective variable was "share of capital costs of purchasing equipment" with a path coefficient of 0.68 and the least effective variable of this dimension was "the share of current costs of legal deductions, tax debts and value added" with a path coefficient of 0.46.

Funds raised by charities are spent on supplying equipment and consumables, paying the salaries of the charity staff, and paying patients' health care costs. Implementing the health system reform plan positively affected the activities of the related organizations and led to: a) a development of health services 2) financing and allocation of resources 3) the supply of medical equipment and 4) the prevention and promotion of health. [29]

Supporting organizations are in charge of the share of sector costs including administrative supplies, hoteling consumption expenditures, current costs of personnel salary and benefits, patients' support costs, current costs of energy carriers, current costs of equipment maintenance, current costs of legal deductions, tax liabilities and value-added tax and other liabilities, current costs of advertisement, fundraising and purchase costs of medical consumables.

In the Fourth dimension of share of capital costs with Standard Estimate of 1, the most effective variable was "obtaining the necessary license and purchasing capital equipment" with a path coefficient of 0.73 and the least

effective variable of this dimension was "physical space development" with a path coefficient of 0.61.

Charities can cooperate with the Iranian universities of medical sciences in building and expanding the physical space of health care organizations. According to Article 10 of the Adjustment Law of the completion of half-finished projects with the cooperation of charities, executive bodies are authorized to complete their projects on the basis of a memorandum of understanding with charities and their cooperation. [30, 11]

Mayo Clinic also operates as a charity training center to fund capital costs, to develop long-term financial models including cash flows and capital expenditures, and to monitor annual operating budgets in a specific structure. [31]

In the Fifth dimension of selecting inpatient ward with Standard Estimate of 0.842, the most effective variable was "selection of radiotherapy and oncology wards" with a path coefficient of 0.73, and the least effective variable of this dimension was "selecting other inpatient wards" with a path coefficient of 0.38.

In their study on charitable donations to AIDS patients with the aim of analyzing the behavior and attitudes of the Canadian population for charitable donations, Don et al showed that despite the cause being a general humanitarian orientation, only a few people were willing to help charities for AIDS [7]; in other words the cause itself is an effective parameter for gaining support. [32-33]

Different methods for gaining cooperation, according to the research results, this factor had a path coefficient of 1.000. In the study of the constituent variables of the methods of attracting cooperation, the most effective variable is "Attracting cooperation as outsourcing" with a path coefficient of 0.296, and in contrast, the least effective variable of this dimension is "Attracting cooperation in an acquired way" with a path coefficient of 0.149.

There are 4 types of cooperative methods including: 1) Acquired method (a large firm completely takes over a smaller firm, 2) Outsourcing (one company carries out its activities through other companies and eventually uses their output, 3) Joint venture (two firms, with the same or different shares, share some of their resources and formally establish the third firm with certain purposes), and 4) Co-operation (one firm shares its different resources with other firms to achieve a common goal). [7]

The most important limitations of this research are as follows: a limited number of aware experts of contract in answering research questions and time-consuming field data collection.

CONCLUSION

The present study criticizes the Ministry of Health's decision that forces hospitals to establish charities. Hospitals are unable to properly recruit and retain people in these charities. Organizational behavior of governmental employees has shown that busy managers, social workers and other employees are not able to deal appropriately and professionally in such situations. According to the results of this study, it can be stated that providing a specific framework for privatizing the inpatient department, signing a contract with a competent charity (with regards to the financing of capital expenditures, the supply and purchase of medical equipment and the current and consumable costs) and using public hospital credits, can help charities raise more money through public donations. The results of the present research are in line with the Chiesa Model and the World Health Organization.

SUGGESTION FOR FUTURE STUDIES

Designing a practical model for contracting with charities in the field of health

Investigating the distribution and allocation of charitable resources in the country's health system

Designing a model for maintaining charities in the health system

Designing a financing model for public hospitals

Designing a model for establishing charitable non-governmental organizations

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CONFLICT OF INTEREST

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APPENDIX

TABLE 3. MATRIX OF ROTATED FACTORS WITH VARIMAX ROTATION

QUESTION NUMBER	FINAL FACTORS					
	1	2	3	4	5	6
	0.75					
	0.69					
	0.76					
	0.72					
	0.70					
	0.70					
	0.66					
	0.70					
	0.79					
	0.77					
						0.70
						0.36
						0.80
						0.67
					0.62	
					0.74	
					0.64	
					0.71	
					0.72	
					0.63	
					0.75	
		0.61				
		0.66				
		0.69				
		0.65				
		0.68				
		0.67				
		0.63				
		0.63				
		0.71				
				0.69		
				0.75		
				0.72		
				0.71		
				0.76		
			0.72			
			0.68			
			0.67			
			0.68			
			0.74			
			0.62			
			0.62			