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REVIEW ARTICLE

A BIBLIOMETRIC ANALYSIS OF HOSPITAL FINANCIAL PERFORMANCE: EMERGING TRENDS AND FUTURE DIRECTIONS

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ABSTRACT

BACKGROUND

The financial performance of hospitals significantly influences the quality and sustainability of healthcare services, particularly amid rising operational costs and evolving healthcare regulations. While various financial metrics have been studied, there remains a lack of comprehensive bibliometric analyses that map the growth, emerging themes, and future research directions in this field. This study aims to fill that gap by examining the development and patterns of hospital financial performance research.

METHODS

A bibliometric analysis was conducted using the SPAR-4-SLR protocol on 2,387 publications retrieved from the Scopus database, spanning from 2014 to October 12, 2024. Bibliometric techniques such as co-authorship, keyword co-occurrence, and citation analysis were performed using VOS viewer to identify research trends, leading contributors, and thematic clusters.

RESULTS

The analysis revealed a steady increase in publications from 2014 to 2021, peaking at 341 papers. A slight decline in subsequent years is likely due to indexing delays, not reduced research activity. Thematic clustering identified four main areas of focus: (1) hospital, (2) COVID-19, and (3) healthcare. In recent years, additional attention has been given to emerging themes such as health equity, access, and the application of artificial intelligence. These findings suggest a dynamic and evolving research landscape that reflects broader shifts in healthcare priorities.

CONCLUSION

Research on hospital financial performance has expanded notably over the past decade. The COVID-19 pandemic exposed financial system vulnerabilities, shifting research priorities. The United States remains the leading contributor to global output in this field. The identified themes highlight both established and emerging priorities that are likely to shape future inquiry. These insights are essential for informing hospital administrators, policymakers, and healthcare professionals in developing more resilient and equitable financial strategies and health policies. Continued bibliometric monitoring will be valuable for tracking progress and guiding strategic interventions.

KEYWORDS

hospital financial performance, financial statement, hospital financial standing, bibliometric analysis

INTRODUCTION

Hospital financial performance significantly impacts healthcare quality and sustainability [1, 2]. Hospitals currently encounter escalating operational expenses, rapid changes in healthcare regulations, and increasing patient service demands, presenting challenges in balancing high-quality care and financial sustainability [3, 4]. Consequently, evaluating hospital financial performance is crucial for administrators, policymakers, researchers, and healthcare professionals to enhance the efficacy of policies and practices.

Despite substantial research, there is a gap in bibliometric analyses that systematically outline trends, contributors, and developments in this area. Most studies focus on specific aspects like efficiency, reimbursement, or cost control, limiting a comprehensive view of the literature's evolution and emerging priorities. This gap restricts the identification of knowledge trends and opportunities for collaboration and innovation.

Recent events, such as the COVID-19 pandemic, have further exposed financial vulnerabilities and highlighted the need for adaptable strategies, especially in low-resource settings [5–7]. The pandemic accelerated the adoption of digital technologies, including cashless transactions and digital currencies, which introduced both opportunities and challenges in financial management [8]. Countries with limited infrastructure and regulatory capacity have faced greater difficulties in adapting to such technological shifts, widening the disparity in healthcare system resilience [9].

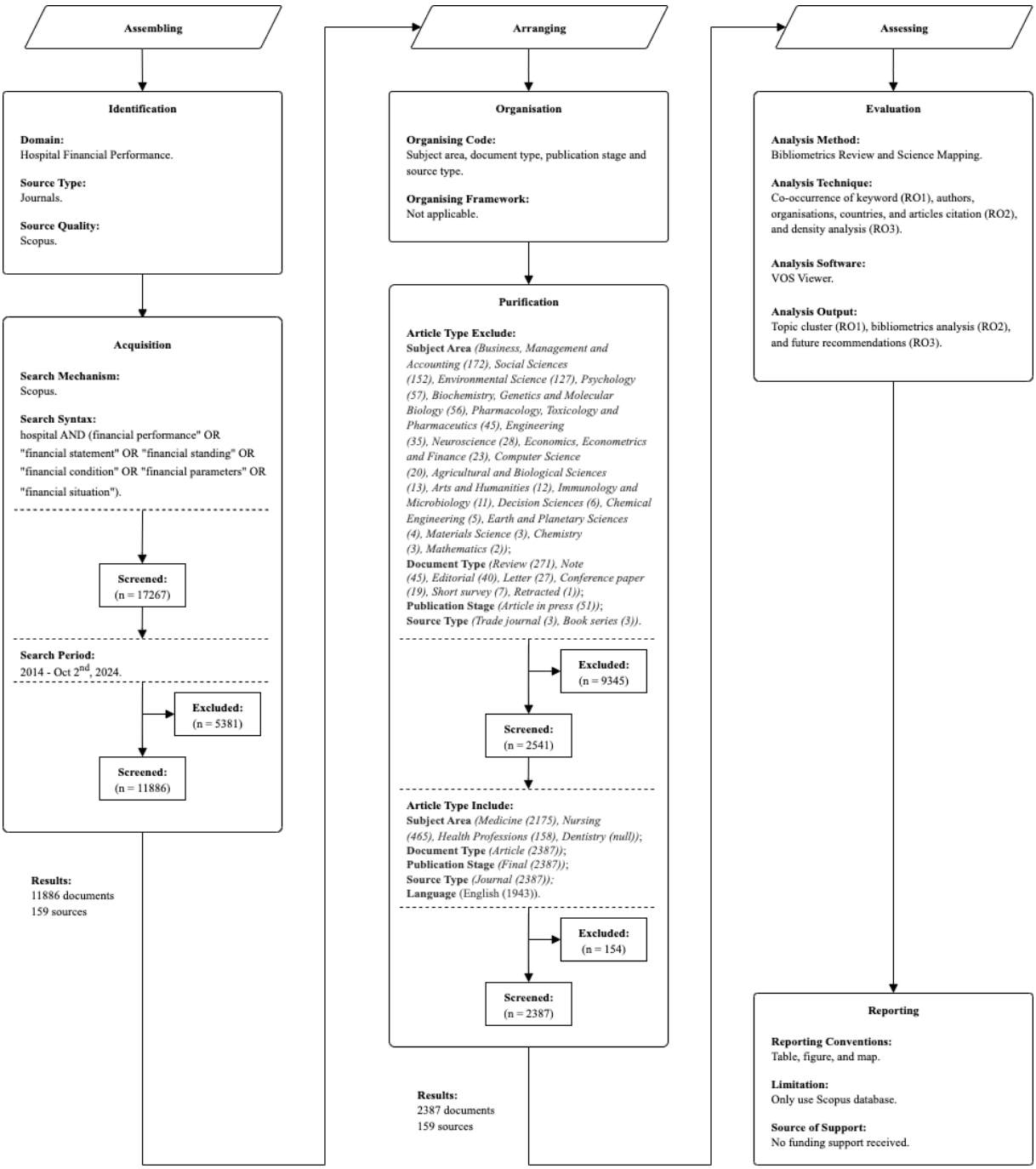
This study applies bibliometric analysis to critically map the existing body of literature on hospital financial performance. Its objectives are threefold: first (RO1), to investigate the publication trends and developmental patterns in this research area; second (RO2), to identify the key contributors, including authors, institutions, and collaborative research networks; and third (RO3), to uncover emerging themes and suggest future directions for research within the domain. Through this analysis, the study aims to address critical knowledge gaps and provide a structured foundation for future academic research and informed financial decision-making in hospital management.

MATERIAL AND METHODS

This study employed bibliometric analysis to investigate trends in hospital financial performance research, employing VOS viewer (https://www.vosviewer.com/) for its advanced capabilities in visualising citation relationships, keyword co-occurrence, and thematic research patterns.

To ensure a systematic and replicable review, the SPAR-4-SLR protocol was followed, providing a structured framework for scientific literature reviews. As illustrated in Figure 1, the protocol comprises three key stages: assembling, arranging, and assessing [10]. This approach strengthens the methodological rigour and transparency of the bibliometric study.

FIGURE 1. SUMMARY OF METHODS EMPLOYED IN THE SPAR-4-SLR PROTOCOL.



ASSEMBLING

The research commenced with data acquisition from the Scopus database, selected for its comprehensive coverage of peer-reviewed literature. The data collection period, from 2014 to 12 October 2024, was selected to ensure the inclusion of recent publications that more accurately reflect current developments and challenges in hospital financial performance. The following search query was used: "hospital" AND ("financial performance" OR "financial statement" OR "financial standing" OR "financial condition" OR "financial parameters" OR "financial situation"). This search yielded 11,886 documents from 159 scholarly journals.

ARRANGING

The collected data were refined to retain only articles relevant to medicine, nursing, and health professions, while excluding records from domains such as business, management, and social sciences. This filtering ensured the analysis

focused on clinical and health services research perspectives, rather than administrative or macroeconomic approaches. Inclusion criteria were: (1) subject areas of medicine, nursing, health professions, and dentistry; (2) original research articles; (3) final publication stage; (4) journal as the source type; and (5) English-language publications. Exclusion criteria are presented in Figure 1. The process yielded 2,387 relevant articles from 159 distinct publishers, categorised by subject area, document type, publication stage, source type.

Only English-language articles were included, with no filters applied for peer-review status or methodological quality. The reliance on Scopus exclusively may have limited the scope, as relevant publications indexed in other databases may not have been captured. Nevertheless, Scopus was deemed sufficient due to its high-quality indexing and analytical compatibility.

ASSESSING

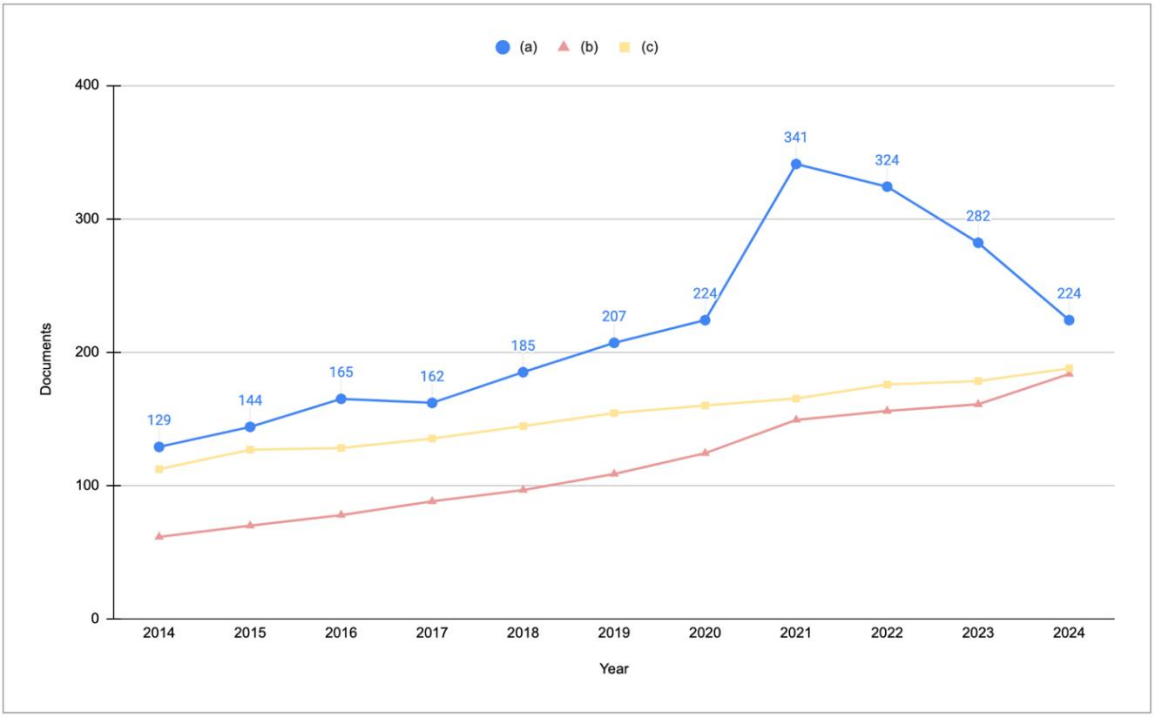
In the final stage, the analysis involved examining keyword co-occurrence and mapping connections among authors, institutions, and countries. VOS viewer was used to generate network visualisations that reveal relationships within the research landscape and highlight influential contributors. The assessment identified major thematic clusters, citation patterns, research gaps, and emerging areas for future investigation [11–13].

RESULTS

ANALYSIS OF PUBLISHING PATTERNS

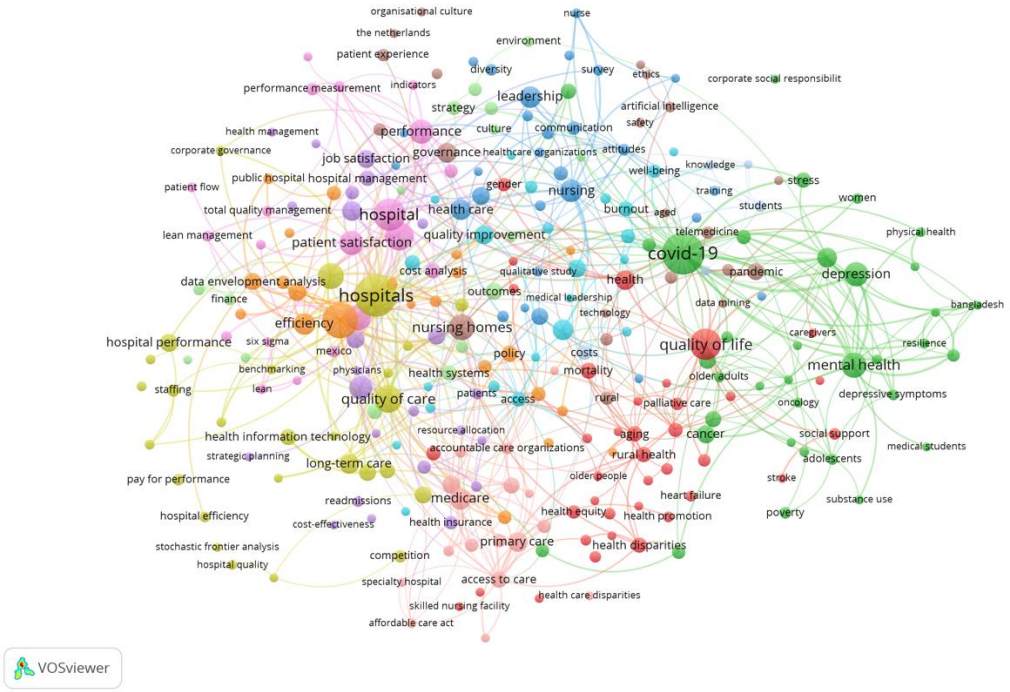
From 2014 to 2024 (Figure 2), studies on hospital financial performance indicated a general rising trajectory, marked by considerable annual variability. Publications rose from 129 in 2014 to 185 in 2018, with a notable surge from 2019 to 2021, reaching a zenith of 341 in 2021. A decline occurred, with 324 papers published in 2022 and 282 in 2023. As of October 2024, a total of 224 publications have been recorded; yet this figure remains incomplete. The noted decline post-2021 results from a lag in data updates rather than a reduction in research activities. This trend indicates rising global focus on hospital financial health, driven by structural reforms, health crises, and increased investment in health systems research. Understanding these temporal patterns helps hospital managers anticipate policy shifts or innovations.

FIGURE 2. TRENDS IN THE DISSEMINATION OF RESEARCH ON HOSPITAL FINANCIAL PERFORMANCE AND RELATED DOMAINS: (A) HOSPITAL FINANCIAL PERFORMANCE, (B) HEALTHCARE COST MANAGEMENT, AND (C) HEALTH ECONOMICS (2014–2024).



BIBLIOMETRIC ANALYSIS

FIGURE 3. RESULTS FROM THE CO-OCCURRENCE KEYWORD ANALYSIS.



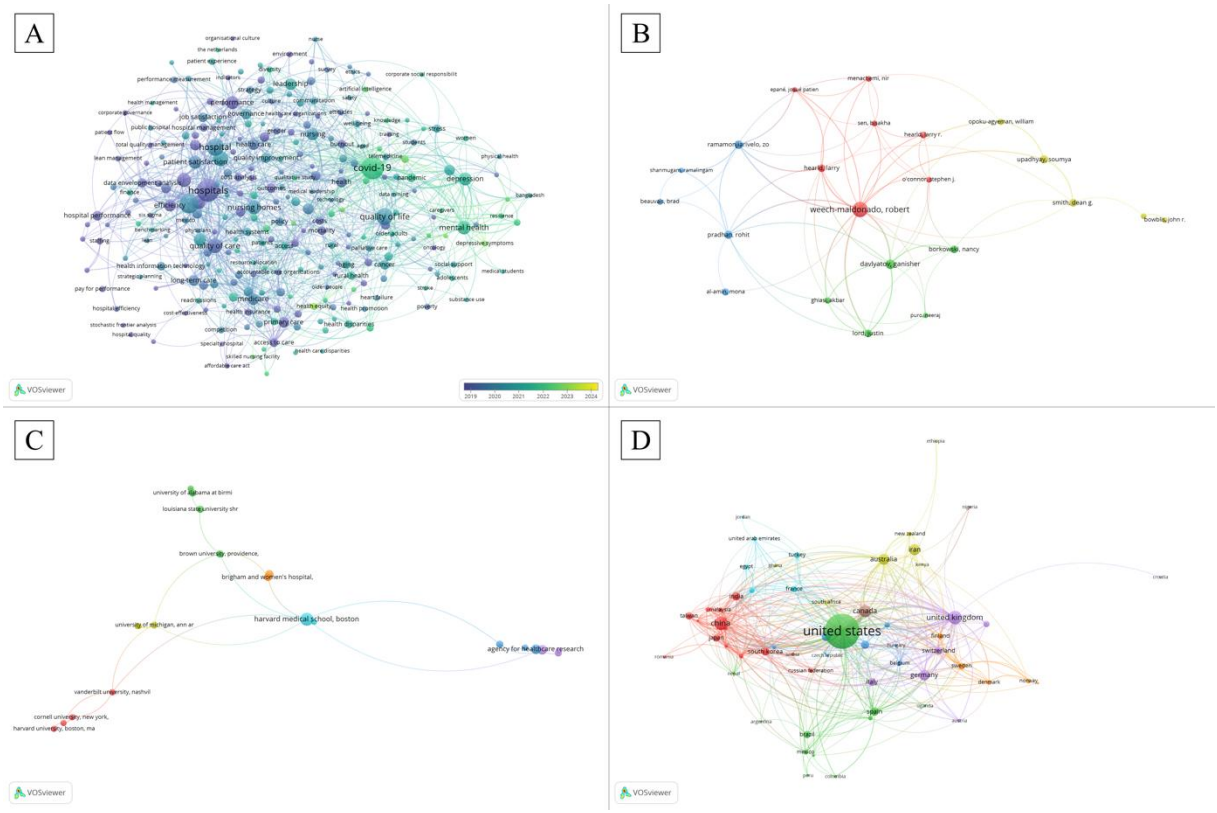
Common research areas

A keyword co-occurrence analysis identified major thematic clusters influencing hospital financial performance. Key themes included financial sustainability, efficiency, quality of service, and patient satisfaction, each closely tied to healthcare outcomes and hospital management. Research on financial sustainability often intersected with reimbursement policies, while service quality was tied to patient safety, satisfaction, and accreditation.

The impact of the COVID-19 pandemic was evident through emerging keywords such as "COVID-19," "telemedicine," and "mental health," highlighting focus on remote care and staff-patient well-being. Workforce stability, technological innovations, and policy reform emerged as dominant topics, driven by staff shortages and digitalisation demands (Figure 3). Ageing populations and rural access frequently appeared, highlighting equity concerns in service delivery. These clusters are critical for hospital administrators and policymakers. The link between workforce stability and digital innovation calls for integrated human-technology strategies to sustain operations. The ongoing emergence of equity-related themes requires investment and policy changes in under-represented regions.

Between 2019 and 2024, thematic shifts were notable, with a moved from cost-effectiveness and hospital performance to health equity and AI integration (Figure 4A). AI and telemedicine showed the most rapid growth, indicating rising influence on hospital finance and healthcare policy. This shift suggests that hospitals must enhance their capabilities to assess not only financial outcomes but also equity, technology adoption, and policy responsiveness. AI's application in hospital finance, though underexplored, offers opportunities for predictive analytics and operational optimisation.

FIGURE 4. PROGRESSION OF RESEARCH ON HOSPITAL FINANCIAL PERFORMANCE (A), AUTHOR NETWORK (B), INTERCONNECTED CO-AUTHORING ORGANISATIONS NETWORK (C), AND AUTHORS' COUNTRY NETWORKS (D) FROM 2014 TO 2024.



Authorship analysis

Table 1 presents the most frequently cited authors in hospital financial performance research based on Scopus data. Key contributors include Robert Weech-Maldonado, Ali M. Mosadeghrad, and George Pink. Weech-Maldonado has 41 publications, primarily focused on nursing homes, while Ali M. Mosadeghrad has nine articles on healthcare quality, and Pink specialises in healthcare financing.

Figure 4B visualises author collaborations across institutions and countries, highlighting shared concerns like hospital closures and financial distress. Prolific authors contribute cross-disciplinary insights from public health, economics, and policy, shaping research priorities and debates in hospital financial management. Their work highlights the importance for hospital managers to engage with literature beyond financial journals, incorporating health policy and clinical administration insights to enhance decision-making.

TABLE 1. THE MOST FREQUENTLY CITED AUTHORS.

No	Author	Articles	Main Topic	Article Citation	Google Scholar Citation
1	Ali M. Mosadeghrad	9	Healthcare Quality	576	12840
2	George H. Pink	11	Healthcare Financing	425	5760
3	George M. Holmes	8	Healthcare Financing	387	9079
4	Robert Weech-Maldonado	41	Nursing Homes	309	6186
5	Richard C. Lindrooth	6	Hospital Closure	223	5492
6	Richard S. Hoehn	5	Safety-Net Hospital	212	2264
7	Shimul A. Shah	5	Safety-Net Hospital	212	17807

Note: *Article Citation* refers to the total number of citations for the author's articles included in this study, based on Scopus data. *Google Scholar Citation* reflects the author's overall citation count across all publications as indexed by Google Scholar.

Organizational analysis

Table 2 presents the most frequently cited organisations in hospital financial performance research. The Tehran University of Medical Sciences leads with six publications, accumulating 525 citations, focusing on healthcare quality and organisational efficiency in middle-income settings. The University of North Carolina at Chapel Hill, particularly through its Gillings School of Global Public Health and the Cecil G. Sheps Center, contributes three high-impact articles on health policy, rural hospital sustainability, and healthcare access. Harvard Medical School, with 13 publications and 224 citations, excels in health systems financing and academic hospital performance.

Other notable contributors include the University of Central Punjab, researching financial resilience in South Asia private sector hospital, and the Icahn School of Medicine at Mount Sinai, exploring emergency care delivery and cost-effectiveness. These institutions offer diverse geographic and institutional perspectives, with Tehran University and UNC-Chapel Hill focusing on middle-income countries and U.S. rural healthcare, respectively.

Collaboration networks (Figure 4C) reveal active partnerships among institutions such as Brigham and Women's Hospital, Brown University, and Vanderbilt University, reflecting an interdisciplinary approach to financial performance. However, strategies effective in U.S. rural hospitals may not apply to middle-income urban settings. Hospital leaders must consider the institutional context when implementing research findings.

TABLE 2. THE MOST CITED ORGANIZATIONS.

Rank	Organization	Articles	Citations
1	School of Public Health, Tehran University of Medical Sciences, Tehran, Iran	6	525
2	Department of Health Policy and Management, Gillings School of Global Public Health and the Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, Chapel Hill, NC, United States	3	256
3	Harvard Medical School, Boston, MA, United States	13	224
4	Faculty of Management Studies, University of Central Punjab, Lahore, Pakistan	3	147
5	Department of Emergency Medicine, Icahn School of Medicine at Mount Sinai, New York, United States	6	140

Note. *Citations* refer to the total number of citations received by Scopus-indexed articles included in this study that are affiliated with each organisation.

Country analysis

The United States leads with 1,011 articles and 12,817 citations followed by the United Kingdom, China, Germany, and Australia. Regional clusters (Figure 4D) demonstrate collaboration among Europe, Asia, and North America, emphasising policy and system effectiveness. These collaborations promote knowledge transfer from resource-rich countries to developing health systems. The dominance of U.S.-based literature highlights the need for more research representation from low- and middle-income countries.

Article analysis

The five most-cited articles (Table 3) each exceeded 100 citations. These studies focus on operating room cost analysis, diversity's role in organisational performance, and the application of Data Envelopment Analysis to measure hospital efficiency. More recent topics include nurse turnover, COVID-19 effects, and rural hospital closures. These high-impact articles have shaped hospital financial research through widely adopted frameworks and methods. However, reliance on established topics risks overlooking emerging issues such as digital finance systems, AI integration, and regional disparities. Policymakers and administrators must recognize these gaps to stay ahead of future trends.

TABLE 3. THE MOST CITED ARTICLES.

Rank	Author	Citation	Title
1	Childers et al.	550	Understanding costs of care in the operating room
2	Gomez et al.	527	Diversity improves performance and outcomes

3	Mosadeghrad et al.	373	Factors influencing healthcare service quality
4	Kohl et al.	267	The use of Data Envelopment Analysis (DEA) in healthcare with a focus on hospitals
5	Kaufman et al.	244	The Rising Rate of Rural Hospital Closures

KEYWORD MAPPING BY CLUSTER

Table 4 organises seven principal concepts into five thematic clusters, prevailing patterns in hospital financial performance studies. Common terms include "hospital," "COVID-19," and "healthcare," while "financial performance" and "efficiency" remain central to the discourse. The increasing presence of the term "artificial intelligence" indicates an emerging research area, although its current citation frequency remains low. This trend reflects a shift in research priorities towards digital innovation, signalling that AI integration in hospital financial studies remains under-explored. This suggests that hospital leaders must enhance digital literacy and prepare for AI-driven financial tools.

TABLE 4. TREND AND THE MOST CITED KEYWORDS BY CLUSTERS.

Cluster	Keyword	Occurrence				Citations
		2014 to 2016	2017 to 2019	2020 to 2024	Total	
Yellow	Hospitals *[hospital, hospitals]*	26	51	79	156	2143
	Financial Performance	14	13	45	72	704
	Quality of Care	10	9	21	43	625
Green	COVID-19 *[covid-19, covid-19 pandemic, covid 19, pandemic covid-19, coronavirus disease 2019 (covid-19), covid]*	0	0	113	113	1407
Blue	Healthcare *[healthcare, health care]*	6	18	44	68	1141
Purple	Job Satisfaction	1	4	13	19	531
Brown	Artificial Intelligent	0	0	7	7	224

DISCUSSION

TRENDS AND PATTERNS IN HOSPITAL FINANCIAL PERFORMANCE EVOLUTION (RO1)

Over the past decade, research on hospital financial performance has intensified. Between 2014 and 2018, the focus was on financial management strategies to improve cost-effectiveness while maintaining clinical quality. The recognition of the link between sound financial practices and improved healthcare delivery contributed to increased hospital expenditures. These findings underscore the role of financial assessments in optimising resource allocation and enhancing performance, coinciding with global policy reforms that sparked academic interest in evaluating financial reforms and cost-containment efforts.

From 2019 to 2021, publication activity peaked, driven largely by the COVID-19 pandemic, which exposed weaknesses in hospital financial systems. Revenue drops and rising costs stressed the need for financial resilience. Studies demonstrate that hospitals with adaptable financial strategies were better positioned to manage crises. Government stimulus packages and emergency funding also influenced how hospitals budget restructuring and service prioritisation, offering new grounds for empirical analysis [14].

Although publication volumes declined slightly after 2021, this trend is likely attributable to *data lag*. Nonetheless, interest in hospital financial sustainability remains strong, with publication outputs in 2022 and 2023 surpassing pre-pandemic levels. The emergence of digital health innovations, such as telemedicine billing models and AI-assisted budgeting, has further shaped research, enhancing cost-efficiency and real-time decision-making [15–17].

IDENTIFICATION OF PRINCIPAL CONTRIBUTORS AND RESEARCH NETWORKS (RO2)

Recognising key contributors and collaborative research networks in hospital financial performance reflects the growing maturity of this field. Ali M. Mosadeghrad linked healthcare quality to financial outcomes, stressing the importance of operational efficiency [18, 19]. Similarly, contributions from George Pink and George Holmes underscore the relevance of financial metrics in healthcare financing, reinforcing the view that sound financial management is integral to hospital sustainability. These scholars not only produce high-impact publications but also shape research agendas through editorial positions and academic collaborations. These suggest the growing need for interdisciplinary approaches that integrate operational, financial, and service quality dimensions.

Institutions such as Tehran University's School of Public Health and UNC-Chapel Hill have emerged as leading centres of excellence. The high citation impact of their publications signifies substantial influence in shaping global discussions on financial sustainability. However, the dominance of high-income countries raises concerns about geographic bias, potentially overlooking the distinct financial challenges faced by hospitals in low- and middle-income countries (LMICs) [9]. These regions often face distinct financial constraints and operational challenges, which could enrich global understanding and policy design.

At the national level, the U.S. leads in output and impact, reaffirming its role in advancing this field. Its influence is reinforced by strong collaborations with countries such as the UK and China, signalling a shared global agenda for improving hospital financial efficiency. Comparative research across systems helps derive broadly applicable policies [20, 21].

Notable works by Childers et al. and Gomez et al. explore themes like cost control, workforce diversity, and financial alignment, thereby illustrating how financial performance intersects with organisational and social dimensions [22, 23]. These works reflect the complexity of financial challenges facing hospitals and the need for multidisciplinary responses, particularly within varied socioeconomic environments.

This analysis reveals a concentration of contributions from a few regions and institutions, suggesting a need for broader representation, especially from LMICs. Future research should prioritise inclusivity through cross-border collaborations, local data collection, and increased funding for LMIC-based researchers. [24].

EXPLORING NOVEL RESEARCH DIRECTIONS IN HOSPITAL FINANCIAL PERFORMANCE (RO3)

The COVID-19 pandemic has dramatically altered research priorities concerning hospital financial performance, exposing weaknesses and underscoring the need for adaptive financial strategies [25–27]. Terms like "financial performance" and "efficiency" indicate the essential need for hospitals to integrate sustainability with fair access to high-quality care. This prompts critical enquiries regarding how hospitals might navigate financial constraints while upholding healthcare excellence.

This study underscores the necessity of tracking financial trends over time to inform resilience and recovery planning [28]. Predictive analytics and cost-optimisation frameworks offer tools to adapt to changing expectations [29, 30]. This strategy seeks to diminish disparities in health care disparities while ensuring financial sustainability, offering valuable insights for legislators and administrators.

Emerging themes such as health equity and AI offer new research avenues. The global focus on health equity highlights the necessity for policies that reduce healthcare access disparities. However, questions persist concerning the impact of equity-driven policies on hospital efficiency and financial sustainability [31, 32]. AI has the potential to transform financial management in healthcare by utilising resources and forecasting costs, but its effectiveness, especially in resource-limited

settings, needs further empirical validation [33–37]. Integrating AI-driven solutions in financial dashboards could improve transparency and budgeting accuracy, but adoption remains slow due to regulatory, infrastructural, and human resource limitations.

Notably, although the term *artificial intelligence* is increasingly prevalent in recent publications, as illustrated in the keyword mapping (Table 4), its citation frequency remains relatively low. This contrast indicates that while interest in AI is growing, the field remains emergent and under-explored. The limited citation volume suggests the need for longitudinal studies, experimental implementations, and case studies that evaluate AI's real-world impact on hospital efficiency, financial planning, and sustainability.

Ongoing regulatory changes, including the global shift towards value-based care, also raise new challenges requiring adaptive financial planning [38–43]. The epidemic has expedited regulatory modifications and highlighted gaps in in hospital financial processes. These evolving regulations may require dynamic costing models, integrated reporting systems, and new metrics for evaluating hospital success beyond profitability. Future research should explore sustainable financial models, such as public-private partnerships and outcomes-based funding, while addressing the intersection of finance and ethics in healthcare access may offer a replicable framework for developing more stable and adaptable financial systems [44–48].

The convergence of conventional financial management and new innovations highlights the increasing complexity of hospital financial performance. Operational efficiency and sustainability are essential; however, the integration of contemporary frameworks such as artificial intelligence and health equity-focused strategies can enhance inclusivity and adaptability. Therefore, the future of hospital financial research lies in exploring how technological advancement, regulatory evolution, and social accountability can be harmonised in strategic financial planning. Aligning such innovations with evolving healthcare regulations, reimbursement systems, and patient expectations should become a key direction for future research [49, 50].

IMPLICATIONS AND LIMITATIONS

This study provides a comprehensive overview of the evolution in hospital financial performance research, focusing on resilience, efficiency, and sustainability. The findings reveal increased collaboration across authors, institutions, and countries, advancing financial strategies in hospital management. Emerging themes such as artificial intelligence and health equity represent promising avenues for future exploration, though these areas remain underdeveloped.

However, several limitations should be acknowledged. First, perspectives from resource-constrained settings may be underrepresented. The dominance of institutions and researchers from high-income countries may limit the applicability of findings to low- and middle-income contexts [24]. Future research should include diverse data sources and regional perspectives to ensure a more inclusive understanding of hospital financial dynamics.

Second, the pandemic context may have skewed the research landscape towards crisis-specific financial issues. As a result, findings may disproportionately reflect emergency-driven responses rather than long-term structural insights. This could limit the generalisability of certain trends or priorities beyond the pandemic period.

Third, the methodological dependence on bibliometric analysis presents inherent constraints. Bibliometric approaches measure research activity based on publication volume, citation frequency, and co-occurrence patterns, but they do not assess the actual quality, depth, or practical impact of the studies. It also excludes grey literature, unpublished work, or publications indexed outside of Scopus, potentially omitting relevant insights. Additionally, it cannot account for contextual, cultural, or qualitative factors that influence financial decision-making in hospitals.

Despite these limitations, this study provides a valuable foundation for future empirical work. By identifying key contributors, collaboration networks, and emerging themes, it offers a roadmap for researchers, policymakers, and healthcare administrators seeking to enhance financial performance across varied healthcare environments.

CONCLUSION

This bibliometric analysis investigates the financial performance of hospitals, emphasising trends, contributions, and deficiencies in prospective research. The COVID-19 pandemic has emerged as a vulnerability within the financial system, resulting in a shift in research objectives. Significant influence in the field has been exerted by key contributors, notably the United States. Additionally, emerging areas such as artificial intelligence, health equity, and policy changes offer opportunities for future exploration. This study highlights the significance of assessing financial performance, so enabling administrators, legislators, and healthcare professionals to formulate more successful and impactful healthcare policies and practices.

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APPENDIX

FIGURE 3. RESULTS FROM THE CO-OCCURRENCE KEYWORD ANALYSIS

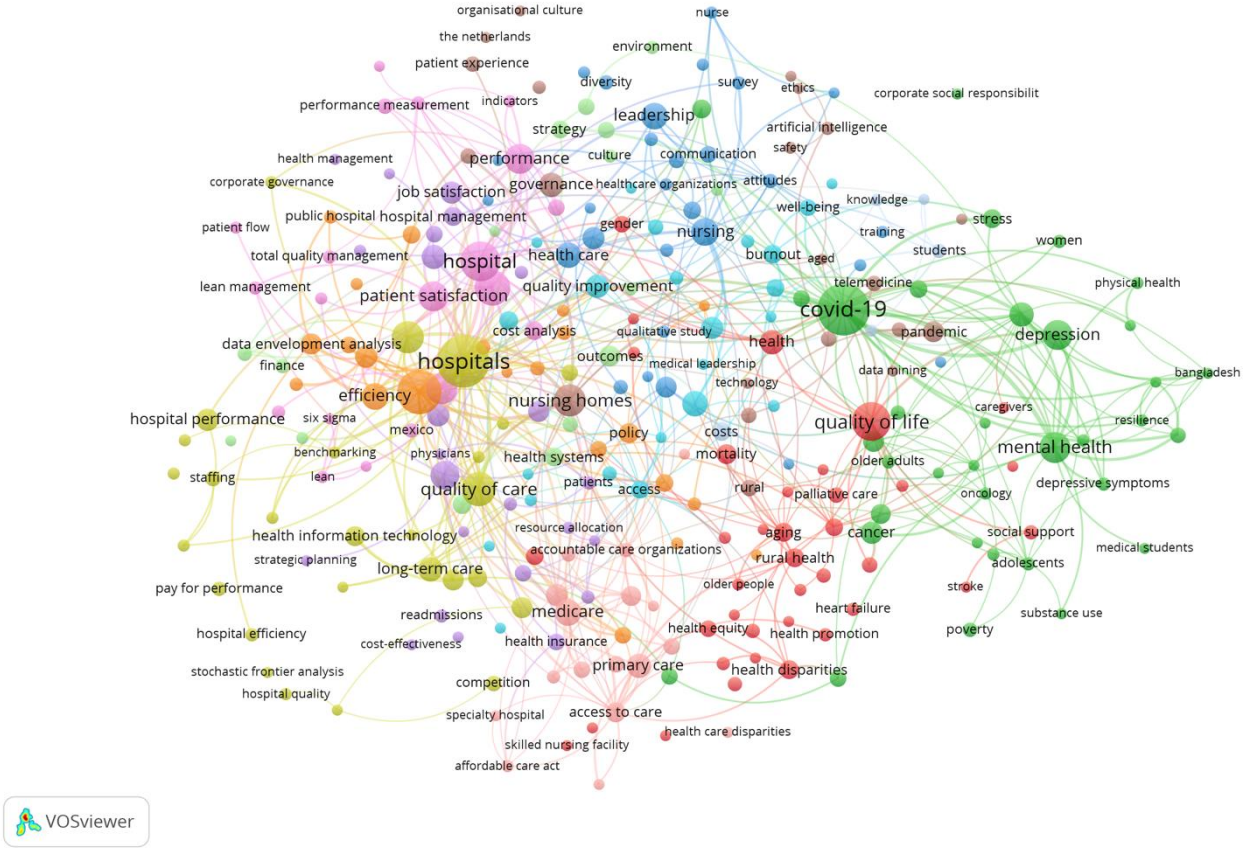

FIGURE 4A. PROGRESSION OF RESEARCH ON HOSPITAL FINANCIAL PERFORMANCE FROM 2014 TO 2024.

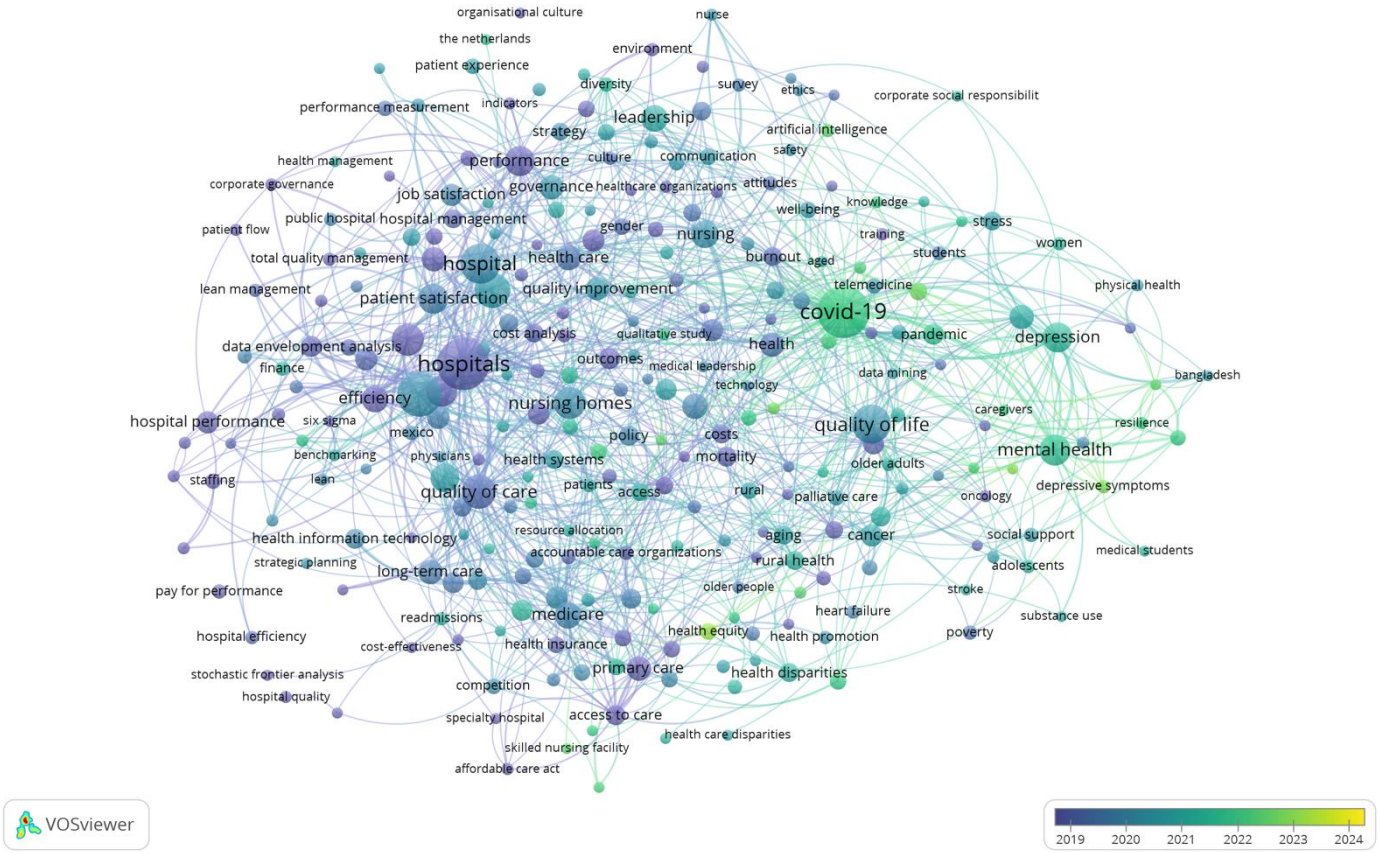

FIGURE 4B. AUTHOR NETWORK FROM 2014 TO 2024.

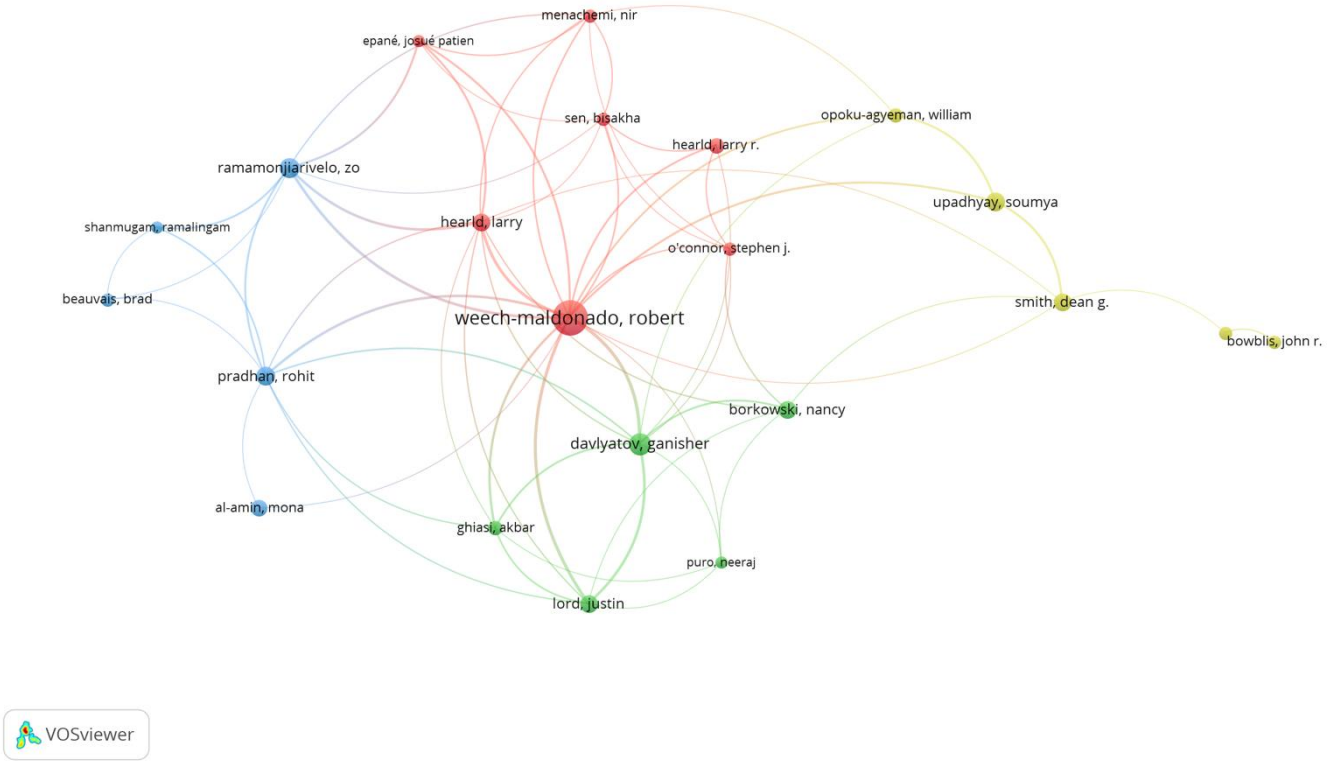

FIGURE 4C. INTERCONNECTED CO-AUTHORING ORGANISATIONS NETWORK FROM 2014 TO 2024.

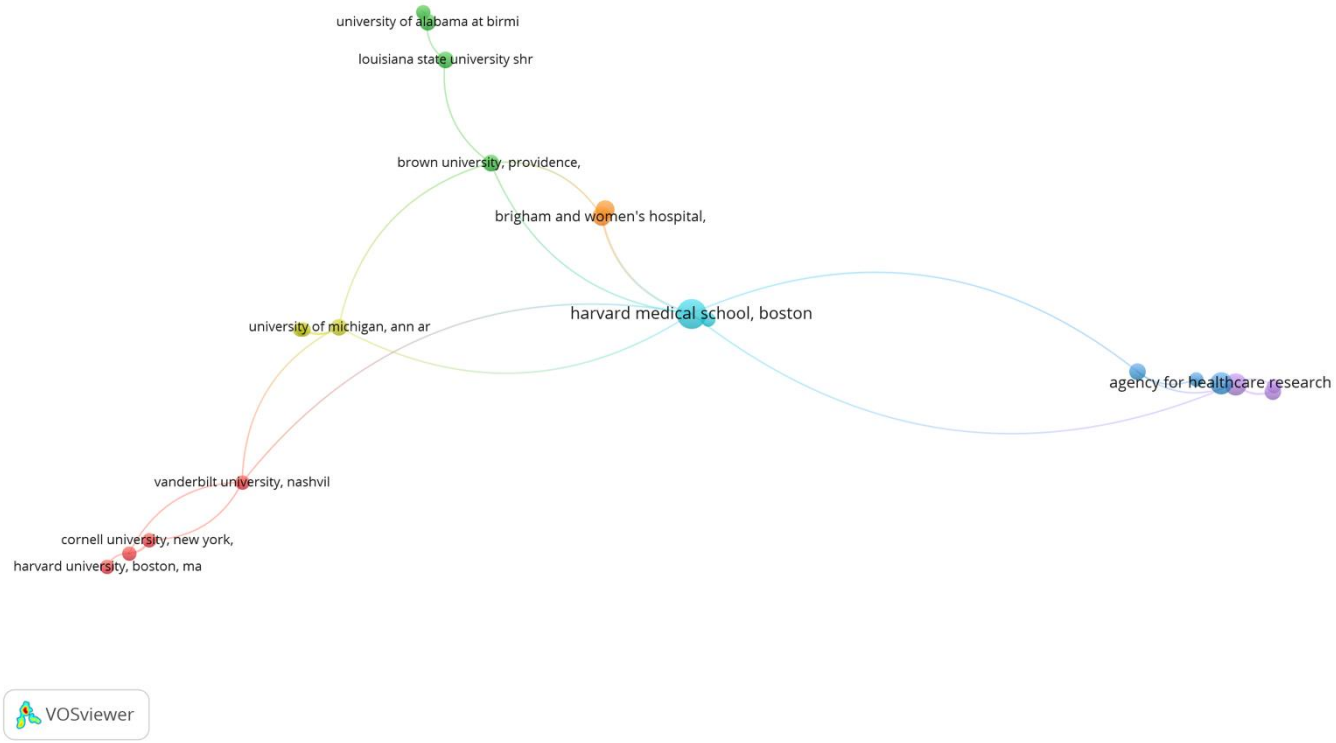

FIGURE 4D. AUTHORS' COUNTRY NETWORKS FROM 2014 TO 2024.