Health Leadership and Quality of Life. 2025; 4:745
doi: 10.56294/hl2025745

REVIEW

Trends and insights in global hospital quality of care research: implications for health leadership and service improvement

Tendencias y perspectivas en la investigación global sobre la calidad de la atención hospitalaria: implicancias para el liderazgo en salud y la mejora de los servicios

Nur Fadhilah Arifin[1], Buyung Nazeli[2], Rasmidar Samad[3], Fuad Husain Akbar[3], Syahrir A. Pasinringi[4]

[1]Universitas Muslim Indonesia, Department of Public Health Dentistry, Faculty of Dentistry. Makassar. Indonesia.
[2]University of Jenderal Ahmad Yani, Department of Hospital Administration, Faculty of Medicine. Yogyakarta. Indonesia.
[3]Hasanuddin University, Department of Public Health Dentistry, Faculty of Dentistry. Makassar. Indonesia.
[4]Hasanuddin University, Department of Hospital Administration, Faculty of Public Health. Makassar. Indonesia.

Cite as: Arifin NF, Nazeli B, Samad R, Akbar FH, Pasinringi SA. Trends and Insights in Global Hospital Quality of Care Research: Implications for Health Leadership and Service Improvement. Health Leadership and Quality of Life. 2025; 4:745. https://doi.org/10.56294/hl2025745

Submitted: 18-08-2024 **Revised:** 01-01-2025 **Accepted:** 22-07-2025 **Published:** 23-07-2025

Editor: PhD. Neela Satheesh

Corresponding author: Nur Fadhilah Arifin

ABSTRACT

Introduction: improving healthcare quality has become a global priority, yet a comprehensive analysis of hospital healthcare quality research over the past two decades is still missing.
Objective: this study aims to comprehensively analyze the global research landscape on hospital healthcare quality over the past two decades through a bibliometric approach. Specifically, it seeks to identify publication trends, geographic distribution, collaboration patterns, key thematic clusters, and evolving research priorities, while highlighting existing gaps and potential future directions in hospital healthcare quality research.
Method: this study examine the development of this field through a bibliometric analysis of 836 publications from the Scopus database (2004–2025), using OpenRefine, Bibliometrix, VOSviewer, and Tableau.
Results: the analysis reveals a steady annual publication growth rate of 2,7 and a dominant contribution from the United States (45,5 %). International collaboration remains limited (13,4 %), with most research originating from academic institutions. Keyword co-occurrence analysis identified three major research clusters: conceptual-managerial frameworks, methodological-epidemiological approaches, and specific patient safety indicators. Over time, the focus of research has shifted from clinical complications to quality frameworks and patient-centered systems. Key gaps include uneven geographic representation, limited global validation of quality indicators, minimal integration of patient perspectives, and difficulty in measuring qualitative aspects of hospital care.
Conclusions: future research will likely focus on digital technologies, artificial intelligence, value-based care, and equity-oriented system approaches. This study offers a foundational overview of the field's evolution and highlights areas for future investigation.

Keywords: Bibliometric Analysis; Healthcare Quality; Hospital Quality Indicators; Patient Safety; Hospital Performance Assessment.

RESUMEN

Introducción: la mejora de la calidad de la atención médica se ha convertido en una prioridad global. Sin embargo, aún falta un análisis integral de la investigación sobre la calidad hospitalaria en las últimas dos décadas.

Objetivo: este estudio tiene como objetivo analizar de manera integral el panorama global de la investigación sobre la calidad de la atención hospitalaria durante las dos últimas décadas mediante un enfoque bibliométrico. En particular, busca identificar las tendencias de publicación, la distribución geográfica, los patrones de colaboración, los principales clústeres temáticos y la evolución de las prioridades de investigación, destacando al mismo tiempo las brechas existentes y las posibles direcciones futuras en la investigación sobre la calidad de la atención hospitalaria.
Método: este estudio examina el desarrollo de este campo mediante un análisis bibliométrico de 836 publicaciones extraídas de la base de datos Scopus (2004–2025), utilizando herramientas como OpenRefine, Bibliometrix, VOSviewer y Tableau.
Resultados: el análisis revela una tasa de crecimiento anual constante de publicaciones del 2,7 % y una contribución dominante de Estados Unidos (45,5 %). La colaboración internacional sigue siendo limitada (13,4 %), y la mayoría de las investigaciones provienen de instituciones académicas. El análisis de coocurrencia de palabras clave identificó tres grandes clústeres de investigación: marcos conceptuales y de gestión, enfoques metodológicos y epidemiológicos, e indicadores específicos de seguridad del paciente. Con el tiempo, el enfoque de la investigación ha evolucionado desde las complicaciones clínicas hacia los marcos de calidad y sistemas centrados en el paciente. Las principales brechas identificadas incluyen una representación geográfica desigual, escasa validación global de los indicadores de calidad, mínima integración de las perspectivas de los pacientes y dificultades para medir aspectos cualitativos de la atención hospitalaria.
Conclusiones: se prevé que la investigación futura se centre en tecnologías digitales, inteligencia artificial, atención basada en el valor y enfoques del sistema orientados a la equidad. Este estudio ofrece una visión general fundamental de la evolución del campo y destaca áreas clave para futuras investigaciones.

Palabras clave: Análisis Bibliométrico; Calidad de la Atención Médica; Indicadores de Calidad Hospitalaria; Seguridad del Paciente; Evaluación del Desempeño Hospitalario.

INTRODUCTION

Improving the quality of health services has become a significant focus for health institutions worldwide, especially in facing the complex increase of global challenges. Public demand for quality health services is increasing along with patients' awareness of their rights as recipients of health services. Quality health care focuses on the healing aspect and includes patient safety, patient satisfaction, and hospital operational efficiency.[1] Mosadeghrad *et al.*[2] defines quality healthcare as providing effective, efficient, and appropriate services humanistic and equitable to produce optimal health and satisfaction for patients and providers. Various methodologies and instruments have been developed to measure and improve the quality of health services in hospitals.

The SERVQUAL instrument developed by Parasuraman *et al.*[3] has become one of the most widely used tools for measuring service quality. SERVQUAL is a 22-item instrument designed to measure the gap between consumers' perceptions and expectations of service quality based on five different dimensions: tangibles, which include physical facilities and personnel appearance, reliability which is the ability to deliver the promised service accurately and reliably; responsiveness which reflects the willingness to help customers and provide services quickly, assurance which includes the knowledge and courtesy of employees and their ability to inspire trust, and empathy which shows individualized attention given to customers. Research conducted by Fatima *et al.*[4] shows that aspects of healthcare quality such as physical environment, customer-friendly environment, responsiveness, communication, privacy, and security positively affect patient loyalty, with patient satisfaction as an important mediator in the relationship.

Over time, health service quality measurement instruments continue to evolve with a more comprehensive approach tailored to the hospital context. Lee *et al.*[5] argues that measuring the quality of health services should consider their unique characteristics, which include technical, interpersonal, infrastructural, and administrative aspects. Implementing quality management in healthcare has significantly developed over the past two decades. Total Quality Management (TQM), Lean Healthcare, and Six Sigma are approaches widely adopted by hospitals to improve service quality.[6] According to Agarwal *et al.*[7] applying Lean and Six Sigma principles in healthcare has proven effective in reducing patient waiting time, improving patient safety, and optimizing the use of hospital resources.[7] Studies conducted by Andreamatteo iet al.[8] show that applying Lean Healthcare methods can reduce waste and improve hospital operational efficiency without sacrificing service quality.

Information and communication technology development has also influenced the evolution of healthcare quality. Electronic Health Records (EHR), telemedicine, and health information systems have changed how hospitals deliver patient services.[9] Their systematic review study found that implementing health information

systems positively impacted the quality of care through improved adherence to guidelines, patient monitoring capabilities, and reduced medical errors.[10] Furthermore, Black et al. highlighted that although digital health technology promises to improve quality and efficiency, its implementation requires significant organizational change and the involvement of all stakeholders.[11]

Hospital accreditation has become an important instrument in standardizing and improving the quality of healthcare services. Joint Commission International (JCI) and other national accreditation organizations have developed comprehensive standards to evaluate the quality and safety of health services.[12] Alkhenizan *et al*.[13] conducted a systematic review and found that hospital accreditation positively impacts clinical structures, processes, and outcomes. However, Braithwaite *et al*.[12] identified that there is still variation in health professionals' perceptions of the benefits of accreditation, indicating the need for ongoing evaluation of the effectiveness of accreditation programs.

Patient-centered care (PCC) has emerged as an important paradigm in improving healthcare quality. PCC emphasizes the importance of involving patients in clinical decision-making and respecting patients' preferences, needs, and values.[14] Research conducted by Rathert et al. showed that PCC implementation was associated with improved patient satisfaction, medication adherence, and better health outcomes. Furthermore, Luxford *et al*.[15] identified important factors in developing a PCC culture in hospitals, including strong leadership, patient feedback, and staff engagement at all levels.

Patient safety has become a critical dimension of healthcare quality following the publication of the "To Err Is Human" report by the Institute of Medicine in 1999.[16] The report estimated that 44,000 to 98,000 deaths occur annually in the United States due to preventable medical errors. Since then, various patient safety initiatives have been developed and implemented in hospitals worldwide. Zegers in their systematic review, identified 14 effective interventions for reducing adverse events and preventable deaths in hospitals. These include multicomponent interventions to prevent delirium, rapid response teams to reduce cardiopulmonary arrest and mortality, pharmacist interventions to reduce drug-related adverse events, and implementing care bundles, checklists, and reminder systems to reduce infections. However, researchers note that the evidence for patient safety interventions is still not strong, with most significant findings based on only five or fewer primary studies with experimental designs.[17,18,19,20]

METHOD

Data Collection and Source

Article data was collected from the Scopus database (www.scopus.com) using the following keywords: "Hospital quality indicators", "quality measurement in hospitals", "patient safety indicators", "hospital performance measurement", "healthcare quality assessment", and "hospital accreditation standards". This search initially yielded 928 documents. The search was restricted to publications from 2004 up to February 27, 2024, at 10:00 AM, to exclude documents published after the data collection date and minimize potential bias. The results were further filtered to include only articles, reviews, and conference papers, resulting in a final dataset of 836 documents. The document data was exported in CSV (Comma-Separated Values) format, including citation details, bibliographic information, abstracts, keywords, tradenames and manufacturers, accession numbers and chemicals, conference information, and references.

Data Analysis

Data files that have been cleaned and standardized using Openrefine were then processed using Bibliometrix, a package developed by R Studio, to obtain data such as general information, publication development each year, total publications per country, affiliations, authors and journals sources, and documents with the most citations for keyword visualization (network and overlay visualization) using the Vos Viewer application. Each year, geographical distribution maps and publication progress charts are visualized using the Tableau Version 2024.2 application.

RESULTS AND DISCUSSION

General Characteristics

Figure 1 shows the productivity and growth of research in healthcare quality in hospitals showed significant development from 2004-2025. A total of 836 documents were published with an annual growth rate of 2,7 %. These publications were spread across 417 sources (journals, books and others), signalling this topic's broad scope of interest. The average age of the documents is 9,3 years, with the average citations per document reaching 23,84, indicating the substantial scientific impact and continued use of this research.

The reference count of 24,703 illustrates the strong literature base underpinning this area of research. The pattern of collaborative authorship reflects the characteristics of modern healthcare research. Out of 3,831 authors, only 34 published single works, with only 38 documents (4,5 % of the total). The average number of authors per document was 5,9 %, indicating a high trend of collaboration in healthcare quality research.

International collaboration reached 13,4 %, indicating a global network, although most research is still conducted in a national context. The richness of keywords used (1,516 author keywords and 3,550 plus keywords) shows the diversity of perspectives and approaches in studying this topic. The majority of publications were journal articles (723 documents or 86,5 %), followed by review articles (66 documents or 7,9 %) and conference papers (47 documents or 5,6 %), reflecting a preference for comprehensive, peer-reviewed scientific publications.

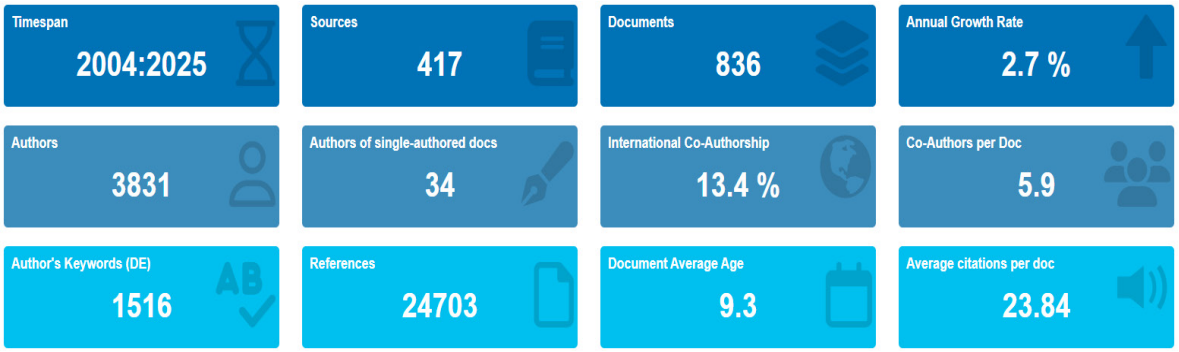

Figure 1. General information of bibliometric data of health service quality research in hospitals for 2004-2025

Development of Research Publications on Quality of Health Services in Hospitals

Figure 2 show a bibliometric analysis of publication trends in hospital healthcare quality research over the period 2004-2025. The data shows 836 publications have been produced over 22 years with varying but increasing growth patterns. The 2004-2009 growth phase was characterized by a rapid increase from 8 articles in 2004 to 35 articles in 2009, reflecting the emergence of global awareness of the importance of healthcare quality standards following the Institute of Medicine report on medical errors. The highest growth momentum occurred in 2005, with a 62,50 % increase over the previous year. Research publications peaked in 2014 with 60 publications, which coincided with the implementation of global health policies that emphasized hospital accountability and performance measurement, such as the introduction of value-based payment systems in various developed countries.[17] The significant decline of 33,33 % in 2015 marked a shift in research focus, followed by a period of fluctuation reflecting a dynamic response to changing global health policy priorities.

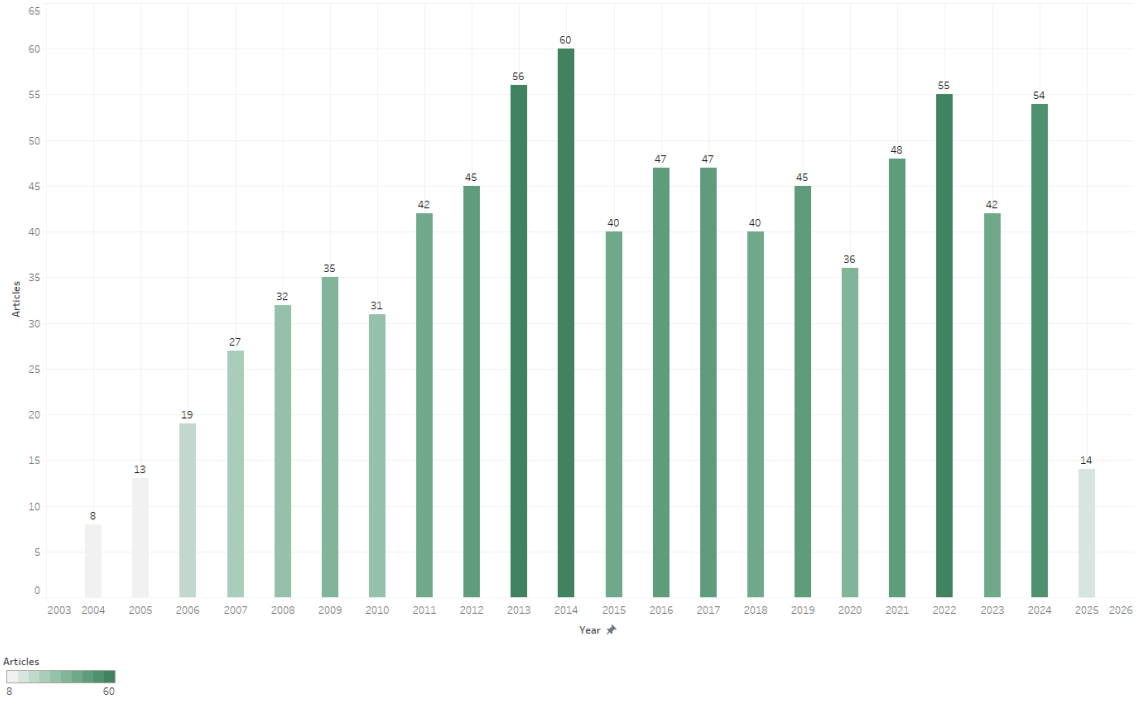

Figure 2. Publication trends in hospital healthcare quality research between 2004 and 2025

Analysis based on period division revealed four distinct phases of development in hospital healthcare quality research. The first phase (2004-2009) can be characterized as the initiation period with a contribution of 16,03 % of the total publications, which was characterized by the introduction of conceptual frameworks and early development of quality indicators. The second phase (2010-2015) was a period of expansion and consolidation

with a 32,78 % contribution, characterized by a significant increase in the number and scope of studies, including more sophisticated measurement methodologies and applications in a broader context. The third phase (2016-2021) reflected a period of transformation with a 31,46 % contribution, where the research focus shifted to patient-centric aspects, integration of digital technologies, and evaluation of the impact of quality improvement interventions. The fourth phase (2022-2025, albeit incomplete) shows signs of sustainability with 19,74 % of contributions, reflecting the institutionalization of quality research in contemporary healthcare practice and adaptation to post-pandemic challenges, albeit with uncertainties associated with the unfinished year 2025.

Geographic Distribution and International Collaboration Patterns

As illustrated in figure 3, an analysis of 836 publications on hospital healthcare quality showed significant disparities in geographical distribution, with the United States dominating substantially, contributing 380 articles (45,5 %) of the global total. This very high concentration of research is reflected in the fact that it only takes the top two countries, the United States and the United Kingdom, to account for 50 % of the global total and 25 countries to account for 80 % of publications. The regional distribution also shows a clear imbalance, with North America (mainly the United States and Canada) contributing 49,10 % of the total publications, followed by Europe (19,30 %), Asia (10,30 %), Oceania (2,20 %), and minimal contributions from South America (1,60 %) and Africa (0,30 %).

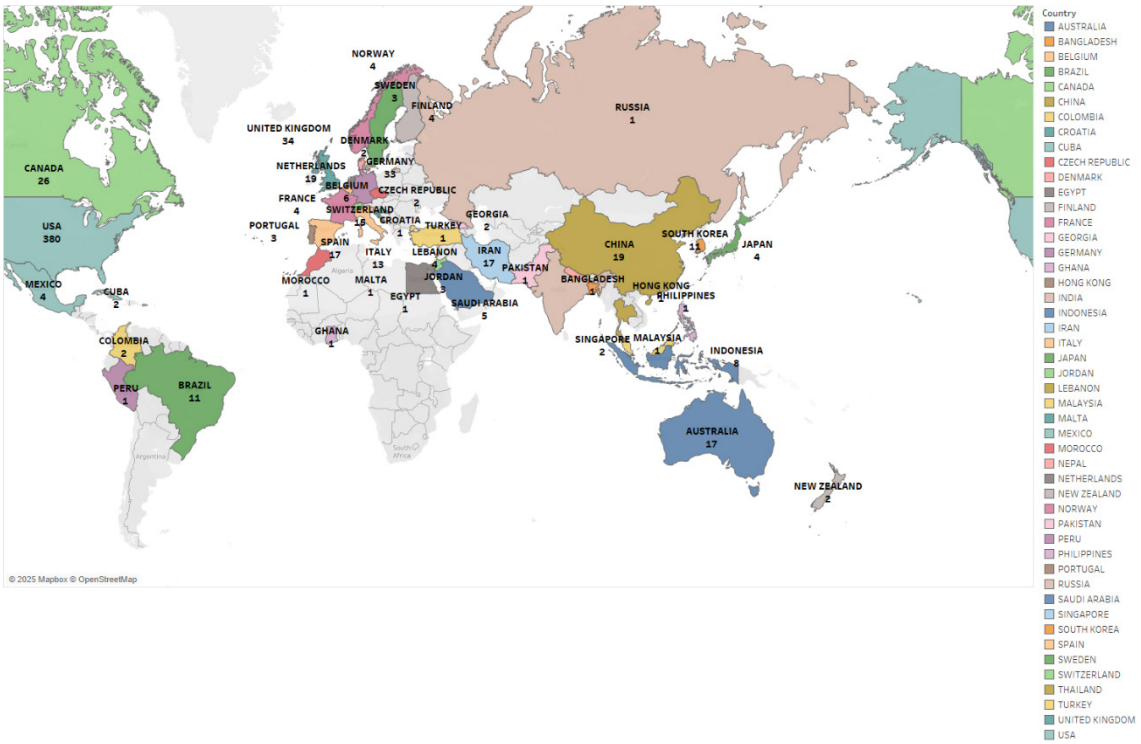

Figure 3. Publication trends in hospital healthcare quality research

As detailed in table 1, analysis of single-country publications (SCP) and multi-country publications (MCP) patterns shows significant variation in the involvement of international collaboration across countries. Overall, the majority of publications (85,59 %) were the result of single-country research (SCP), while only 14,41 % involved international collaboration (MCP), with a global average MCP of 20,32 %. Interestingly, there is an inverse correlation between the number of publications and the percentage of MCPs; the United States, as the most significant contributor, has a very low percentage of MCPs (5,5 %), indicating independence in research. In contrast, countries such as Switzerland (60 % MCP), Finland (75 % MCP) and Saudi Arabia (60 % MCP) show a higher reliance on international collaboration. Among countries with at least 10 publications, Switzerland, the UK (41,2 % MCP), and Italy (38,5 % MCP) lead in international collaboration, while Indonesia, India, and Japan show no collaborative publications (0 % MCP). Regional differences are also evident, with Europe showing the highest collaboration rate (29,81 % MCP), contrasting with North America (7,32 % MCP) and Africa (0 % MCP), reflecting differences in research approaches and funding structures across regions.

Table 1. Publications Patterns Across Countries.

Country	Articles	Articles %	SCP	MCP	MCP %
USA	380	45,5	359	21	5,5
United Kingdom	34	4,1	20	14	41,2
Germany	33	3,9	30	3	9,1
Canada	26	3,1	19	7	26,9
China	19	2,3	14	5	26,3
Netherlands	19	2,3	13	6	31,6
Australia	17	2	15	2	11,8
Iran	17	2	14	3	17,6
Spain	17	2	14	3	17,6
Switzerland	15	1,8	6	9	60

Note: SCP, single-country publications; MCP, multi-country publications.

Publication Trend Analysis

Analysis of Institutional Contributions to Healthcare Quality Research in Hospitals

Analysis of institutional contributions to bibliometric research provides important insights into centres of excellence, patterns of institutional collaboration, and the geographic distribution of research within a field, as detailed in table 2. The analysis showed that the 1,289 affiliates contributing to hospital healthcare quality research showed a very uneven distribution pattern, with most institutions (52,3 %) contributing only one article. In contrast, the top 20 institutions accounted for 19,31 % of the total 3,956 publications in this field. The data shows a strong dominance of US institutions in hospital healthcare quality research, with nine of the country's top 10 most productive affiliates coming. Harvard Medical School emerged as the most productive institution, with 97 articles contributing, followed by the University of Florida (70 articles) and the University of California (69 articles). The only non-US institutions in the top 10 list were Germany's University Hospital Bonn (65 articles) and Canada's University of Calgary (45 articles), indicating that despite being centred in the United States, there were significant contributions from other European and North American institutions.

Table 2. Top ten most productive institutional affiliations based on total publications in healthcare quality research in hospitals.

Affiliation	Documents	Country
Harvard Medical School	97	United States
University of Florida	70	United States
University of California	69	United States
University Hospital Bonn	65	Germany
Stanford University	53	United States
University of Pennsylvania	52	United States
University of Calgary	45	Canada
Mayo Clinic	44	United States
Stanford University School of Medicine	31	United States
Boston University School of Public Health	30	United States

Classification of affiliations by institution type revealed a strong dominance of the academic sector, with universities accounting for 63,20 % of total publications through 627 identified affiliations. Despite being the site of direct application of quality indicators, hospitals contributed only 11,38 % of the total publications through 227 affiliates, indicating a gap between clinical practice and formal research activities. Research institutes took third place with a contribution of 8,70 % of total publications, while the government, including health regulatory bodies that often drive quality of care interventions, only 1,39 %. This reflects the dynamics of the healthcare quality research ecosystem, where universities play a central role in developing methodologies and theoretical frameworks. At the same time, hospitals and government agencies focus more on practical implementation than scientific publications. Interestingly, the presence of affiliates such as the Agency for Healthcare Research and Quality (AHRQ) among the top 20 institutions indicates the active role of certain government agencies in driving the healthcare quality research agenda through scientific publications.[21,22,23,24,25,26]

Keyword Analysis

Network Visualization

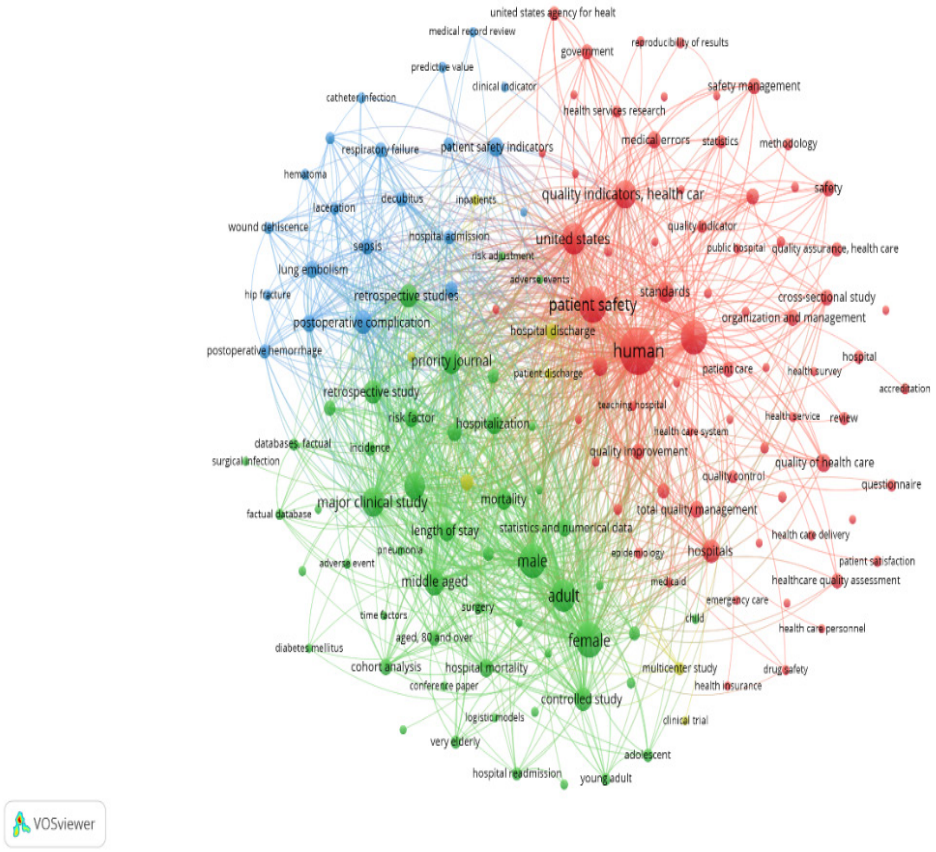

Figure 4. Visualization of the co-occurrence network of keywords for health service quality research in hospitals using VOSviewer

Visualization of the keyword co-occurrence network using VOSviewer software in figure 4 reveals the intellectual structure of hospital healthcare quality research divided into three main clusters, reflecting different but interrelated thematic focuses. The red cluster is dominated by keywords related to conceptual and managerial frameworks such as “quality indicators, health care”, “standards”, “accreditation”, and “organization and management”, which are closely related to the institutional role shown through the keywords ‘government’ and “united states agency for health”. This is in line with the findings of Jha et al.[16] who identified a paradigm shift from a process-based approach to an outcome-based approach in the evaluation of healthcare quality, as well as the study of Braithwaite et al.[12] who emphasized the role of accreditation standards in shaping service quality frameworks. The central position of the keywords “human” and “patient safety” in the network indicates a strong patient-centric orientation in healthcare quality research, as also noted by Hanefeld et al.[27] in the structure-process-outcome framework that is still the main conceptual foundation in this field.

The green cluster reflects methodological and epidemiological approaches in healthcare quality research, with keywords such as “major clinical study”, “controlled study”, “retrospective study”, and “risk factor”, indicating a strong empirical evidence base. The presence of demographic variables such as “male”, ‘female’, “adult”, and age categories indicates the importance of population stratification in quality of care analysis, in line with the health equity principles in the Sustainable Development Goals.[27] The connection between these methodological keywords and outcome indicators such as “hospital mortality” and “length of stay” underscores the importance of measurable metrics in evaluating quality of care, as also identified in systematic reviews by Mainz et al.[28] analyzing the evolution of administrative data-based quality indicators. These findings are also consistent with the global trend in using big data and health analytics for quality of care monitoring identified by Bates et al.[29]

The blue cluster focuses on more specific patient safety indicators and clinical complications, with keywords such as “patient safety indicators”, ‘sepsis’, “respiratory failure”, and “postoperative complication”, which are in line with the Agency for Healthcare Research and Quality (AHRQ) Patient Safety Indicators developed

in the United States. The link between these indicators and the keyword "risk adjustment" underscores the importance of a risk standardization methodology in comparing performance between healthcare facilities, as emphasized by Romano et al.[30] in a validation study of patient safety indicators. Bratzler et al.[31] also emphasized in their studies that postoperative complications and healthcare-associated infections remain a major focus in global quality improvement efforts. The interconnections between these three clusters, especially at points such as "retrospective studies", 'mortality', and "patient safety", reflect the multifaceted approach to healthcare quality research advocated by Learning Health Systems that emphasizes the integration of safety, effectiveness, efficiency, and patient orientation aspects in healthcare quality assessment.[31]

Overlay Visualization

The VOSviewer overlay visualization reveals the chronological progression of hospital healthcare quality research topics from 2013 to 2017, with colour gradations from blue (2013) to yellow (2017). This temporal pattern shows a significant shift in research focus, where keywords such as "patient safety indicators", "postoperative complication", and "respiratory failure" marked in bluish colour represent the initial focus of research on specific clinical complications and patient safety. This is in line with the studies of Ramanathan et al.[32] who validated AHRQ patient safety indicators to detect postoperative complications. The evolution of the research then moves towards methodology and institutional aspects (purple-green), as seen in the keywords "quality indicators, health care", 'standards', and "organization and management", reflecting the consolidation phase of the quality of care framework. In their study, Chen et al.[33] identified this period as a critical point in the standardization of healthcare quality measurement. The most recent developments (2016-2017) marked in the yellow show a focus on system aspects and patient experience, reflected in keywords such as "patient satisfaction", "healthcare quality assessment", and "total quality management", signifying an expansion of perspective from patient safety to a more comprehensive concept of quality.

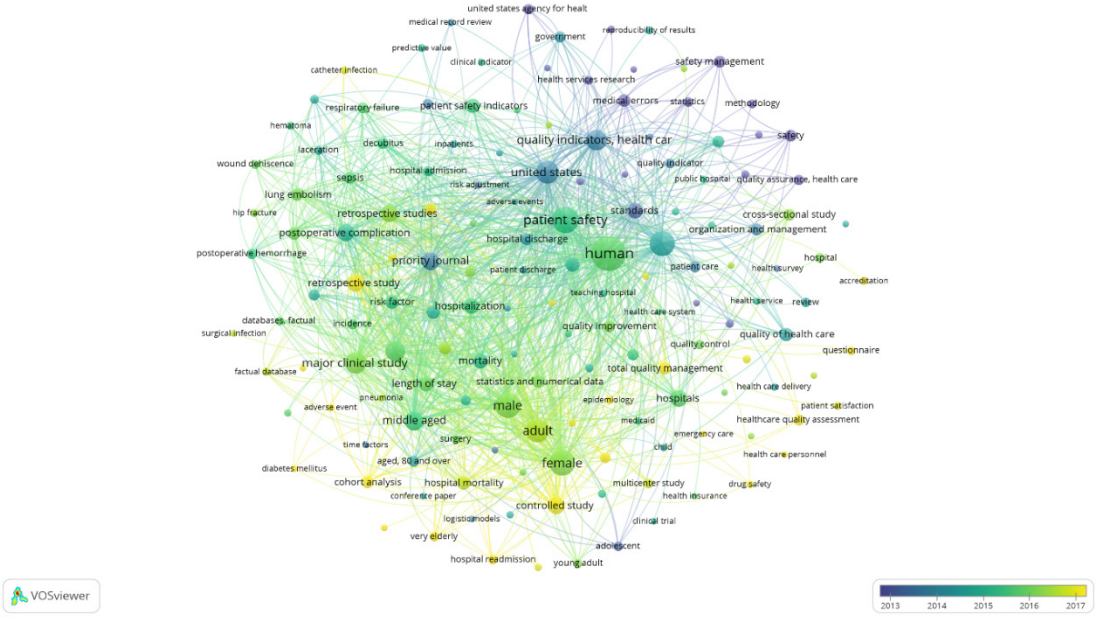

Figure 5. Visualization of temporal overlay of keywords of health service quality research in hospitals for the period 2013-2017

The temporal pattern also reveals methodological evolution, with early studies dominated by retrospective approaches focusing on clinical complications such as "sepsis", "catheter infection", and 'decubitus' (blue colour). In contrast, the middle period (green colour) shows an emphasis on "risk adjustment" and "retrospective studies", reflecting increasing methodological sophistication. Desai et al.[34] explained the importance of this risk adjustment methodology in comparing hospital performance, while Kaafarani et al.[35] developed a risk adjustment model for surgical patient safety indicators. Recent research (yellow colour) shows the influence of a total quality management approach with the emergence of keywords such as "accreditation", "patient satisfaction", and "health care personnel", reflecting a systemic perspective that aligns structure, process, and outcomes as advocated in the Donabedian framework. This development is consistent with the findings of Sousa et al.[36] who identified a shift from a reactive, incident-based approach towards a culture of proactive safety and continuous quality improvement.

The temporal distribution of keywords also reveals the evolution of patient segmentation in healthcare quality research. Early studies (blue) showed a focus on general clinical indicators, while the middle period (green) began to emphasize demographic segmentation such as "male", 'female', and "adult", reflecting the introduction of stratification approaches in quality analysis. In the most recent period (yellow), there was a focus on special populations such as "very elderly", "young adult", 'adolescent', and "child", indicating increased attention to patient experience by specific age groups. Abbott et al.[37] notes that this evolution reflects a paradigm shift towards patient-centred care and health equity principles. Methodology-related buzzwords such as "cohort analysis", "logistic models", and "factual databases" appearing in the most recent period indicate advances in analytic techniques for evaluating quality of care, in line with the adoption of big data in healthcare research as emphasized by Bates et al.[38] This overall temporal pattern confirms the transformation of healthcare quality research from an incident-based approach to a comprehensive systemic approach, emphasizing the integration of patient safety, clinical effectiveness, and patient experience as key dimensions of healthcare quality.

Future Research Directions and Research Challenges

Based on keyword network analysis and temporal overlay visualization, future healthcare quality research in hospitals will likely evolve in several directions. First, integrating digital technologies and artificial intelligence in quality measurement and improvement will become increasingly dominant, focusing on real-time monitoring, risk prediction, and personalized care. The recent proliferation of keywords related to "predictive value" and "factual database" indicates this trend. Second, the approach to quality measurement will shift from process-based indicators to more value-based outcomes, emphasizing meaningful metrics, such as quality of life and patient satisfaction. This is reflected in the appearance of the keywords "patient satisfaction" and "healthcare quality assessment" in the latest period of the visualization.

Research will increasingly emphasize complex systems approaches and interconnections between different aspects of quality of care, replacing fragmented approaches that focus on single dimensions. Multidisciplinary studies linking quality of care to social determinants of health and health equity are likely to increase, broadening the focus from hospital performance measurement to the impact of health systems on populations. The development and validation of indicators for underserved population groups will also receive increased attention, given the emergence of demographic stratification in recent research trends. In addition, quality measurement methodologies will evolve to accommodate new models of care, such as telemedicine, home-based care, and integrated care, reflecting the transformation of the post-pandemic healthcare landscape.

Healthcare quality research in hospitals faces several significant challenges. First, measurement standardization remains a major challenge, especially in international comparisons. The keyword network visualization predominates "United States," indicating a geographical bias in developing quality indicators. Developing a framework that can be adapted globally while remaining locally relevant is a complex challenge, given the differences in health system structure, culture, and policy priorities between countries. Secondly, integrating patient perspectives into quality measurement is still not optimal, although a trend towards this is visible in the overlay visualization. Developing methods that validly capture patient experience and integrate it with traditional clinical metrics requires innovative methodological approaches.

The third challenge relates to the complexity of measuring hard-to-quantify quality dimensions such as humanity of care, coordination of services, and responsiveness to individual patient needs. Keywords related to these dimensions are relatively less prominent in the visualization, suggesting gaps in the operationalization of these concepts. Fourth, attribution of causality in quality improvement interventions remains a methodological challenge, especially in complex and adaptive health systems where multiple interventions are often implemented simultaneously. Other challenges include the difficulty of integrating data from multiple sources in fragmented health information systems and ethical and privacy challenges related to utilizing big data for quality evaluation. Finally, ensuring that healthcare quality research results in practical changes in clinical care requires effective implementation strategies, an aspect often overlooked in the existing literature.

CONCLUSIONS

A bibliometric analysis of 836 scientific publications on hospital healthcare quality over 2004-2025 revealed significant research focus and methodology developments. Research productivity showed a consistent growth trend of 2,7 % per year, although fluctuations reflected dynamic responses to global health policy priorities. The geographical distribution of publications shows substantial disparities, with the United States dominating (45,5 %), reflecting global disparities in research capacity. International collaboration is relatively limited (13,4 %), with most publications resulting from single-country research. Academic institutions, mainly from the United States, dominate research production, with Harvard Medical School being the most significant contributor. Keyword co-occurrence analysis identified three main clusters of research: (1) conceptual and managerial frameworks, (2) methodological and epidemiological approaches, and (3) specific patient safety indicators and

clinical complications. The temporal evolution shifted from an initial focus on specific clinical complications towards consolidating quality frameworks to a comprehensive and patient experience-oriented systems approach in the most recent period. Analysis of the highest-cited articles revealed patient safety as a dominant theme, with a shifting trend from incident-based approaches to systemic and integrative approaches. Identified research gaps include (1) unequal geographic distribution, (2) limited validation of indicators in diverse global contexts, (3) suboptimal integration of patient perspectives, and (4) methodological challenges in measuring difficult-to-quantify dimensions of quality. Future research directions will likely evolve towards integrating digital technologies and artificial intelligence, value-based measurement, complex systems approaches, and methodological development for evolving models of care, emphasizing health equity and patient experience as important dimensions in the conceptualization of healthcare quality in hospitals.

REFERENCES

1. Donabedian A. Evaluating the Quality of Medical Care. Milbank Q. 2005;83(4):691-729. doi: https://10.1111/j.1468-0009.2005.00397.x

2. Mohammad Mosadeghrad A. Healthcare service quality: towards a broad definition. Int J Health Care Qual Assur. 2013;26(3):203-19. doi: https://10.1108/09526861311311409

3. Parasuraman A, Zaithaml VA, Berry LL. SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. J Retail. 1988;64(1):12-35.

4. Fatima T, Malik SA, Shabbir A. Hospital healthcare service quality, patient satisfaction and loyalty. Int J Qual Reliab Manag. 2018;35(6):1195-214. doi: https://10.1108/IJQRM-02-2017-0031

5. Lee D. HEALTHQUAL: a multi-item scale for assessing healthcare service quality. Serv Bus. 2017;11(3):491-516. doi: https://10.1007/s11628-016-0317-2

6. DelliFraine JL, Langabeer JR, Nembhard IM. Assessing the Evidence of Six Sigma and Lean in the Health Care Industry. Qual Manag Health Care. 2010;19(3):211-25. doi: https://10.1097/QMH.0b013e3181eb140e

7. Agarwal S, Gallo JJ, Parashar A, et al. Impact of lean six sigma process improvement methodology on cardiac catheterization laboratory efficiency. Cardiovasc Revasc Med. 2016;17(2):95-101. doi: https://10.1016/j.carrev.2015.12.011

8. D'Andreamatteo A, Ianni L, Lega F, Sargiacomo M. Lean in healthcare: A comprehensive review. Health Policy. 2015;119(9):1197-209. doi: https://10.1016/j.healthpol.2015.02.002

9. Buntin MB, Burke MF, Hoaglin MC, Blumenthal D. The Benefits Of Health Information Technology: A Review Of The Recent Literature Shows Predominantly Positive Results. Health Aff. 2011;30(3):464-71. doi: https://10.1377/hlthaff.2011.0178

10. Chaudhry B, Wang J, Wu S, et al. Systematic Review: Impact of Health Information Technology on Quality, Efficiency, and Costs of Medical Care. Ann Intern Med. 2006;144(10):742-52. doi: https://10.7326/0003-4819-144-10-200605160-00125

11. Black AD, Car J, Pagliari C, et al. The Impact of eHealth on the Quality and Safety of Health Care: A Systematic Overview. PLoS Med. 2011;8(1):e1000387. doi: https://10.1371/journal.pmed.1000387

12. Braithwaite J, Clay-Williams R, Taylor N, et al. Bending the quality curve. Int J Qual Health Care. 2020;32(Suppl 1):1-7. doi: https://10.1093/intqhc/mzz102

13. Alkhenizan A, Shaw C. Impact of Accreditation on the Quality of Healthcare Services: A Systematic Review of the Literature. Ann Saudi Med. 2011;31(4):407-16. doi: https://10.4103/0256-4947.83204

14. Kitson A, Marshall A, Bassett K, Zeitz K. What are the core elements of patient-centred care? A narrative review and synthesis of the literature from health policy, medicine and nursing. J Adv Nurs. 2013;69(1):4-15. doi: https://10.1111/j.1365-2648.2012.06064.x

15. Luxford K, Safran DG, Delbanco T. Promoting patient-centered care: a qualitative study of facilitators

and barriers in healthcare organizations with a reputation for improving the patient experience. Int J Qual Health Care. 2011;23(5):510-5. doi: https://10.1093/intqhc/mzr024

16. Jha AK, Larizgoitia I, Audera-Lopez C, et al. The global burden of unsafe medical care: analytic modelling of observational studies. BMJ Qual Saf. 2013;22(10):809-15. doi: https://10.1136/bmjqs-2012-001748

17. Ho PM, Bryson CL, Rumsfeld JS. Medication Adherence. Circulation. 2009;119(23):3028-35. doi: https://10.1161/CIRCULATIONAHA.108.768986

18. Classen DC, Resar R, Griffin F, et al. 'Global Trigger Tool' Shows That Adverse Events In Hospitals May Be Ten Times Greater Than Previously Measured. Health Aff. 2011;30(4):581-9. doi: https://10.1377/hlthaff.2011.0190

19. Singer S, Lin S, Falwell A, Gaba D, Baker L. Relationship of Safety Climate and Safety Performance in Hospitals. Health Serv Res. 2009;44(2 Pt 1):399-421. doi: https://10.1111/j.1475-6773.2008.00918.x

20. Murff HJ, FitzHenry F, Matheny ME, et al. Automated Identification of Postoperative Complications Within an Electronic Medical Record Using Natural Language Processing. JAMA. 2011;306(8):848-55. doi: https://10.1001/jama.2011.1204

21. Mardon RE, Khanna K, Sorra J, Dyer N, Famolaro T. Exploring Relationships Between Hospital Patient Safety Culture and Adverse Events. J Patient Saf. 2010;6(4):226-32. doi: https://10.1097/PTS.0b013e3181fd1a00

22. Welp A, Meier LL, Manser T. Emotional exhaustion and workload predict clinician-rated and objective patient safety. Front Psychol. 2015;5:1573. doi: https://10.3389/fpsyg.2014.01573

23. Isaac T, Zaslavsky AM, Cleary PD, Landon BE. The Relationship between Patients' Perception of Care and Measures of Hospital Quality and Safety. Health Serv Res. 2010;45(4):1024-40. doi: https://10.1111/j.1475-6773.2010.01122.x

24. Versporten A, Bielicki J, Drapier N, Sharland M, Goossens H. The Worldwide Antibiotic Resistance and Prescribing in European Children (ARPEC) point prevalence survey: developing hospital-quality indicators of antibiotic prescribing for children. J Antimicrob Chemother. 2016;71(4):1106-17. doi: https://10.1093/jac/dkv418

25. Januel JM, Chen G, Ruffieux C, et al. Symptomatic In-Hospital Deep Vein Thrombosis and Pulmonary Embolism Following Hip and Knee Arthroplasty Among Patients Receiving Recommended Prophylaxis. JAMA. 2012;307(3):294-303. doi: https://10.1001/jama.2011.2029

26. Silber JH, Romano PS, Rosen AK, Wang Y, Even-Shoshan O, Volpp KG. Failure-to-rescue: comparing definitions to measure quality of care. Med Care. 2007;45(10):918-25. doi: https://10.1097/MLR.0b013e31812e01cc

27. Hanefeld J, Powell-Jackson T, Balabanova D. Understanding and measuring quality of care: dealing with

complexity. Bull World Health Organ. 2017;95(5):368-74. doi: https://10.2471/BLT.16.179309

28. Mainz J. Defining and classifying clinical indicators for quality improvement. Int J Qual Health Care. 2003;15(6):523-30. doi: https://10.1093/intqhc/mzg081

29. Bates DW, Saria S, Ohno-Machado L, Shah A, Escobar G. Big Data In Health Care: Using Analytics To Identify And Manage High-Risk And High-Cost Patients. Health Aff. 2014;33(7):1123-31. doi: https://10.1377/hlthaff.2014.0041

30. Romano PS, Mull HJ, Rivard PE, et al. Validity of Selected AHRQ Patient Safety Indicators Based on VA National Surgical Quality Improvement Program Data. Health Serv Res. 2009;44(1):182-204. doi: https://10.1111/j.1475-6773.2008.00905.x

31. Bratzler DW, Hunt DR. The Surgical Infection Prevention and Surgical Care Improvement Projects: National Initiatives to Improve Outcomes for Patients Having Surgery. Clin Infect Dis. 2006;43(3):322-30. doi: https://10.1086/505220

32. Ramanathan R, Leavell P, Wolfe LG, Duane TM. Agency for Healthcare Research and Quality patient safety indicators and mortality in surgical patients. Am Surg. 2014;80(8):801-4.

33. Chen J, Ou L, Hollis SJ. A systematic review of the impact of routine collection of patient reported outcome measures on patients, providers and health organisations in an oncologic setting. BMC Health Serv Res. 2013;13:211. doi: https://10.1186/1472-6963-13-211

34. Desai NR, Ross JS, Kwon JY, et al. Association Between Hospital Penalty Status Under the Hospital Readmission Reduction Program and Readmission Rates for Target and Nontarget Conditions. JAMA. 2016;316(24):2647-56. doi: https://10.1001/jama.2016.18533

35. Kaafarani HMA, Borzecki AM, Itani KMF, et al. Validity of Selected Patient Safety Indicators: Opportunities and Concerns. J Am Coll Surg. 2011;212(6):924-34. doi: https://10.1016/j.jamcollsurg.2010.07.007

36. Sousa P, Uva AS, Serranheira F, Uva MS, Nunes C. Patient and hospital characteristics that influence incidence of adverse events in acute public hospitals in Portugal: a retrospective cohort study. Int J Qual Health Care. 2018;30(2):132-7. doi: https://10.1093/intqhc/mzx190

37. Abbott P. Patient-centred health care for people with chronic skin conditions. Br J Dermatol. 2017;177(2):329-30. doi: https://10.1111/bjd.15709

38. Bates DW, Saria S, Ohno-Machado L, Shah A, Escobar G. Big Data In Health Care: Using Analytics To Identify And Manage High-Risk And High-Cost Patients. Health Aff. 2014;33(7):1123-31. doi: https://10.1377/hlthaff.2014.0041

FINANCING

No financing.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Nur Fadhilah Arifin, Buyung Nazeli, Rasmidar Samad.
Data curation: Nur Fadhilah Arifin.
Formal analysis: Nur Fadhilah Arifin, Fuad Husain Akbar, Syahrir A Pasinringi.
Research: Nur Fadhilah Arifin, Buyung Nazeli, Rasmidar Samad.
Methodology: Nur Fadhilah Arifin, Buyung Nazeli, Syahrir A Pasinringi.
Project management: Rasmidar Samad, Fuad Husain Akbar, Syahrir A Pasinringi.
Resources: Nur Fadhilah Arifin, Buyung Nazeli.
Software: Nur Fadhilah Arifin, Buyung Nazeli, Syahrir A Pasinringi.
Supervision: Buyung Nazeli, Rasmidar Samad, Fuad Husain Akbar, Syahrir A Pasinringi.
Validation: Buyung Nazeli, Rasmidar Samad, Fuad Husain Akbar, Syahrir A Pasinringi.
Display: Nur Fadhilah Arifin, Buyung Nazeli, Rasmidar Samad, Syahrir A Pasinringi.
Drafting - original draft: Nur Fadhilah Arifin.
Writing - proofreading and editing: Buyung Nazeli, Rasmidar Samad, Fuad Husain Akbar, Syahrir A Pasinringi.