



Mapping research trends in digital health technology for public services: a bibliometric analysis

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ABSTRACT

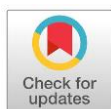
Purpose: to analyze global research trends, thematic developments, and collaborative networks in digital health technology applied to public services using a bibliometric approach.

Method: a bibliometric analysis was conducted using the PRISMA framework to systematically identify, screen, and analyze 34 relevant articles from Scopus published between 2017 and 2025, focusing on publication trends, subject areas, document types, country distribution, author collaborations, and thematic relationships in digital health technology for public services.

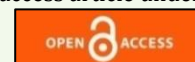
Findings: a significant upward trend in publications on digital health technology in public services, with Medicine as the dominant subject area, complemented by Social Sciences and Computer Science. Journal articles were the most common document type, while India and Finland were the leading contributors. Thematic and co-authorship analyses revealed strong interconnections between digitalization, healthcare, development, and population challenges, highlighting the interdisciplinary and global nature of research in this field.

Implications: successful digital transformation in public health services requires integrative strategies combining technological innovation, institutional readiness, policy support, and inclusive approaches to enhance efficiency, accessibility, and equity in healthcare delivery.

Originality: this study uniquely maps global research trends and collaborations in digital health technology for public services using a bibliometric approach.



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Introduction

In recent years, digital health technology has experienced rapid development and is increasingly being adopted in public services in various countries. The implementation of these technologies is expected to improve the quality of healthcare services, operational efficiency, and accessibility for the broader population. Digital platforms, including health applications, telemedicine, and electronic medical records,

have been shown to optimize service workflows and facilitate interaction between patients and healthcare providers (Calduch et al., 2021; Ferreira et al., 2025; Shen et al., 2021; Siddiqui et al., 2025; Zhai et al., 2023). These trends motivate this research, which aims to understand the extent to which digital health technology affects public health services. Smartphone-based technologies, in particular, can complement traditional communication channels, providing viable alternatives during service disruptions and promoting more equitable healthcare access (Gkintoni et al., 2025; Han et al., 2025; Junaid et al., 2022; Leshner et al., 2021). Ongoing digitalization initiatives in countries like Bangladesh have emerged as powerful catalysts for citizen security and economic development (Faruk, 2024). Additionally, digital health technologies are transforming user engagement in healthcare services, influencing both service delivery and patient interactions (Albulushi et al., 2024; Aldogher & Halim, 2025; Aytekin et al., 2025).

Despite the advantages of digital health technology, its adoption faces several challenges. The digital divide limits access for certain population segments, particularly in rural areas or regions with inadequate infrastructure. Privacy and data security concerns are also major obstacles in the implementation of these technologies (Abdulsalam & Hedabou, 2021; Prabowo et al., 2025; Rao & Deebak, 2023). Furthermore, overreliance on digital systems may reduce direct interactions between patients and healthcare providers, potentially impacting relationship quality and diagnostic accuracy. Previous studies have mainly examined technical aspects or the implementation of specific digital health technologies, such as telemedicine or electronic medical records, within hospitals or clinics (Barbieri et al., 2023; Borrelli et al., 2023; Nascimento et al., 2023; Wang et al., 2021). Other research highlights interdisciplinary collaboration and adherence to health service ethics standards (Shaha & Grace, 2023), as well as the development of learning applications and public sector digital services (Dmytryshyn et al., 2025). Studies have also identified digital access gaps among elderly populations in remote areas due to infrastructure limitations and insufficient digital literacy (Mwansa et al., 2025).

While previous research has addressed technical implementations, comprehensive studies mapping the use of digital health technology in public services, including policies, accessibility, and social challenges, are still limited. Moreover, bibliometric analyses examining global trends, collaborations, and research directions in this field are scarce. Therefore, a holistic understanding of the impact, challenges, and potential of digital health technologies in public service delivery remains underexplored. This study adopts a bibliometric approach to systematically map trends and developments in digital health technology applied to public services. By analyzing publications, citations, and author collaborations, this research provides broader, more structured insights into global developments and identifies underexplored areas. This approach also highlights emerging topics, such as the integration of cloud-based digital wallets and the digital health gap among elderly populations in remote regions (Singh et al., 2025).

This study aims to identify and analyze publication trends in digital health technology for public services, including annual publication and citation patterns. Determine the journals that publish the most research on digital health technology in public services. Identify the most contributing authors and map their collaboration networks. Examine the main subject areas and frequently appearing research topics in the literature. Categorize topic clusters and identify potential emerging topics with significant opportunities for further study, such as artificial intelligence integration in public health services or improving accessibility in remote areas. The urgency of this

study stems from the rapid advancement of digital health technologies and their profound impact on the quality of public health services. While telemedicine, electronic medical records, and health applications have been implemented in many countries, challenges such as the digital divide, infrastructure limitations, and data privacy issues persist. Addressing these challenges is essential to ensure equitable access and effective utilization of digital health services (Kaihlanen et al., 2022). Understanding how public policies and infrastructure can support or hinder technology adoption is critical for designing inclusive and sustainable healthcare systems.

Method

This study employed a bibliometric analysis using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure a systematic, transparent, and replicable literature selection process (Figure 1). The PRISMA approach was adopted to clearly document each stage of identification, screening, eligibility assessment, and final inclusion of articles. The literature search was conducted in major academic databases, focusing on publications from 2017 to 2025 to capture recent developments in digital health technology within the context of public services. The keywords used in the search process were “public service” and “health digitization,” which were applied to titles, abstracts, and keywords to ensure comprehensive coverage of relevant studies.

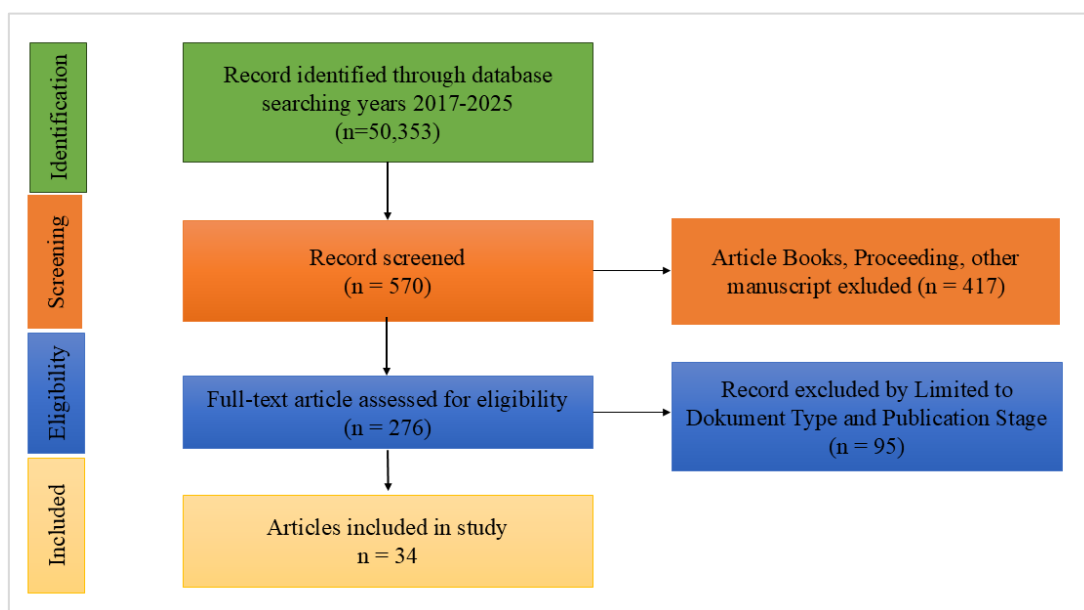


Figure 1 PRISMA method

At the identification stage, a total of 50,353 records were retrieved from the database search. These records were then subjected to a screening process based on title and abstract relevance to ensure alignment with the research theme. After this initial filtering, 570 articles were considered relevant for further evaluation. During this stage, 417 records were excluded because they consisted of books, proceedings, and other document types that were not consistent with the study’s focus on scholarly research articles.

Subsequently, 276 full-text articles were assessed for eligibility. The inclusion criteria required that the articles explicitly discuss the relationship between digital technology and public health services, including aspects such as implementation,

governance, accessibility, policy, or system development in the healthcare sector. Articles that focused solely on technical or clinical issues without connection to public service contexts, or those that did not meet the document type and publication requirements, were excluded. As a result, 95 articles were removed during the eligibility stage due to limitations related to document type and publication status.

After completing the eligibility assessment, 34 articles met all inclusion criteria and were included in the final analysis. These selected articles were further examined using bibliometric techniques to analyze annual publication trends, subject areas, document types, country distribution, author collaboration networks, and thematic relationships. The rigorous application of the PRISMA procedure ensures the credibility, transparency, and methodological rigor of this study, thereby strengthening the validity of the bibliometric findings regarding digital health technology in public services.

Results and discussion

Publication trends per year

In order to assess the trajectory and momentum of research development in this area, the annual distribution of publications is illustrated in Figure 2.

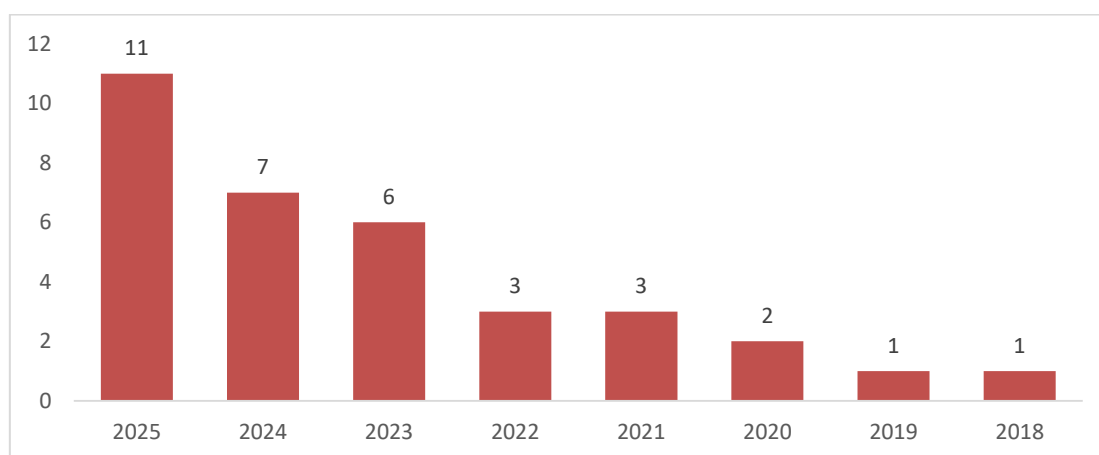


Figure 2 publication trends per year

Source: Scopus, 2026

As shown in Figure 2, the number of publications on digital health technology in public services shows a clear, consistent upward trend over the observed period. The data indicate a gradual increase beginning in 2019, followed by a more significant rise after 2020. Specifically, only one publication was recorded in 2018 and one in 2019, while the number increased slightly to two publications in 2020. This early phase reflects a relatively limited scholarly focus on the intersection between digitalization and public health services. However, a noticeable acceleration occurred starting in 2021, with three publications recorded in both 2021 and 2022. The growth continued in 2023 with six publications and further increased to seven in 2024. The highest number of publications was recorded in 2025, with eleven articles. This sharp increase indicates a growing academic interest and heightened research activity in this field.

The significant rise in publications after 2020 may be associated with the broader adoption of digital technologies in the post-pandemic era, where digital health solutions such as telemedicine, remote monitoring, and electronic health systems became essential components of public service delivery. The growing number of studies

suggests that digital health technology in public services has become a highly relevant and strategic research area. It reflects not only technological advancement but also the urgent need to address systemic challenges in healthcare accessibility, efficiency, and resilience. The upward trajectory shown in Figure 2 confirms that digitalization in public health services is gaining sustained scholarly attention. The consistent increase in annual publications highlights the growing recognition of digital health as a critical component in modernizing public service systems and responding to emerging healthcare demands.

Subject area

To understand the disciplinary distribution of research on digital health technology in public services, the subject areas of the selected publications were analyzed, as presented in Figure 3.

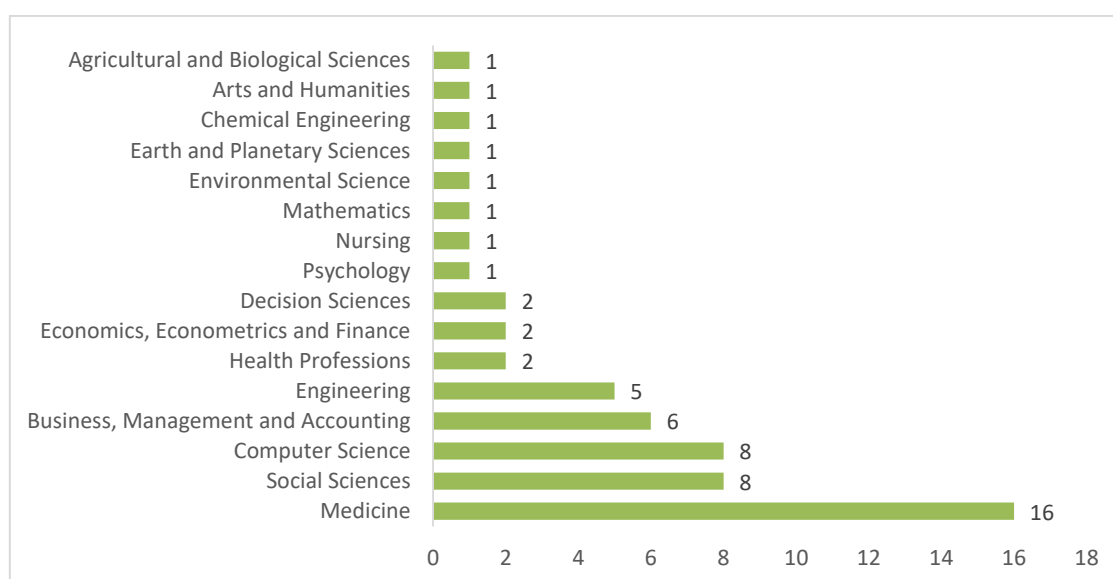


Figure 3 field of study
Source: Scopus, 2026

According to Figure 3, the dominant subject area is Medicine, with 16 publications. This finding indicates that digital health technology in public services is primarily rooted in the healthcare sector, where digital transformation directly influences service delivery models, including telemedicine, electronic medical records, digital diagnostics, and health information systems. The strong concentration in Medicine suggests that research in this field is largely application-oriented, focusing on improving healthcare efficiency, quality, and accessibility through technological innovation. In addition to Medicine, Social Sciences, and Computer Science, each contributes 8 publications, demonstrating the interdisciplinary nature of this research domain. The presence of Social Sciences highlights the importance of governance, policy frameworks, public administration, and societal impacts in the implementation of digital health systems. Meanwhile, Computer Science reflects the technical foundation of digital transformation, including system development, data management, cybersecurity, and artificial intelligence applications in healthcare services.

Furthermore, Business, Management, and Accounting account for 6 publications, indicating growing attention to managerial, organizational, and economic dimensions of digital health implementation. These studies often address strategic planning, resource

allocation, performance evaluation, and digital transformation management within public health institutions. Other contributing fields include Engineering (5 publications), Health Professions (2 publications), Decision Sciences (2 publications), and Economics, Econometrics, and Finance (2 publications), suggesting the involvement of technical optimization, professional practice, policy evaluation, and financial sustainability considerations. Additional subject areas, such as Agricultural and Biological Sciences, Arts and Humanities, Chemical Engineering, Earth and Planetary Sciences, Environmental Science, Mathematics, Nursing, and Psychology, each contribute one publication, reflecting the broader multidisciplinary reach of digital health research, even though their representation remains limited. The distribution of subject areas confirms that digital health technology in public services is inherently interdisciplinary. While the medical field remains the central driver, integrating technological, social, managerial, and economic perspectives underscores the complexity of digital transformation in public healthcare systems. This diversity of disciplines underscores the need for cross-sector collaboration to ensure effective and sustainable implementation of digital health innovations.

Type of document

To gain a comprehensive understanding of the scholarly output on digital health technology in public services, it is important to examine the distribution of document types. This classification provides insight into the predominant forms of academic contribution and the nature of knowledge dissemination within the field, as presented in Figure 4.

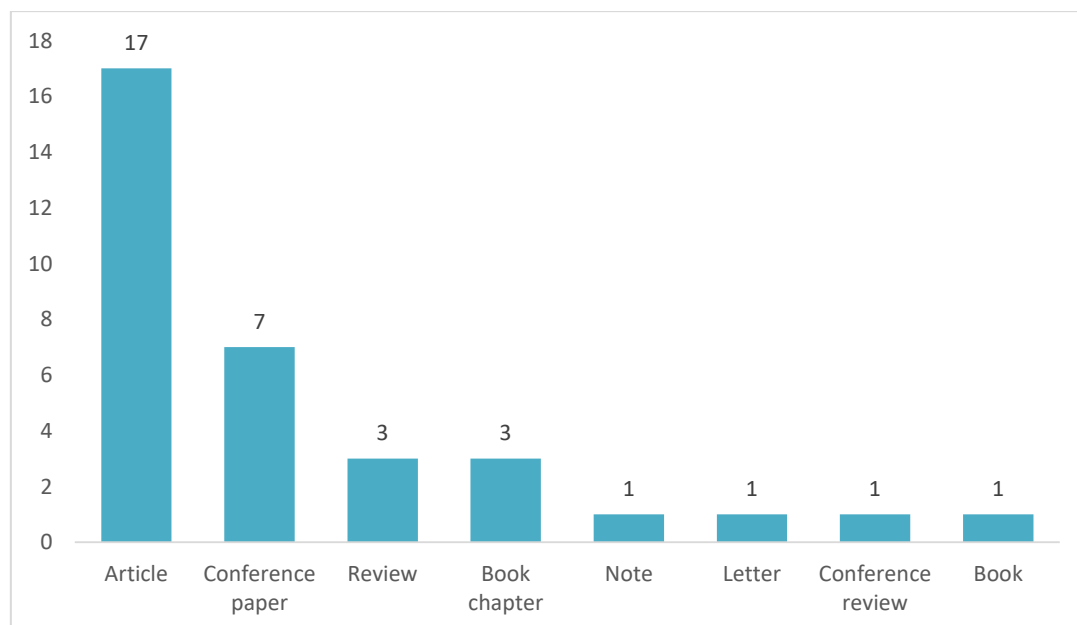


Figure 4 type of document

Source: Scopus, 2026

As illustrated in Figure 4, the most prevalent document type is the article, with 17 publications. This dominance suggests that research on the digitalization of public services, particularly in the health sector, is primarily communicated through full-length scholarly articles. Such articles typically present rigorous empirical studies, detailed methodological approaches, and comprehensive analyses. Consequently, they make

substantial contributions to understanding the implementation of digital technologies and their impact on public service delivery. The strength of these publications lies in their analytical depth, data-driven findings, and practical relevance. In addition to journal articles, 7 publications are categorized as conference papers. Conference papers generally report preliminary findings, innovative frameworks, or emerging research trends presented at academic conferences. Their presence indicates an active and evolving research landscape, where scholars disseminate current developments and engage in academic dialogue prior to formal journal publication.

Furthermore, the dataset includes 3 review articles and 3 book chapters. Review articles play a crucial role in synthesizing existing literature, identifying research trends, and highlighting theoretical or methodological gaps. Meanwhile, book chapters often provide thematic or conceptual discussions within edited volumes, offering broader contextual or interdisciplinary perspectives on digital health technologies in public services. Other document types, such as notes, letters, conference reviews, and books, each account for only one publication. The limited representation of these formats suggests that they play a relatively minor role in the overall body of research and may address more specific or specialized aspects of the topic. The distribution of document types demonstrates that the field is strongly grounded in empirical journal articles, supported by conference contributions and literature reviews that collectively enrich both theoretical development and practical application in digital health technology within public services.

Distribution of publications by country

To further understand the global landscape of research on digital health technology in public services, it is essential to analyze the geographical distribution of publications. Examining the country-wise distribution provides insight into which nations are most actively contributing to this field and highlights broader international research trends, as presented in Figure 5.

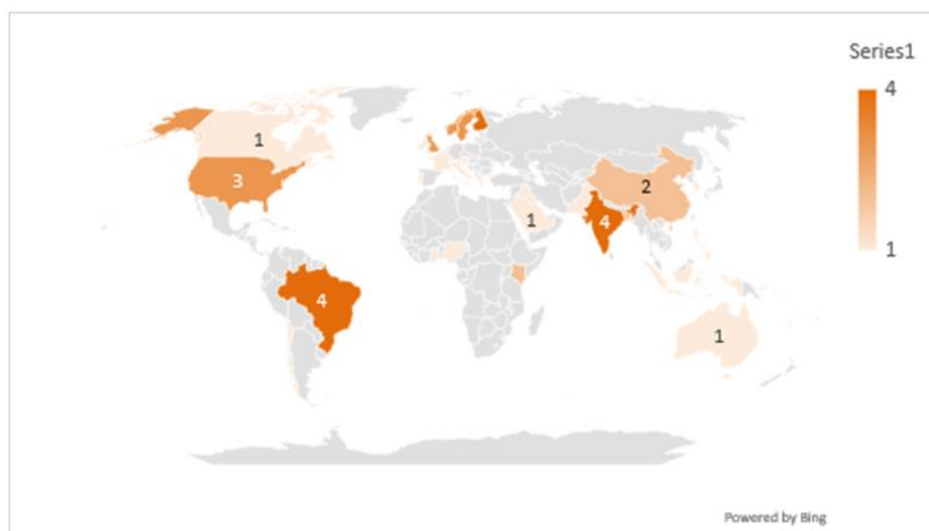


Figure 5 distribution of publications by country

Source: Scopus, 2026

As shown in Figure 5, the highest number of publications originates from India and Finland, each contributing 4 documents. This indicates that both countries play a prominent role in advancing research on digitalization and health technology within the

public service sector. Their contributions may reflect strong national initiatives, policy frameworks, or technological infrastructures that support digital health innovation. Several other countries demonstrate notable research activity. Brazil, the United States, the United Kingdom, and Sweden each account for 3 publications, suggesting a consistent and focused engagement with digital transformation in public health services. The presence of these countries, many of which possess well-established research ecosystems and advanced healthcare systems, underscores the strategic importance of digital technologies in strengthening public service delivery.

In addition, Kenya, China, Bangladesh, and South Korea each contribute 2 publications. Although their output is comparatively lower, these contributions indicate a growing commitment to exploring and implementing digital health solutions within diverse socio-economic and institutional contexts. This distribution highlights that interest in digital health technology is not confined to highly industrialized nations but is also evident in emerging and developing countries. Countries such as Portugal, the Philippines, and Nigeria each record 1 publication. While their contributions are limited in number, their inclusion demonstrates that research on digital health technology in public services is gaining attention across various regions of the world. The geographical distribution of publications reveals a broad international engagement with the topic. The data reflect a global trend toward the digital transformation of public health services, driven by contributions from both technologically advanced countries and emerging economies. This pattern suggests that digital health technology has become a shared global priority in efforts to enhance the efficiency, accessibility, and quality of public service systems.

The relationship between research themes

To better understand the conceptual structure of the study, network visualization was developed to map the relationships among the main research themes. Figure 6 illustrates the interconnections between digital health technology and public service research themes, based on bibliometric data extracted from Scopus. The visualization highlights how central concepts are linked and how they collectively shape the discourse on digitalization in public health services.

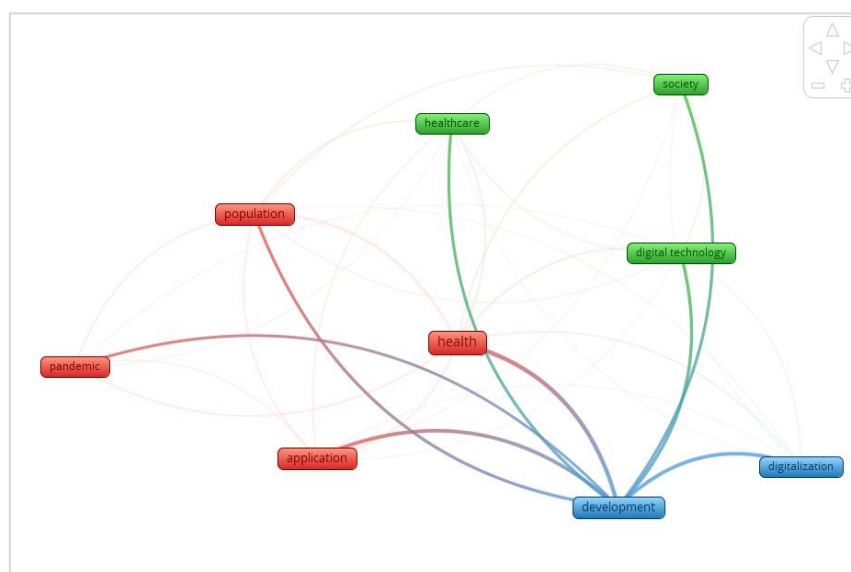


Figure 6 relationship between research themes

Source: Scopus, 2026

Based on Figure 6, a strong interrelationship can be observed among several key concepts that define this study, particularly digitalization in public health services. The concepts of health and healthcare are closely linked to digitalization and digital technology. This relationship indicates that the integration of digital technologies in healthcare systems significantly drives the transformation of public services. The adoption of digital solutions contributes to greater efficiency, improved accessibility, enhanced service delivery, and more effective health information management. Furthermore, development emerges as a central linking theme, bridging digitalization and healthcare. This suggests that technological advancement in public services is not a static process but requires continuous innovation, policy adaptation, infrastructure improvement, and capacity building. Sustainable development in digital health systems is therefore essential to ensure long-term improvements in service quality and system resilience.

The themes of population and pandemic are also closely connected to health and development. This reflects the increasing pressure on public health systems due to population growth and large-scale health crises. In particular, the COVID-19 pandemic has intensified the need for scalable, technology-driven solutions to maintain service continuity and expand healthcare capacity. Digital health technologies such as telemedicine, electronic health records, and data-driven monitoring systems have become critical instruments in responding to such emergencies. The figure demonstrates a complex and dynamic relationship between health, technology, population challenges, and development processes. It underscores that digitalization in public health services is not merely a technological shift, but a multidimensional transformation influenced by societal needs, demographic pressures, and global health crises.

Relationship between authors

To further examine the intellectual structure of research on digital health technology in public services, a co-authorship network analysis was conducted. This analysis aims to identify patterns of collaboration among scholars and to reveal the extent of interconnectivity among researchers in this field. Figure 7 presents the visualization of author relationships based on bibliometric data extracted from Scopus.

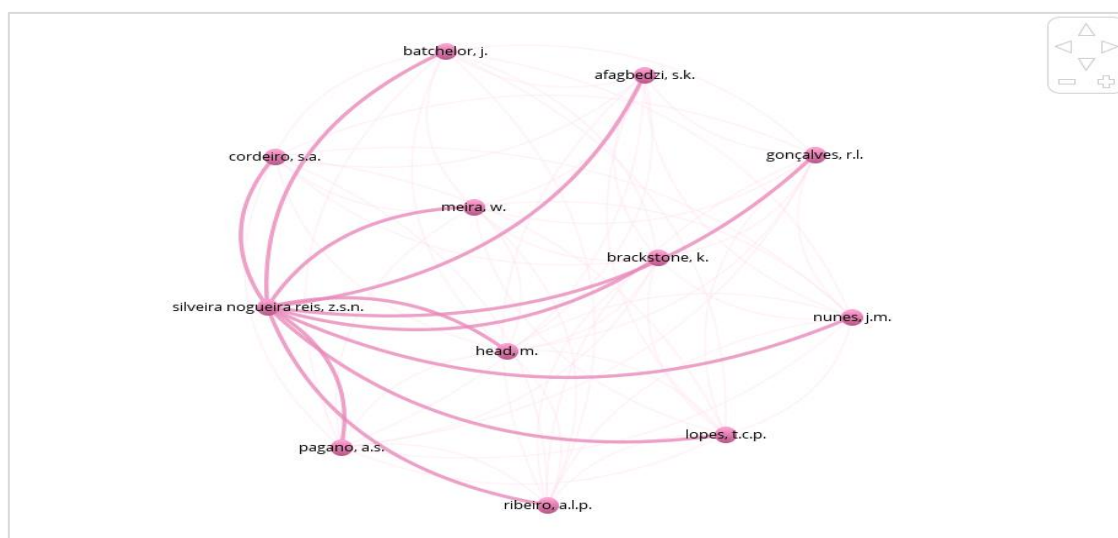


Figure 7 relationship between authors
Source: Scopus, 2026

Figure 7 illustrates the collaborative network among authors who have contributed to research on digitalization in public services, particularly within the health sector. In this network visualization, each node represents an individual author, while the connecting lines indicate co-authorship relationships or collaborative publications. The thickness and number of connections reflect the strength and frequency of collaboration between authors. Several authors, including Batchelor, J., Afagbedzi, S. K., and Gonçalves, R. L., appear to occupy more central positions within the network. The relatively thicker and more numerous links associated with these authors suggest stronger collaborative ties and more frequent joint publications. Their centrality indicates that they play a significant role in shaping the research discourse on digital health technology, particularly in studies related to system usability and healthcare service innovation.

Other authors, such as Cordeiro, S. A., Meira, W., and Silveira Nogueira-Reis, Z. S. N., are also part of the network, although their connections appear comparatively less dense. This suggests that while they contribute meaningfully to the field, their collaborations may be more limited in scope or concentrated within specific research groups. Such variations reflect the diverse patterns of academic collaboration, in which some researchers are embedded in highly interconnected teams, while others engage in more selective or independent partnerships. The co-authorship network demonstrates the existence of an active and evolving scientific community in the field of digital health and public service digitalization. Analyzing these relationships is essential for understanding how knowledge is produced, disseminated, and developed collaboratively. It also highlights the importance of scholarly networks in advancing innovation and strengthening research capacity in digital health technology.

Discussion

The findings of this study confirm that digitalization in public services, particularly in the health sector, has evolved into a strategically significant and rapidly expanding research domain. The growing scholarly attention to digital health reflects broader structural transformations in healthcare systems, where technological integration is no longer optional but essential for ensuring efficiency, accessibility, and resilience. The increasing adoption of digital tools, such as telemedicine platforms, electronic medical records, and integrated health information systems, demonstrates how digital transformation is reshaping service delivery models and administrative processes within public healthcare institutions. Digital health dashboards, for instance, enable policymakers and public administrators to communicate more effectively with citizens and to respond dynamically to public health challenges. As argued by Rashid et al. (2025), digital dashboards function not only as monitoring instruments but also as transformative tools that reshape public health service paradigms. Similarly, Narayan et al. (2025) emphasize that digital health technologies are instrumental in addressing geographical, epidemiological, and clinical disparities, thereby expanding healthcare reach beyond conventional institutional boundaries. These perspectives reinforce the argument that digitalization plays a critical role in mitigating structural inequalities within healthcare systems.

Nevertheless, implementing digital health solutions also presents operational and perceptual challenges. Aldekhyyel et al. (2021); Lin et al. (2024) observe that while telemedicine systems are generally perceived as user-friendly, further investigation is needed to understand the contextual factors that influence usability perceptions, including differences between public and private healthcare settings. This indicates that

technological effectiveness is not solely determined by system functionality but also by institutional environments and user readiness. In addition, Wang et al. (2021); Bevere & Faccilongo (2024); Varadarajan (2024) highlight the increasing proliferation of integrated and innovative online portals in healthcare, suggesting that digital expansion is accelerating. However, rapid digital growth necessitates continuous evaluation to ensure system coherence, interoperability, and equitable access. The relevance of this research theme is further reflected in governmental digital transformation initiatives. In the Indonesian context, programs such as the National Health Information System, telemedicine services, and the technology-supported National Health Insurance illustrate concrete efforts to modernize public healthcare delivery through digital integration. These initiatives demonstrate a policy-level commitment to improving service efficiency, data management, and nationwide accessibility. Such developments align with the broader global shift toward digitally enabled public service systems.

Despite these advancements, digital transformation in healthcare is not without unintended consequences. Fisk et al. (2023); Cheshmehzangi & Zou (2025) identify potential negative impacts, including reduced service access, increased inequality, uneven utilization patterns, and professionals' unpreparedness to adapt to digital demands. These findings suggest that technological implementation alone does not guarantee equitable outcomes. Similarly, Brommeyer et al. (2024); YahiaMarzouk (2025) underscores the managerial complexities of digitalizing health services, emphasizing the need for strategic governance frameworks. Agostino et al. (2022); Atobishi et al. (2024) further highlights the broader implications of digitalization in the public sector, particularly for institutional adaptation and accountability. These critical perspectives indicate that digital health transformation must be approached as a multidimensional reform process rather than a purely technological upgrade. Infrastructure disparities, especially between urban and rural regions, remain significant barriers to equitable implementation. Limited internet connectivity, insufficient digital literacy, and inadequate professional training hinder the optimal utilization of digital systems. Therefore, sustainable digital transformation requires not only technological investment but also capacity building, regulatory support, and inclusive policy design. This discussion demonstrates that digitalization in public health services represents a complex interplay between technological innovation, governance structures, institutional readiness, and societal conditions. While digital health technologies offer substantial opportunities to enhance efficiency, expand access, and strengthen system resilience, their success depends on coherent policy frameworks, infrastructural preparedness, and stakeholder adaptability. Consequently, future research and policy development should prioritize integrative strategies that balance innovation with inclusivity to ensure that digital transformation contributes to equitable and sustainable public healthcare systems.

Conclusions

The results and discussion collectively demonstrate that digital health technology in public services has emerged as a rapidly expanding, strategically important research domain characterized by growing scholarly attention, interdisciplinary engagement, and broad international participation. The upward trend in publications reflects the growing recognition of digitalization as a critical mechanism for enhancing efficiency, accessibility, and resilience in public healthcare systems, particularly in response to global health crises and demographic pressures. The thematic and collaborative analyses further indicate that interconnected dimensions of technology, governance,

development, and societal needs shape digital transformation in healthcare. At the same time, the discussion highlights that successful implementation extends beyond technological innovation and requires supportive policy frameworks, institutional readiness, infrastructure development, and professional capacity building. Therefore, digitalization in public health services should be understood as a multidimensional, ongoing reform process that demands integrative, inclusive, and sustainable strategies to ensure equitable, long-term improvements in healthcare delivery.

This study carries significant theoretical, practical, and policy implications. Theoretically, it confirms that digitalization in public health services is inherently interdisciplinary and requires integrative frameworks that combine technological innovation, governance structures, institutional capacity, and societal readiness to understand its impact fully. Practically, the findings emphasize the importance of organizational preparedness, user-centered system design, digital literacy development, and continuous evaluation to ensure that the adoption of digital health technologies effectively enhances service efficiency, accessibility, and quality. At the policy level, the study underscores the need for coherent regulatory frameworks, sustainable infrastructure investment, cybersecurity protection, and inclusive strategies to reduce digital inequality, particularly in underserved and rural areas. Overall, the research suggests that successful digital transformation in public healthcare must be approached as a comprehensive, systemic reform that aligns technological advancement with institutional strengthening and equitable service delivery.

This study has several limitations. First, the analysis relies solely on bibliometric data from a single database, Scopus, which may limit the dataset's comprehensiveness. Second, the study primarily focuses on quantitative bibliometric indicators, such as publication trends, subject areas, and co-authorship networks, without conducting an in-depth qualitative content analysis of the selected articles. Consequently, the findings emphasize structural and publication patterns rather than detailed thematic or empirical insights. Future research should expand the data sources to include multiple international databases to ensure broader coverage and comparative validation. Furthermore, future studies could incorporate a systematic literature review or qualitative content analysis to explore theoretical frameworks, methodological approaches, and empirical findings in greater depth. Combining bibliometric mapping with qualitative synthesis would provide a more comprehensive understanding of the development, challenges, and impact of digital health technologies in public services.

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