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Analysing Trends in the Healthcare Industry: Impact of Information Technology and Digitalisation on Healthcare Delivery

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Abstract

With the increasing integration of digital technologies in medical practice, healthcare providers, patients, and administrators are witnessing the evolution of traditional healthcare models into more dynamic, data-driven systems.

Aims: To evaluate the effect of information technology digitization on the delivery of medical services, such as the advantages and disadvantages that come with the use of digital healthcare solutions.

Study design: A bibliometric analysis was done between 1973 and 2025 using an extensive dataset of 2848 documents from the Scopus database.

Methodology: The publication analyses, citation analyses, co-authorship network, and keyword clusters were assessed using the bibliometric software VOSviewer (v.1.6.19) and Biblioshiny (R v.4.4.2).

Results: From the analysis of 1,168 sources spanning 1973 to 2025, the research focus is on health digitalization, where 2,848 documents were used. The dataset indicates an annual growth rate of 7.85%. The substantial scholarly impact is suggested through the mean document age of 6.93 years, which has 24.37 citations, on average, per document. There is a strong international research network demonstrated by an international collaboration of 21.38% and co-authorship of 6.35 authors per document. Publication trends indicate peaks

Keywords: telemedicine, digital health, e-health, m-health, ai, healthcare access, medical apps.

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in 2021 with 380 articles, followed by 2024 with 319 articles and 2022 with 293 articles. The documents that were cited the most 10 times focused on mHealth, telemedicine, and acceptance of technology, while the most cited paper was on mHealth adoption among the elders. It was published in 2017 and has 705 citations. Major contributors are the USA, China, and European countries, while the leading institutions in the co-authorship network include the University of Ottawa and Harvard Medical School.

Conclusion: The analysis highlights the significant growth in health digitalization research, with strong international collaboration and impactful contributions from leading institutions. mHealth, telemedicine, and technology acceptance dominate, with notable studies on mHealth adoption among elders.

Introduction

In the past couple of decades, the medical industry has experienced a major change, especially in IT and digital technology use. These technologies have changed how healthcare services are offered globally by making them better, easier, and faster [1]. With the digitalization of medicine, providers, patients, and management are experiencing the transformation from traditional healthcare systems to more sophisticated ones. The impact of these technological changes has been very important in reorganising healthcare institutions, providing medical services, and patient care [2,3].

The increasing reliance on information technologies and digitalization have arguably become necessary for meeting the health sector's needs. These strategies have automated many routine administrative tasks and lowered the barriers to communication as well as the speed and accuracy of the diagnosis [4,5]. Specifically, Information Technologies, like Artificial Intelligence, telemedicine, Electronic Health Records, Machine Learning, and cloud computing, have transformed patient records management, physicians' interactions with their clients, and decision-making. Consequently, medical services are now more centred on the patients than the illnesses, emphasising personalization, outcomes, and patient satisfaction as goals to achieve [6,7].

While the increased adoption of digital technologies brings new possibilities and difficulties within healthcare, the advantages of digitalization are better coordination of care, decreased medical errors, and improved treatment strategies. However, the negative implications involve concerns about data privacy, security risks, and technologically widening disparities in healthcare access among different regions and populations [8]. There are also worries stemming from the rapid technological advancements concerning training for healthcare professionals, change resistance to new technologies, and the responsible use of technology in clinical practice [9].

The digitization of healthcare systems has been marked by significant developments such as the implementation of telemedicine, the integration of Artificial Intelligence in diagnostics and treatment planning, and the digitization of medical records [10]. Telemedicine, for example, has increased access to healthcare services in the world's remotest and most underserved regions by allowing patients to remotely interact with healthcare professionals on virtual platforms. This has cut down the average number of in-person visits and lowered costs, thus increasing the affordability of healthcare services [11]. Furthermore, the introduction of HER has automated the patient documentation process, eliminating the use of paper files. As a result, healthcare services can be provided and received with speed, accuracy and convenience. In addition, EHR systems improve diagnosis, reduce mistakes, enable greater cooperation among many providers, and create better care [12].

Additionally, the swift rate of change is a challenge for healthcare workers. The medical professionals' workload is unavoidably affected by the need for skillset maintenance. With every new intervention comes an incessant need to 'teach the taught', which is a drain on resources. Moreover, the information systems and computer technologies in use are not embedded in the organizational structures, leading to employee resistance. Education and training for healthcare workers should be combined with measures aimed at facilitating work within the organizational frameworks [21]. Integrating information technology and digitalization has significantly transformed healthcare delivery, improving efficiency, accessibility, and patient-centred care. However, challenges persist, including data privacy concerns, healthcare access equity, and technology integration within the healthcare workforce. As the industry evolves, digitalization and IT will be vital in achieving better health outcomes, reducing costs, and fostering sustainable healthcare systems. The ongoing technological advancements promise substantial changes, and all stakeholders must collaborate, ensuring the effective use of these technologies while addressing the emerging challenges. The future of healthcare depends on overcoming these barriers while maximizing the benefits of digital transformation.

Research Problem

The use of telecommunications and IT in the healthcare sector has improved the delivery of medical services. Nevertheless, it has also created problems such as data information privacy, security risks, and inequality in healthcare services across different geographical regions. The proliferation of digital healthcare technologies such as telemedicine, AI, EHR, and big data analytics poses the challenge of enabling healthcare systems to reap the benefits of modern technology while safeguarding patient data and ensuring that all patients have appropriate access to the technologies. There is sparse literature on how these challenges relate to adopting and implementing digital healthcare approaches, especially in resource-poor environments, and how they affect healthcare outcomes in patients from different ethnic groups. This gap highlights the need for rigorous research on the challenges of digital transformation in healthcare.

Research Focus

This research focuses on the role of ICT and digitalization in the delivery of medical services, focusing on the pros and cons of using digitalized healthcare tools. This study will analyze the benefits these technologies offer, such as better healthcare services, improved health outcomes, greater access, and challenges, such as data privacy issues and the digital gap. This research will help understand how digital healthcare tools impact patient care in different regions and populations and how these impacts can be optimized.

Research Aim

To evaluate the consequences of the application of information technology and digitalization on medical service delivery, emphasising the positive and negative consequences of these technologies. The study will evaluate the extent to which computerised tools have changed the quality of healthcare services and how lower socioeconomic groups are likely to be left out of the benefits.

Research Questions:

1. Which notable patterns can be distinguished in IT employment in healthcare services?
2. What improvements have been identified in the delivery of health services due to the processes of digitalization, telemedicine, AI, and EHR systems use?
3. How do digital healthcare tools affect healthcare outcomes in regions and demographics?
4. What strategies can be developed to overcome the barriers to digital healthcare adoption and ensure equitable access to digital health solutions?

Research Methodology

General Background

The general background of this research explores the growing role of IT and digitalization in healthcare. Adopting digital tools like telemedicine, EHR, AI, and big data has revolutionized the medical industry, improving care delivery, accessibility, and efficiency. However, data privacy concerns, security risks, and healthcare disparities persist. This study aims to assess these impacts and propose strategies for overcoming these barriers.

Study design

A bibliometric analysis from 1973 to 2025.

Search Strategy

Figure 1 illustrates how the study was identified and screened for bibliometric analysis. Initially, 4435 records were extracted from the Scopus database with the keywords “telemedicine” OR “e-health” OR “medical informatics” OR “digital solutions” OR “innovative services” AND (“impact” OR “trends” OR “digitalization”) AND (“medical services” OR “healthcare services” OR “health services”). After applying inclusion criteria such as Articles only, English, and Final Versions, 2848 records were retained for further analysis. In the screening stage, 1587 records were removed because they did not satisfy the criteria. These 2848 studies formed the final dataset, which provided the basis for the bibliometric analysis and enabled a more detailed examination of the trends in medical industry digitalization and the effects of information technology on healthcare services.

Data Analysis

The data analysis for this study was conducted using VOSviewer (v.1.6.19) and Biblioshiny (R v.4.4.2). VOSviewer was used to visualize citation networks, co-authorship relationships and keyword clusters, enabling an exploration of the evolution of digital health research and global collaborations. Biblioshiny, an R-based tool, facilitated a comprehensive bibliometric analysis, extracting publication trends, citation impact, and keyword analysis over time. Both software tools provided valuable insights into the digital health field's growth, influence, and thematic shifts, highlighting key trends, influential authors, and collaborative networks.

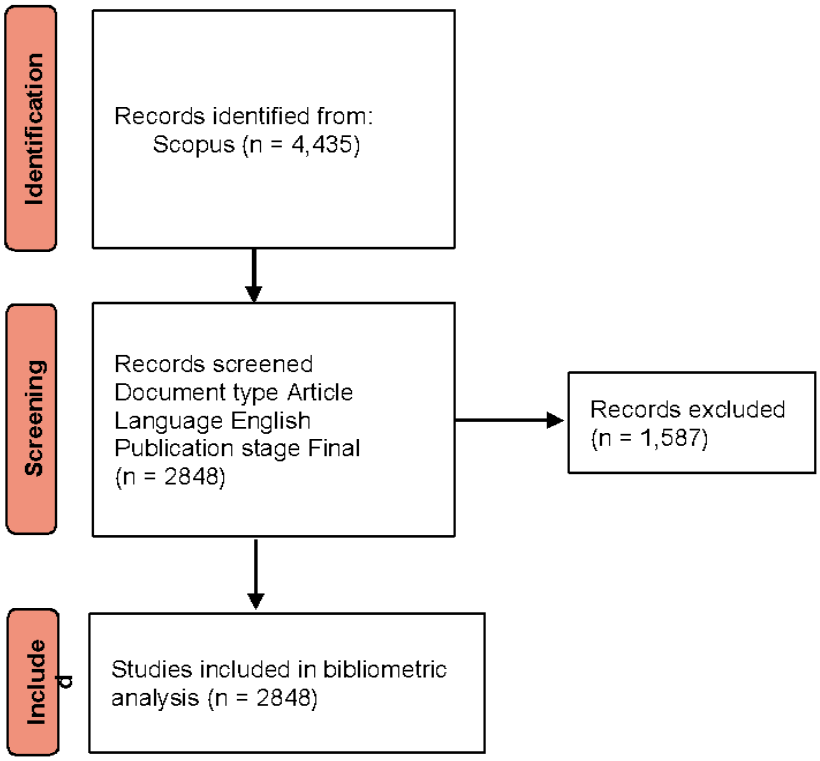

Figure 1. PRISMA flow diagram

Research Results

Figure 2 examines the dataset, revealing that it comprises 2848 documents from 1168 sources published over 52 years, from 1973 to 2025, with an average annual increase of 7.85%. This suggests an increasing attention to the effect of computerization and digitalization on the provision of medical services. The average document age of 6.93 years suggests relatively recent research, while an average of 24.37 citations per document reflects strong academic influence. With 96,434 references, the dataset demonstrates extensive scholarly engagement. The study includes 9,138 Keywords Plus and 5,414 Author's Keywords, highlighting a diverse thematic scope. Authorship data reveals 16,105 contributing authors, with only 162 single-authored papers, signifying high collaboration. A co-authorship rate of 6.35 authors per document and 21.38% international co-authorship suggest a well-connected global research network. Notably, all documents are journal articles, reinforcing the dominance of peer-reviewed publications in this field.

Figure 2. Overview of dataset

Figure 3 illustrates the publication trend over time, showing a significant rise in research on the impact of information technology and digitalization in medical services. The highest number of publications was recorded in 2021 (380 articles), followed by 2024 (319 articles) and 2022 (293 articles), reflecting a peak in recent years. Since 2015, annual publications have consistently exceeded 100, indicating a growing interest in digital healthcare advancements. A surge began in 2019 (164 articles), likely driven by increased adoption of telemedicine, artificial intelligence, and data-driven healthcare solutions. The decline in 2025 (51 articles) may be due to incomplete data collection. Before 2000, research activity was minimal, with sporadic publications, and no records exist between

1974 and 1993. This trend highlights how the field gained momentum over the last two decades, emphasizing the expanding role of digital transformation in medical services.

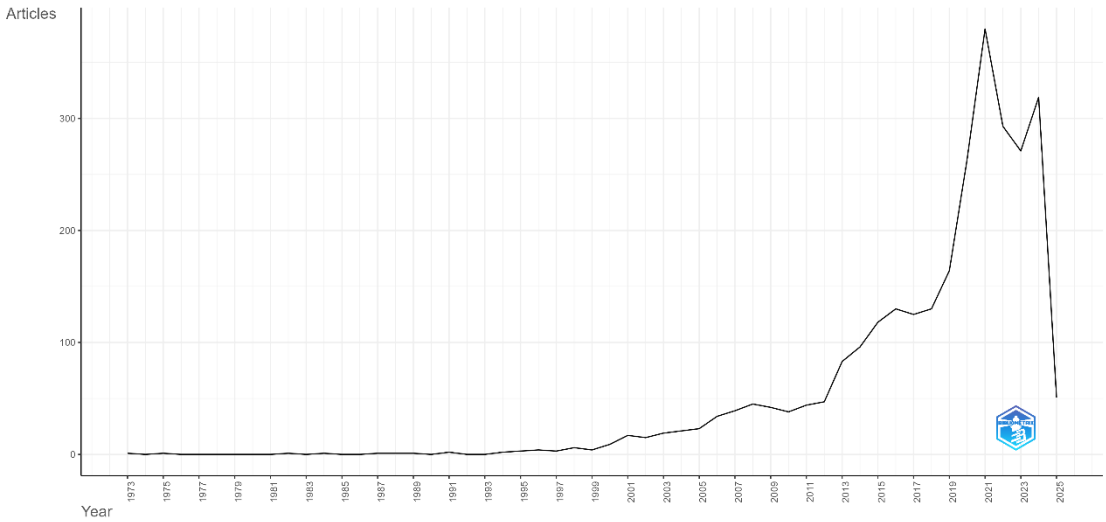

Figure 3. **Publication trend over time**

Figure 4 presents the average citations per year, highlighting the impact and longevity of research on the digitalization of medical services. The highest citation rates are observed for older publications, such as 1996 (116 citations per article) and 1982 (69 citations per article), likely due to their long citation years. More recent articles, such as 2020 (41.49 citations per article) and 2016 (42.08 citations per article), also show high impact, suggesting their relevance in shaping modern discussions. The mean citation per year is highest for 2020 (6.92 per year), reflecting strong ongoing influence. In contrast, 2024 and 2025 have low citations due to their recent publication. The fluctuating citation trends indicate that while older studies accumulate citations over time, recent publications with high relevance quickly gain attention.

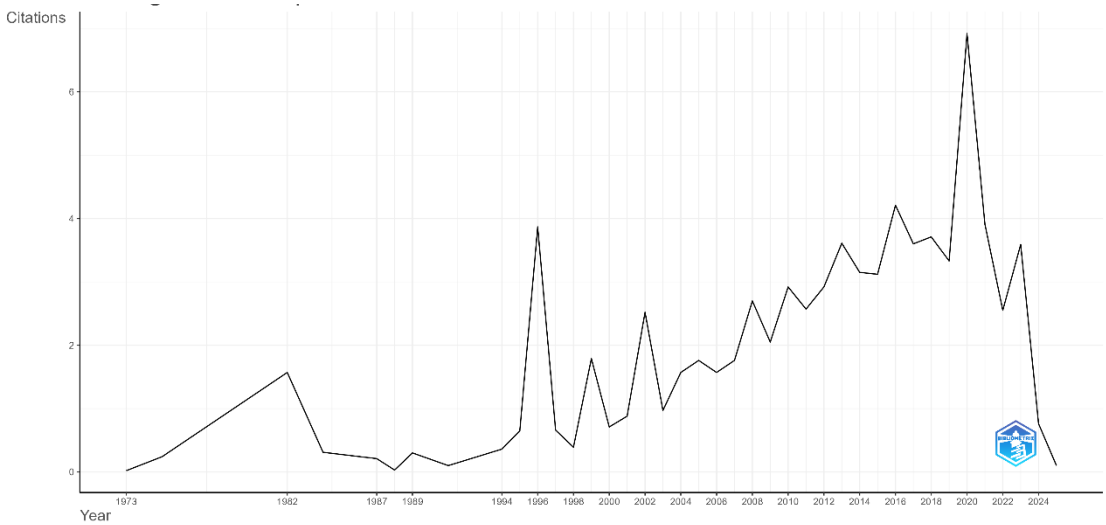

Figure 4. **Average citations per year**

Table 1 highlights the top 10 most cited documents, reflecting key research shaping digital transformation in medical services. The most cited paper, *Understanding Factors Influencing the Adoption of mHealth by the Elderly* (2017, 705 citations), emphasizes the role of the UTAUT model in mHealth adoption. Studies on telehealth and eHealth, such as *Behavioral Intervention Technologies* (2013, 510 citations) and *Effect of Telehealth on Secondary Care and Mortality* (2012, 471 citations), demonstrate the impact of digital interventions on healthcare outcomes.

Using VOSviewer for citation analysis, a minimum citation threshold of 5 was set. Out of 2,848 documents, 1,927 met this criterion, indicating that a significant portion of research has gained scholarly recognition. The high citation

counts for studies on mHealth, telehealth, and technology acceptance highlight the growing interest in digital healthcare solutions.

Table 1. Top 10 Most cited documents

Document	Year	Citations
Understanding factors influencing the adoption of mHealth by the elderly: An extension of the UTAUT model	2017	705
The healthcare cost and utilization project: an overview	2002	534
Behavioral Intervention Technologies: Evidence review and recommendations for future research in mental health	2013	510
Effect of telehealth on use of secondary care and mortality: Findings from the Whole System Demonstrator cluster randomised trial	2012	471
A telecommunications system for monitoring and counseling patients with hypertension impact on medication adherence and blood pressure control	1996	449
Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa	2014	427
Using a modified technology acceptance model in hospitals	2009	408
Analyzing older users' home telehealth services acceptance behavior-applying an Extended UTAUT model	2016	405
E-health technologies show promise in developing countries	2010	403
eHealth trends in Europe 2005-2007: A population-based survey	2008	364

Figure 5 presents the co-authorship network of countries, visualized using VOSviewer. The analysis was conducted with a minimum threshold of 5 documents and 5 citations per country, resulting in 65 out of 217 countries meeting the criteria. The United States is the most central and dominant node, indicating its strong research output and extensive collaborations in medical digitalization. Other major contributors include China, Canada, Germany, the United Kingdom, and Australia, reflecting their active role in advancing digital health technologies.

The network structure reveals distinct clusters representing regional and international research collaborations. European countries, including Germany, Spain, and Italy, form a dense co-authorship network, while China and other Asian countries exhibit strong linkages, particularly with Australia and Singapore. African countries such as South Africa, Nigeria, and Egypt also engage in international collaborations.

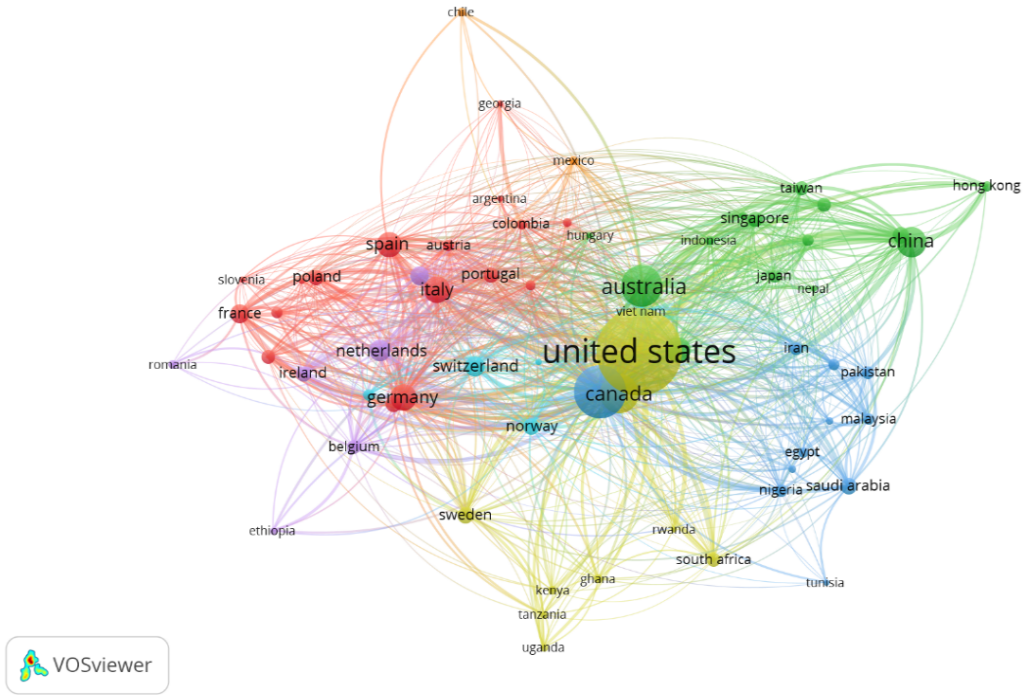

Figure 5. Co-authorship network of countries

Table 2 presents the co-authorship network of organizations, analyzed using VOSviewer with a minimum threshold of 5 documents and 5 citations per organization. Out of 10,518 organizations, only 13 met the threshold, indicating a concentrated group of highly collaborative institutions. The University of Ottawa dominates the network, with its Department of Family Medicine (10 documents, 295 citations, 12 link strength) and Department of Medicine

(10 documents, 307 citations, 14 link strength) playing a pivotal role in medical digitalization research. Harvard Medical School leads in citations (490 citations, 9 documents) but lacks strong co-authorship links. The RAND Corporation in Santa Monica (899 citations, 7 documents) and Arlington (829 citations, 6 documents) demonstrate significant research impact. The University of Toronto also emerges as a key contributor, with multiple affiliated institutions participating

Table 2. Co-authorship network of organizations

Organization	Documents	Citations	Total Link Strength
Department of family medicine, university of ottawa, canada	10	295	12
Department of medicine, university of ottawa, canada	10	307	14
Harvard medical school, boston, ma, US	9	490	0
Department of medicine, university of toronto, canada	8	252	14
Rand corporation, santa monica, ca, US	7	899	1
Ibis reproductive health, cambridge, ma, US	6	173	0
Institute of health policy, management and evaluation, dalla lana school of public health, University of toronto, canada	6	130	10
Rand corporation, arlington, va, US	6	829	1
C.T. lamont primary health care research centre, bruyère research institute, ottawa, on, Canada	5	126	11
Dalla lana school of public health, university of toronto, canada	5	44	1

Figure 6 illustrates the temporal analysis of the author's keywords generated using VOSviewer. A minimum occurrence threshold of 5 was applied, resulting in 354 out of 5,418 keywords meeting the criteria. These keywords were grouped into 14 clusters, forming 4,732 links with significant total link strength.

The most frequently occurring keywords include "telemedicine," "telehealth," "digital health," "e-health," and "mental health", reflecting dominant themes in medical digitalization research. The prominence of terms such as "primary health care," "coronavirus," "mental health services," and "telepsychiatry" indicates a strong focus on digital solutions for healthcare access and service delivery.

Clusters highlight specialized areas, such as mobile health (m-health), emergency medical services, and chronic disease management. Emerging topics like video consultation, AI-driven healthcare, and health disparities demonstrate the evolving landscape of digital health research.

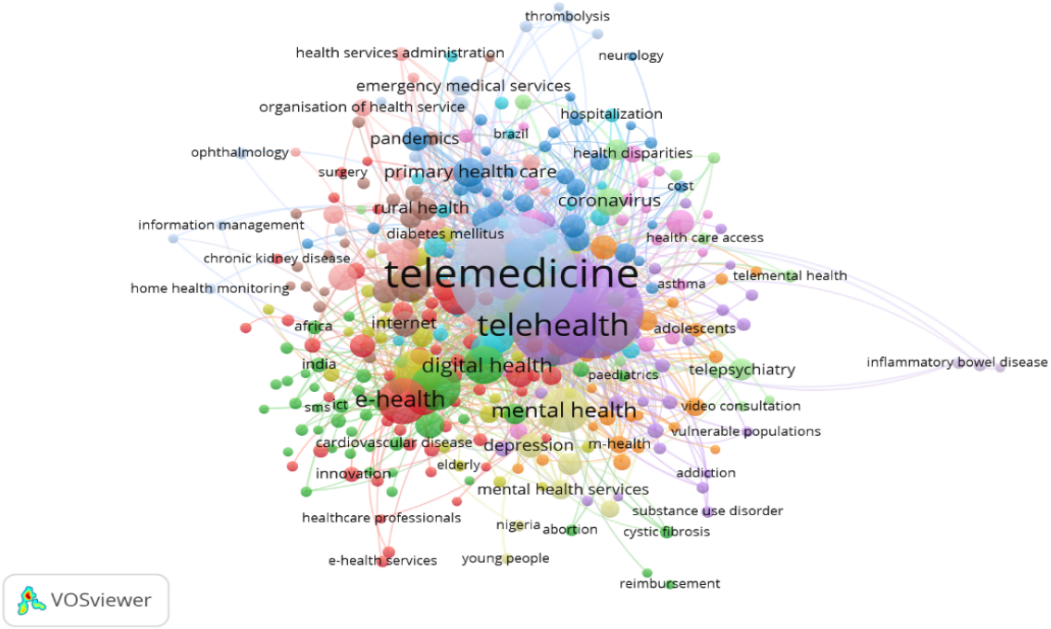

Figure 6. Temporal analysis of author's keywords

Figure 7 presents the top 10 most cited sources in the medical industry digitalisation bibliometric analysis. The Journal of Medical Internet Research (98 documents, 3,231 citations) leads in citations, reflecting its significant influence on digital health and telemedicine. Telemedicine and E-Health (123 documents, 2,782 citations) is the most prolific source, emphasising its key role in advancing telemedicine research.

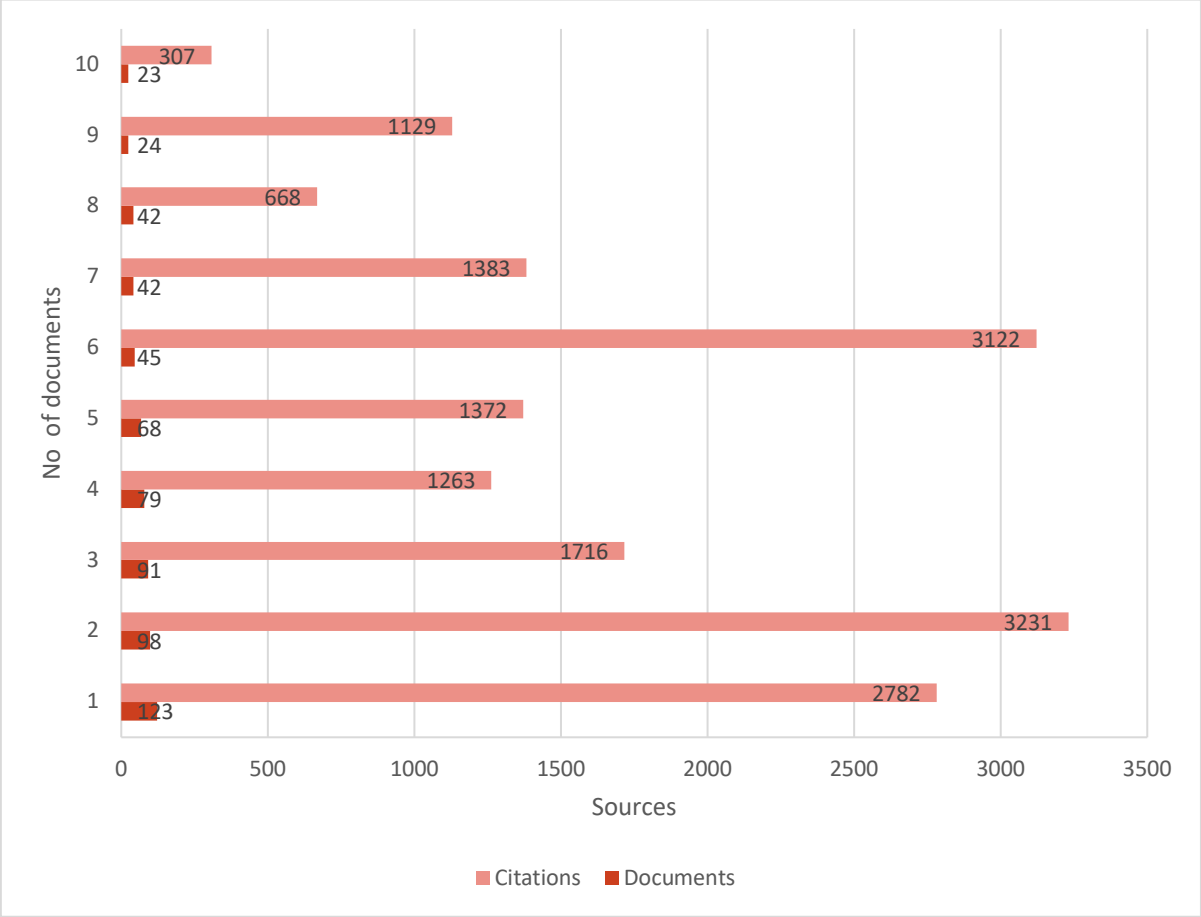

Figure 7. Top 10 most cited journals

Other high-impact journals include the International Journal of Medical Informatics (45 documents, 3,122 citations) and the Journal of Telemedicine and Telecare (42 documents, 1,383 citations), highlighting the growing importance of medical informatics and remote healthcare solutions. BMJ Open (79 documents, 1,263 citations) and BMC Health Services Research (68 documents, 1,372 citations) further contribute to the discourse on healthcare accessibility and digital transformation.

Discussion

The current study presents 2,848 documents published between 1973 and 2025, showing an increasing volume in the literature that examines the effect of information technology and digitalization in healthcare. The findings suggest an increasing emphasis on digital healthcare. This increase shows increasing scholarly attention and the likely effects of digitization on healthcare operations. Importantly, there is a notable degree of international cooperation evidenced by the dataset, especially in the published peer-reviewed journal article, which highlights the importance of this research area in the academic community and globally. The variety of keywords such as "digital health," "mobile health," and "telemedicine" describes the breadth of research conducted in this field. The process of digitalization in healthcare has changed conventional ways of doing business, the most notable being the EHRs. With the widespread adoption of EHRs, patient care has improved due to better availability of patients' information, fewer mistakes, and more effective clinical and administrative decision-making processes [22]. In addition to EHRs, Big Data and analytics are also being adopted into telehealth services.

Big Data enables predictive analytics, individualized treatment programs, and population health management. Merging big data analytics with EHRs leads to better healthcare choices being maximized and achieved at a higher level and improving and enhancing results [23]. The digital health market is expected to grow exponentially in the long term. From a value of $387.8 billion in 2025, the market is predicted to grow to a whopping $2.19 trillion by 2034. These growth rates are largely due to spending on emerging AI, big data analytics, and other digital tools. Such growth indicates a positive reception of digital technologies along with their potential to transform service

delivery in the healthcare sector [24]. The adoption of telehealth solutions, such as remote consultations and patient monitoring, has increased dramatically during the pandemic. It is predicted that telehealth will take a leading role in the overall healthcare market by 2037 due to its convenience, scalability, and effectiveness [25]. Digital health now encompasses a wide range of technologies. New telecommunications technologies have significantly advanced digital health and telemedicine. Nowadays, the digital health sphere includes a wide variety of innovations such as the analysis and application of Big Data, the IoT, full digitization of health records, wireless and mobile technologies like 5G, mobile AI, ML and deep learning, blockchain technology, and even wearable biosensors [26]. Together, these findings highlight the profound impact that information technology and digitalization have on the healthcare sector, shaping its future and offering unprecedented opportunities for improvement in patient care and healthcare delivery.

The publication trend indicates a sharp rise in research output, especially since 2015, with notable peaks in 2021, 2022, and 2024. This surge reflects the rapid adoption of digital health technologies, like telemedicine and AI, driven by technological advancements and societal needs, particularly after 2019. Digital transformation in healthcare is expanding globally, focusing on improving accessibility, efficiency, and personalized patient care. Health systems invest heavily in digital platforms, electronic medical records, and AI to improve efficiency and patient outcomes. By 2025, over 90% of C-suite executives expect increased use of digital technologies in healthcare [27]. The COVID-19 pandemic accelerated the adoption of digital health, particularly telemedicine [28]. Advances in AI, IoT, and cloud computing have enabled more sophisticated healthcare solutions, such as predictive analytics and personalized medicine [29]. Research also identifies the growing potential of telemedicine in countries like China and guides future developments and collaborations [30]. Additionally, digital health innovations are revolutionizing healthcare and biomedical science, creating new tools for a healthier future [31]

Citation analysis reveals both older and recent research exerts strong academic influence. Studies from the 1990s and early 2000s continue accumulating citations, highlighting their lasting impact, while newer articles, particularly from 2016 and 2020, show high citation rates, indicating their role in shaping contemporary digital health discussions. This reflects the field's rapid evolution, with newer publications quickly gaining academic recognition. Reviews highlight health literacy, telemedicine, and social impact, with recent studies focusing on technology acceptance, mobile health and telemedicine [32,33]. Bibliometric analyses indicate significant contributions from countries like the USA, Germany, and China [34]. The JMIR leads the field, emphasizing digital health literacy's potential to improve health outcomes and reduce health inequalities. Additionally, studies show that Health Information Technology improves patient safety by reducing medication errors and adverse drug reactions through technologies like EMRs, CPOE, and CDS [35].

The most cited documents emphasize influential research on adopting mHealth, telehealth, and digital health. A key 2017 study on mHealth adoption among the elderly highlights the growing impact of digital interventions in healthcare, particularly in underserved populations. These highly-cited studies underscore the recognition of digital technologies in improving healthcare access. Older adults can benefit from mHealth services for managing chronic diseases and self-care, though adoption was modest before the COVID-19 pandemic. Factors like perceived usefulness, ease of use, social influence, and service quality affect mHealth adoption [36]. The concept of digital transformation (DX) in healthcare is reshaping medical services by improving accessibility, efficiency, and personalization. This transformation addresses administrative challenges, reduces costs, and boosts operational efficiency, with projections suggesting savings of up to $360 billion in healthcare spending from AI and machine learning [37]. Despite the benefits, barriers to mHealth adoption include technological, social, and organizational factors, with strategies focusing on usability, interoperability, and ongoing technical support [38,39]. The telehealth market is expected to reach €161 billion by 2026, driven by increased accessibility and the integration of AI, wearable devices, and EHRs for more proactive and personalized care [40]. Co-authorship analysis reveals significant international collaboration, with the United States as a central player in digital health research, alongside active contributions from China, Canada, Germany, the UK, and Australia. Strong collaborations are also observed within Europe, Asia, and Africa, reflecting the global importance of medical digitalization. A study of the top 60 countries with the highest scientific publications (2011-2015) reveals that over 95% of publications come from these nations, with the USA, China, and European countries leading collaborations [41]. The co-authorship network in network science, covering 31,763 papers and 56,646 researchers, highlights major collaborations and central authors, including those linking diverse groups and communities [42]. A study found that 10.29% of papers were single-authored, while 89.71% were multi-authored. The top-ranking author, with the highest degree of betweenness centrality, played a key role in connecting other authors and groups. Malaysia, Nigeria, and India were also significant players in the network [43]. Research on medical images from 2001-2010 reveals low co-authorship network coherence, though increased author collaboration during this decade was evident.[44]. Furthermore, computational psychopathology research (2000-2022) shows growth in network centrality and topic modelling insights but lacks collaboration between computer scientists and domain experts [45]. Organizational co-authorship analysis reveals that a small group of institutions, including the University of Ottawa, Harvard Medical School, RAND Corporation, and the University of Toronto, are at the forefront of research in medical digitalization. These institutions play key roles in advancing digital health solutions, underscoring the importance of institutional collaboration. Studies such

as "Patterns of collaboration and knowledge generated by an Australian rural research centre" show increased co-author networks and focus on Aboriginal health, strengthening rural health research [46]. The "Co-Authorship Network Analysis of Prevention Research Centres" finds low network density but identifies key figures who enhance collaboration and public health research impact [47]. Another study, "Can co-authorship networks predict author research impact?" shows a strong correlation between collaboration and research visibility in Degenerative Cervical Myelopathy [48]. "Collaborative patterns, authorship practices, and scientific success" suggests that while collaboration aids success, excessive co-authorship may harm it [49]. The emphasis on institutional leadership reflects the growing role of collaborations in healthcare digitalization, especially in AI, IoT, and telemedicine [50]. The Ottawa Hospital is advancing remote care with tools like Dragon Ambient eXperience (DAX) Copilot to reduce physician burnout and improve patient communication [51]. In conclusion, institutional collaboration is crucial in advancing medical digitalization and improving healthcare delivery. As digital health technologies evolve, partnerships between key institutions will remain essential to driving innovation and addressing global health challenges.

A temporal analysis of authors' keywords reveals a growing focus on telemedicine, telehealth, and digital health, with emerging topics like AI-driven healthcare and video consultations gaining attention. Keywords related to mental health services and the coronavirus highlight digital health's responsiveness to public health crises. This dynamic research landscape reflects evolving areas of interest, including chronic disease management and remote healthcare delivery, fueled by technological advancements. The systematic review identifies five key themes: challenges and benefits, integration in diagnosis and monitoring, future considerations, AI's role in early diagnosis, and potential innovations. It emphasizes AI's diagnostic potential and telemedicine's role in improving healthcare access in underserved areas [52]. In the study, the author analyzes the merging of these technologies and their impact on enhancing the effectiveness of diagnostics treatment planning and predictive analytics on health outcomes, while discussing problems such as data privacy and security or appropriate legal frameworks [53]. The progression of AI in medicine- from healthcare in the 1960s to present-day uses – increases the accessibility of care, but issues concerning privacy and ethics must be considered [54].

Additionally, AI is shifting the paradigm in disease monitoring by facilitating remote monitoring and personalization of care, with the expectation that patient outcomes will improve [55]. This review also reflects on the emergence of telemedicine, largely fuelled by new technologies, and its impact on the accessibility and sustainability of healthcare services [56]. The advancements in digital health technologies are bound to significantly alter how healthcare services are accessed, provided, and managed, with physicians and patients as the main focus. As this work continues, the degree to which such innovations can eliminate healthcare inequalities and improve outcomes among vulnerable populations is staggering.

The JMIR, Telemedicine, and E-Health are just a few of the 10 most cited sources in digital health research. This sector focuses on propagating new research on health technologies and health services. These journals have driven the debate on healthcare digitalization, where the citation rate represents its relevance to the field. The perpetuation of these sources indicates the increasing importance of medical informatics and telehealth services in contemporary healthcare systems. Using VOSviewer and Citespace to conduct a comprehensive bibliometric analysis on digital health literacy illustrates how the US remains on the top regarding the number of publications and citations, attributing a large portion of the credit to the University of California System. The JMIR is a key source, and highly cited research focuses on health literacy definitions, its impact on health outcomes, and the digital divide, emphasizing digital health literacy's potential to reduce inequalities [57]. The 25th-anniversary bibliometric analysis of JMIR highlights a steady increase in publications and citations, particularly during the COVID-19 pandemic. Key themes include AI, patient empowerment, and victimization, with a call for more diverse research topics and increased contributions from developing countries [58].

Meanwhile, research in eHealth and mHealth, especially in physical activity and diet, has significantly increased, with Generation 2 technologies like smartphones and wearables driving growth [59]. The development of digital tools has advanced theories in digital health, eHealth, AI, telemedicine, and related technologies, providing sustainable benefits in improving patient experience and healthcare delivery [60]. These findings emphasize digital health research's ongoing evolution and impact, with increasing global interest and an expanding array of technologies reshaping healthcare delivery.

Limitations

Limiting the study to journal articles as the only data source may cause the study to overlook important findings from other research sources, including conference papers and technical reports. Further, the focus on specific regions for the research, such as the United States, may restrict the generalizability of the findings to other parts of the world. The drop in publications in 2025 may also reflect a lack of accurate data as opposed to an actual decrease in research activity, which could distort the analyses and the more general claims regarding the development of the field and its expansion.

Conclusions and Implications

This research demonstrates an increasing focus on digitalization in healthcare due to the marked increase in publications, citations, and international cooperation. The patterns suggest that several health technologies, such as AI, telemedicine and m-health, are increasingly appreciated for their ability to enhance the efficiency, accessibility and effectiveness of medical services. This new knowledge puts even greater demand on healthcare institutions and policymakers to invest and support the innovation of digital health technologies to overcome challenges like healthcare accessibility and provision.

The enhanced global collaboration noted in this research points to an emerging collective effort towards promoting digital health solutions. Active collaboration between countries will be essential in eliminating gaps in healthcare accessibility, especially within low and middle-income countries. With the advancement in digital health technologies, new possibilities for providing healthcare services in poorly serviced areas are being created, particularly through AI-enabled healthcare services and remote patient monitoring.

Moreover, the findings of the study point to the importance of adopting new digital health technologies in healthcare organizations. Although there are still issues like infrastructure and privacy data protection, the possibilities presented by new technologies are outstanding. As this field develops, further spending in research and infrastructure for digital health will be necessary to provide quality healthcare services to all people.

To synthesize the results of this study, there are significant shifts in the healthcare systems with the implementation of digital health technology. A developing literature seeks to underpin the need for continued advancement and partnerships, as well as funding of digital health tools.

Suggestions for Future Research

The study reveals significant advancements in the adoption of digital health technologies and their incorporation into healthcare systems worldwide. However, there are many areas where further research is needed to completely utilize these digital technologies. One area that needs more attention is measuring the use and effect of digital health technologies, especially AI, telemedicine, and m-health, in expanding access to healthcare services and improving the quality of care in low- and middle-income countries. It is important to figure out how these regions and populations can respond to these technologies to solve healthcare inequalities.

Further aspects concerning the evolution of infrastructure and privacy safeguards require additional effort. As promising as digital health technologies are, their data safety and privacy issues pose tremendous obstacles. There is a clear need for further investigation to devise effective ways to protect sensitive patient data while meeting legal requirements. Additionally, there is a need for research directed towards adopting digital health technologies in the current healthcare systems so that there is minimal friction and accompanied resistance by healthcare providers.

Moreover, future studies should concentrate on digital health technologies' cost efficiency and prolonged viability. This entails assessing the impact of mass adoption of these solutions, possible cost benefits, and their scalability to different healthcare systems. Further studies must also concentrate on other ways to capture the digital health ROI and its cost implications for health system delivery.

Ultimately, additional focus on research gaps about the ethical issues of digital health technologies, especially regarding decision-making by AI, patient consent, and equity, is required. These aspects will be vital in shaping the future of digital health.

Declarations

Author Contributions

Conceptualization, Serhii Riabkov and Neonila Korylchuk; methodology, Serhii Riabkov; software, Valery Kaminskyy; validation, Serhii Riabkov, Neonila Korylchuk and Rayisa Yuriy; formal analysis, Rayisa Yuriy; investigation, Serhii Riabkov and Tetiana Volosheniuk; data curation, Tetiana Volosheniuk; writing—original draft preparation, Serhii Riabkov and Rayisa Yuriy; writing—review and editing, Neonila Korylchuk and Tetiana Volosheniuk; visualization, Valery Kaminskyy; supervision, Neonila Korylchuk; project administration, Serhii Riabkov and Neonila Korylchuk; funding acquisition, Valery Kaminskyy. All authors have read and agreed to the published version of the manuscript.

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None

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