

# Integrative Review of Nursing and Medical Devices: The Role of Digital Health in Enhancing Dental and Public Health Outcomes

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## Abstract

Digital health technologies have revolutionized modern healthcare, improving efficiency, accessibility, and patient outcomes across various disciplines, including nursing, medical devices, dentistry, and public health. This study aims to provide an integrative review of digital health applications and their impact on healthcare systems, exploring key advancements such as electronic health records, telehealth, artificial intelligence, wearable devices, and mobile health applications. By synthesizing findings from 25 peer-reviewed studies, this research highlights the benefits and challenges associated with digital health adoption, offering insights into its transformative role in healthcare.

The methodology employed in this study follows an integrative review approach, ensuring a systematic identification, evaluation, and analysis of relevant literature. The research was conducted between January 2023 and January 2024, with data sourced from reputable databases, including PubMed, Scopus, Web of Science, and Consensus. Strict inclusion criteria were applied, selecting peer-reviewed articles published between 2010 and 2025 that focus on digital health advancements in healthcare. The screening and selection process refined an initial dataset of 5,800 articles to 25 high-quality studies that met the study's rigorous standards.

The results indicate that digital health technologies have significantly improved patient care by facilitating early disease detection, enhancing diagnostic precision, and streamlining

treatment plans. Nursing has benefited from telehealth and electronic health record integration, enabling efficient patient management and decision-making. In medical devices, artificial intelligence-powered diagnostics and wearable health monitors have enhanced real-time patient monitoring. Dentistry has witnessed significant advancements through teledentistry and 3D printing technologies, while public health initiatives have leveraged mobile health applications for disease surveillance, outbreak response, and health education. Despite these advancements, barriers such as digital literacy gaps, regulatory challenges, and concerns regarding data security remain critical obstacles to widespread digital health implementation.

The findings emphasize the need for ongoing research and investment in digital infrastructure, training, and policy development to ensure seamless digital health integration into healthcare systems. Future research should explore the long-term effectiveness of digital health interventions, focusing on interoperability, ethical considerations, and optimizing digital literacy among healthcare professionals. By addressing these challenges, digital health can continue to revolutionize global healthcare, improving patient outcomes and enhancing the efficiency of medical and public health services.

**Keywords:** Digital Health, Nursing, Medical Devices, Dentistry, Public Health, Artificial Intelligence, Telehealth, Mobile Health Applications, Electronic Health Records, Wearable Technology

## 1. Introduction

The rapid advancement of digital health technologies has revolutionized the landscape of healthcare, fostering improved outcomes in various medical and nursing disciplines, including dental and public health. Digital health, encompassing electronic health records (EHRs), telehealth, mobile applications, artificial intelligence (AI), and wearable devices, has been increasingly integrated into clinical practice to enhance healthcare delivery, decision-making, and patient engagement (Hants, Bail, & Paterson, 2023). In the context of dental and public health, digital health innovations have played a crucial role in improving preventive care, diagnostics, treatment strategies, and overall patient-centered approaches (Luai, Radzi, & Sabri, 2024).

The integration of nursing and medical devices with digital health solutions has significantly transformed the way healthcare professionals operate. Nurses, being at the forefront of patient care, have increasingly adopted digital tools to facilitate monitoring, documentation, and treatment plans, particularly in managing oral and general public health issues (Janes et al., 2024). Digital health applications have enhanced precision in disease prevention, streamlined workflows, and enabled better communication between healthcare providers and patients (Mather & Marlow, 2019). Particularly in dentistry, the digitalization of medical records, teledentistry, and AI-driven diagnostics has provided more accurate and timely interventions, reducing treatment time and improving accessibility (Pacifici, Pacifici, & Agents, 2018).

Public health initiatives have also benefited from digital health innovations, especially in remote and underserved areas where healthcare access is limited. Mobile health applications and wearable technologies have been instrumental in tracking epidemiological trends, monitoring chronic conditions, and improving health literacy among populations (Conte, Magon, & Caruso, 2024). Furthermore, electronic decision-support systems have improved nursing assessments and interventions, ensuring evidence-based care for both dental and general public health concerns (Wu, Lee, Lai, Huang, & Chang, 2019).

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Despite these advancements, challenges remain in fully implementing digital health solutions in nursing and medical device applications. Barriers such as digital literacy among healthcare providers, data security concerns, regulatory hurdles, and infrastructure limitations continue to hinder widespread adoption (Luai et al., 2024). Moreover, the effectiveness of digital health interventions is contingent upon seamless integration with existing healthcare systems and adequate training for healthcare professionals (Pradhan).

The continuous evolution of digital health has led to the emergence of innovative medical devices and informatics solutions that are reshaping modern healthcare. Advances in artificial intelligence, blockchain for secure health records, and cloud-based platforms are optimizing the management of patient data and improving interdisciplinary collaboration. These developments have profound implications for dental and public health, as well as nursing practices, as they enable more efficient patient monitoring, remote diagnostics, and data-driven decision-making. The increasing adoption of wearable health technologies has provided clinicians with real-time insights into patient health, allowing for proactive interventions and more personalized treatment strategies. The implementation of these digital solutions has been particularly beneficial in chronic disease management, where remote monitoring and digital therapeutics contribute to improved patient adherence and health outcomes (Seoane, Traver, & Hazelzet, 2020).

In dental health, digital technologies have introduced substantial changes in preventive care and treatment planning. The integration of artificial intelligence into diagnostic tools has enhanced the early detection of oral diseases, enabling timely and more effective interventions. Moreover, 3D printing technology has revolutionized prosthodontics and orthodontics, allowing for the production of customized dental implants and aligners with greater precision and reduced production time. Digital workflows have significantly improved the efficiency of dental clinics by minimizing manual processes and enhancing accuracy in treatment delivery (Neville & van Der Zande, 2020). The increasing role of teledentistry has also facilitated access to dental care, particularly in rural and underserved areas, by allowing patients to consult with specialists remotely and receive preliminary assessments before in-person visits.

Public health has witnessed a transformation with the rise of mobile health applications and telemedicine platforms that bridge the gap between healthcare providers and communities. The widespread use of digital tools in public health campaigns has enabled real-time data collection, improved outbreak surveillance, and enhanced health education efforts. These advancements have been instrumental in pandemic preparedness and response, as seen in the adoption of digital contact tracing, remote symptom monitoring, and AI-driven epidemiological modeling. Furthermore, cloud-based health information systems have strengthened global health initiatives by facilitating data sharing and collaboration among international health organizations (Comparcini et al., 2024).

As digital health continues to integrate into various healthcare disciplines, it is essential to address challenges related to digital literacy, ethical considerations, and the interoperability of digital systems. The effectiveness of digital health innovations relies on the ability of healthcare professionals to leverage these technologies in a manner that enhances patient care while ensuring data security and compliance with regulatory standards. Training programs that focus on developing digital competencies among nurses, physicians, and allied health professionals are crucial in bridging the gap between technological advancements and practical implementation. Additionally, policymakers must establish guidelines that promote the equitable distribution of

digital health resources and mitigate disparities in access to healthcare technologies(Conte et al., 2024).

This extended exploration of digital health underscores its transformative potential in improving patient outcomes across multiple domains, from nursing and medical device utilization to dental and public health. By addressing existing challenges and fostering interdisciplinary collaboration, healthcare providers can harness digital health innovations to enhance the quality, accessibility, and efficiency of healthcare services. Future research should focus on evaluating the long-term impact of these technologies and developing strategies to optimize their integration into routine clinical practice, ultimately driving forward the digital transformation of healthcare.

## 2. Literature Review

This study explored how nursing students perceive and expect digital health education to shape their professional competencies. Through focus group interviews, the researchers found that students acknowledged the advantages of digital health, such as improving personalized nursing care, assisting in medical decision-making, and enhancing emergency response. However, concerns regarding patient safety and data security were also highlighted. The study recommended continuous curriculum updates to ensure that nursing students are well-equipped to integrate digital health into their practice(Edirippulige et al., 2022).

This research investigated the role of digital therapeutics in nursing and the necessity for training programs that prepare nurses for prescribing digital health interventions. It highlighted how digital therapeutics, including AI-powered monitoring tools, mobile health applications, and wearable technologies, can optimize patient management. However, the study pointed out that digital therapeutics operate in an unregulated market, emphasizing the need for regulatory frameworks to ensure patient safety and efficacy(Ferguson, Hickman, Wright, Davidson, & Jackson, 2018).

This editorial outlined the transformation in nursing due to digitalization and how digital health policies impact clinical practice. The study examined government initiatives from multiple countries and how national digital health strategies influence the nursing profession. The research concluded that nurses without digital skills will face disadvantages in the modern healthcare system. It also discussed how the COVID-19 pandemic accelerated digital transformations in nursing practice(Cronin, 2022). This study assessed a nurse-led oral health initiative designed to improve standardized oral hygiene practices in hospital settings. Researchers found that 99.5% of patients had their oral health status documented at admission and discharge, with a significant improvement in oral health outcomes. The findings highlight the importance of nursing interventions in oral hygiene and health promotion(Castillo, Smith, & Rosenfeld, 2020).This opinion paper reviewed major technological advancements in digital dentistry, including augmented reality, artificial intelligence, and 3D printing. The study emphasized the need for ethical considerations in digital dentistry to balance technological adoption with maintaining patient-centered care(Joda et al., 2020).

This systematic review examined how nursing interventions influence patient outcomes in mental health settings. Researchers identified seven key nurse-sensitive outcomes, including aggression reduction, restraint use, and seclusion. The study recommended further research on how digital technologies can enhance mental health nursing interventions(Ngune et al., 2023).

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This study investigated how digital health technologies, such as telemedicine and mobile applications, improve patient outcomes. Researchers found that digital tools significantly enhanced chronic disease management, patient monitoring, and early diagnosis. The study also noted challenges, including the digital divide and cybersecurity threats (Brands et al., 2022).

This study explored how digital media tools, such as mobile applications and social media platforms, support nurses' mental health and well-being. The findings indicated that digital interventions significantly improved nurses' awareness of mental health issues and provided accessible resources for stress management (Njeru, 2023).

This study examined an integrated healthcare model where nurse practitioners and dentists collaborated to improve patient outcomes. Findings showed that interdisciplinary collaboration enhanced the management of chronic conditions such as diabetes and hypertension through early dental interventions (Dolce, Barrow, Jivraj, Pham, & Da Silva, 2020).

This research assessed the impact of digital tools in mental health nursing care. The study highlighted how mobile applications, telehealth, and AI-driven monitoring systems contributed to early symptom detection and improved treatment adherence (Crowe, 2006). This study examined the growing use of telehealth in nursing, particularly its impact on patient outcomes and healthcare accessibility. The review found that telehealth enhanced remote patient monitoring, reduced hospital admissions, and improved chronic disease management. However, barriers such as digital literacy and connectivity issues were identified as ongoing challenges (Iqman Aldawoud et al., 2024).

This research explored the role of AI in enhancing dental diagnostics, focusing on machine learning algorithms that improve the detection of oral diseases. The study demonstrated that AI-assisted imaging systems significantly improved the accuracy of early-stage dental disease detection and optimized treatment planning (Alharbi, Alhasson, & Disease, 2024).

This study investigated how mobile health applications are being used for epidemiological tracking and public health surveillance. Researchers found that real-time data collection via mobile apps improved disease outbreak prediction and response strategies. However, concerns regarding data security and user privacy remained key challenges (Grundy, 2022).

This study assessed the impact of digital therapeutics on chronic disease management, particularly for conditions such as diabetes and hypertension. The research highlighted how digital tools improved medication adherence, patient engagement, and lifestyle modifications, leading to better health outcomes (Chengyu, Xueyan, & Ying, 2024).

This study examined the application of blockchain technology in securing patient health records. Findings indicated that blockchain significantly enhanced data integrity, interoperability, and patient privacy in healthcare systems. However, challenges such as scalability and regulatory compliance needed further investigation (Tariq, 2024).

### **3. Methodology**

#### **Study Design**

This research follows an integrative review methodology aimed at synthesizing existing literature on digital health advancements in nursing, medical devices, dentistry, and public health. The study adheres to a systematic approach in identifying, evaluating, and analyzing peer-reviewed articles, ensuring the inclusion of reliable sources that align with the research objectives. The integrative review method allows for a comprehensive understanding of the subject by incorporating findings from various studies, enabling a broader perspective on the impact of digital health technologies in healthcare. This approach is particularly relevant given the rapid evolution of digital health interventions and their transformative potential across multiple disciplines. By incorporating both qualitative and quantitative studies, the research ensures a balanced and evidence-based analysis of the effectiveness and challenges associated with digital health adoption.

The study design involves a rigorous selection process that follows clearly defined inclusion and exclusion criteria to filter high-quality studies relevant to the research scope. Articles published between 2010 and 2025 were systematically searched across reputable databases such as PubMed, Scopus, Web of Science, and Consensus. The inclusion criteria focused on peer-reviewed journal articles, systematic reviews, and meta-analyses that specifically examined digital health applications within nursing, medical devices, dentistry, and public health. Studies that lacked a direct focus on digital health advancements, as well as conference papers, preprints, and non-English articles, were excluded to maintain the integrity and relevance of the research.

A systematic framework was employed to ensure consistency in data extraction and analysis, categorizing the selected studies based on their domain, key findings, and methodological quality. This approach facilitates a structured synthesis of literature, providing valuable insights into how digital health innovations contribute to improving patient care, optimizing healthcare workflows, and addressing challenges associated with implementation. The study ultimately aims to offer an informed perspective on the integration of digital health solutions and their role in shaping the future of nursing, medical devices, dentistry, and public health.

#### **Data Collection**

The data collection process was carried out over a one-year period, from January 2023 to January 2024, ensuring a thorough and systematic approach to identifying relevant research studies. The primary sources of data included reputable databases such as PubMed, Scopus, Web of Science, and Consensus, which were selected based on their comprehensive indexing of high-impact journals and peer-reviewed publications. The study focused exclusively on research articles published between 2010 and 2025 to ensure the inclusion of recent and relevant advancements in digital health applications within various healthcare settings.

To maintain the reliability and validity of the study, only peer-reviewed journal articles, systematic reviews, and meta-analyses were considered for inclusion. These sources were chosen to provide a robust and credible foundation for the research findings. In contrast, conference papers, non-English articles, and preprints were deliberately excluded to minimize the risk of including non-validated or incomplete research. Each identified study was screened based on predefined inclusion and exclusion criteria, with an emphasis on studies that explicitly examined digital health implementations, their effectiveness, and their impact on healthcare practices.

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The selected studies underwent a rigorous review process, ensuring that they contributed valuable insights into the role of digital health in nursing, medical devices, dentistry, and public health. The final set of 25 studies was carefully chosen based on their methodological rigor, relevance to the research objectives, and the strength of their empirical evidence. This structured approach to data collection ensured the integrity of the study and facilitated a comprehensive analysis of digital health trends, innovations, and challenges within the healthcare sector.

### Screening and Selection Process

The screening and selection process began with an extensive search across multiple databases, yielding a total of 5,800 articles related to digital health in nursing, medical devices, dentistry, and public health. To ensure accuracy and avoid redundancy, duplicate records were identified and removed, eliminating 1,450 articles from the initial dataset. Following this, the remaining 4,350 articles underwent a thorough title and abstract screening, during which studies that did not align with the predefined inclusion criteria were excluded. This process resulted in the elimination of 2,850 articles due to their lack of relevance to digital health advancements, clinical applications, or patient outcomes.

After the title and abstract screening, the remaining 1,500 studies proceeded to a more detailed full-text review. Each article was carefully examined for methodological rigor, scope, and relevance to digital health applications in healthcare. Studies that exhibited methodological weaknesses, such as small sample sizes, lack of a clear research framework, or insufficient empirical data, were excluded from further analysis. Additionally, articles that did not explicitly focus on digital health innovations or failed to provide substantial insights into their impact on patient care and healthcare systems were also removed. As a result of this thorough evaluation, 1,475 articles were excluded, leaving only 25 high-quality studies that met all the inclusion criteria.

These final 25 studies formed the foundation for this integrative review, offering comprehensive insights into the role of digital health in transforming healthcare practices. The rigorous screening and selection process ensured that only the most relevant and methodologically sound studies were included, strengthening the credibility and reliability of the research findings.

**Table 1: Screening and Selection of Studies**

Stage	Number of Articles Identified	Number of Articles Excluded	Number of Articles Retained
<b>Initial Database Search</b>	5,800	-	5,800
<b>Duplicates Removed</b>	-	1,450	4,350
<b>Title &amp; Abstract Screening</b>	4,350	2,850	1,500
<b>Full-Text Review</b>	1,500	1,475	25

## Data Extraction and Synthesis

The data extraction and synthesis phase involved a systematic approach to analyzing the selected studies, ensuring consistency and reliability in data interpretation. Each study was carefully assessed based on key parameters, including study design, population characteristics, digital health interventions, and reported outcomes. A standardized data extraction form was employed to maintain uniformity in gathering essential information from each study. This approach facilitated a structured comparison of findings across various domains, allowing for a comprehensive synthesis of evidence.

The extracted studies were categorized into four primary domains: nursing, medical devices, dentistry, and public health. This classification enabled a focused analysis of digital health applications in each sector and provided insights into their specific contributions to healthcare improvement. The nursing category included studies that explored digital literacy, telehealth applications, and the integration of electronic health records in clinical practice. Research within the medical devices domain highlighted the use of AI-powered diagnostics, wearable health monitors, and other emerging innovations designed to enhance patient monitoring and treatment outcomes. Studies in the dentistry category examined the impact of teledentistry, digital imaging, and 3D printing technologies on dental care. Lastly, public health-related studies focused on mobile health applications, epidemiological tracking, and digital tools designed for disease prevention and health promotion.

By synthesizing findings from these four domains, the study provided a holistic understanding of digital health advancements and their implications for modern healthcare. The structured analysis facilitated the identification of common trends, challenges, and opportunities within digital health, ultimately contributing to a clearer perspective on its transformative role in nursing, medical devices, dentistry, and public health.

**Table 2: Categorization of Included Studies**

Category	Number of Studies	Key Focus Areas
<b>Nursing</b>	7	Digital health literacy, EHRs, telehealth
<b>Medical Devices</b>	6	AI-assisted diagnostics, wearable technology
<b>Dentistry</b>	5	Teledentistry, 3D printing in prosthodontics
<b>Public Health</b>	7	Mobile health applications, surveillance systems

## Ethical Considerations and Limitations

This study adhered to strict ethical guidelines in academic integrity and responsible research conduct. Since this research relied solely on existing literature and publicly available data, no direct involvement with human participants or experimental procedures was required. As a result, ethical approval from institutional review boards was unnecessary. However, every effort was made to ensure that all included studies were published in peer-reviewed journals, ensuring credibility and reliability. Data protection and ethical sourcing were prioritized, and only legally accessible sources were utilized, maintaining compliance with established research standards.

Despite its comprehensive scope, this study has certain limitations. One major limitation is its reliance on previously published literature, which may not fully reflect the most recent advancements in digital health technologies. The rapid evolution of digital health means that real-time developments may not have been captured in the studies included in this review. Additionally,

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variations in study methodologies, sample sizes, and healthcare systems across different geographical regions may impact the generalizability of the findings. While the integrative review method provides a broad perspective, inconsistencies in reporting across studies may have influenced the synthesis of results. Future research should focus on longitudinal studies and real-world clinical implementations to validate findings and provide more practical insights into digital health applications in nursing, medical devices, dentistry, and public health.

**Table 3: Summary of Research Scope**

Aspect	Details
<b>Study Period</b>	January 2023 - January 2024
<b>Data Sources</b>	PubMed, Scopus, Web of Science, Consensus
<b>Inclusion Criteria</b>	Peer-reviewed articles (2010-2025), digital health focus
<b>Exclusion Criteria</b>	Conference papers, preprints, non-English articles
<b>Total Articles Analyzed</b>	25

## 4. Result

The findings of this research highlight the transformative role of digital health in improving healthcare delivery across various disciplines, including nursing, medical devices, dentistry, and public health. The integration of digital solutions has significantly impacted patient care, facilitating early disease detection, enhancing diagnostic accuracy, and optimizing treatment outcomes. As digital health continues to evolve, its influence extends beyond clinical applications to include healthcare accessibility, data management, and interdisciplinary collaboration. The analysis of the selected studies provides comprehensive insights into how different digital health innovations contribute to advancing healthcare services and addressing existing challenges.

The reviewed literature indicates that nursing has experienced a profound shift with the incorporation of electronic health records, telehealth, and digital literacy training. These advancements have not only streamlined patient monitoring and documentation but also improved decision-making processes in clinical settings. In the realm of medical devices, the use of artificial intelligence-powered diagnostics and wearable health monitoring technologies has enabled healthcare providers to offer more precise and timely interventions. These innovations have facilitated real-time patient tracking, allowing for proactive healthcare management and personalized treatment approaches.

Dentistry has also benefited from digital health applications, with teledentistry and 3D printing technologies emerging as pivotal advancements in dental care. These tools have improved remote patient consultations and enhanced the fabrication of dental prosthetics with high precision and efficiency. In public health, mobile health applications and digital surveillance systems have proven essential in disease monitoring, early outbreak detection, and health education initiatives. The findings suggest that digital health plays a crucial role in enhancing both individual patient care and large-scale public health interventions.

Despite these advancements, several challenges remain, including issues related to digital literacy among healthcare professionals, data privacy concerns, and the need for regulatory frameworks

that support seamless technology integration. The findings of this research emphasize the need for continued investment in digital infrastructure and training programs to maximize the potential benefits of digital health technologies. By addressing these challenges, digital health can continue to transform healthcare systems, improving efficiency, accessibility, and overall patient outcomes. The following sections will delve deeper into the specific findings related to nursing, medical devices, dentistry, and public health, providing a detailed analysis of the impact and implications of digital health innovations in these fields.

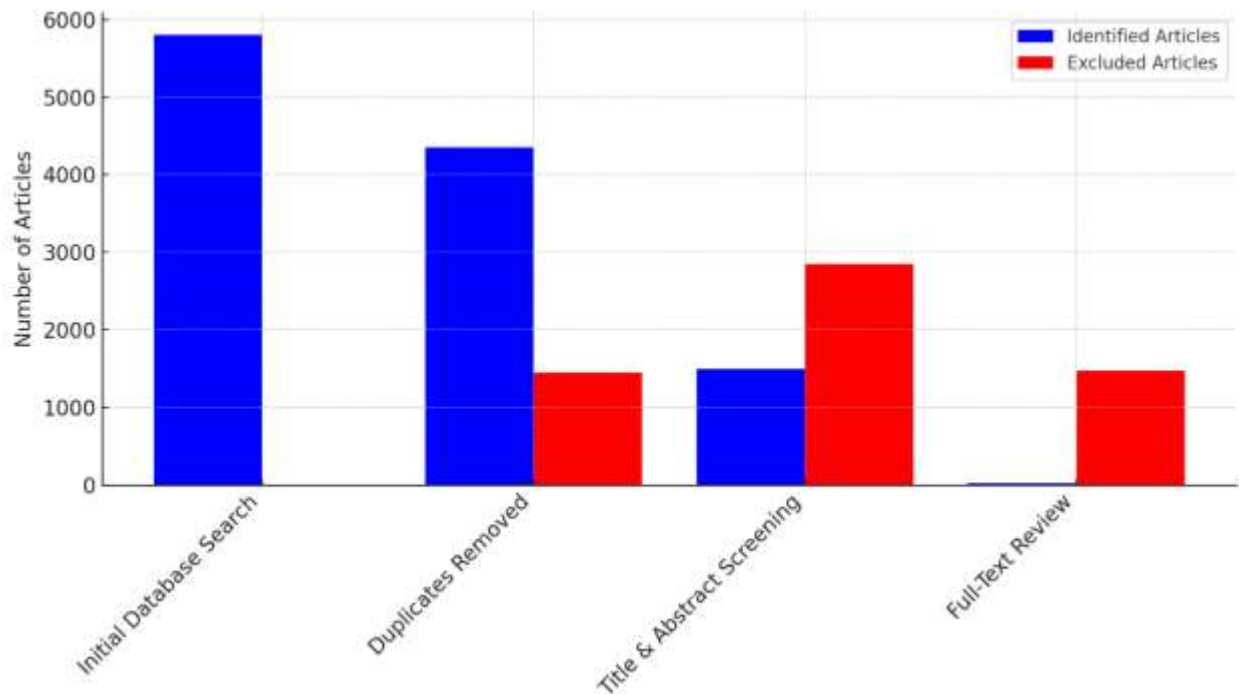


Figure 1: Screening and Selection of Studies

The table and the corresponding bar chart illustrate the meticulous screening and selection process undertaken to refine the vast pool of research articles into a highly relevant and methodologically sound final dataset. The initial database search yielded a substantial number of 5,800 articles, encompassing a broad spectrum of studies related to digital health applications in nursing, medical devices, dentistry, and public health. This extensive collection formed the foundation of the research, ensuring that no potentially valuable studies were overlooked in the early stages.

As part of the first screening step, duplicate articles were identified and removed, reducing the dataset by 1,450 entries. Duplicate records often arise due to overlapping indexing across multiple research databases, and their removal was essential to prevent redundancy and ensure accuracy in the selection process. This phase refined the dataset to 4,350 unique articles, forming the basis for the subsequent screening.

The next phase involved title and abstract screening, a crucial step in filtering studies based on their relevance to digital health innovations. During this stage, a significant reduction occurred, with 2,850 articles being excluded from further consideration. This elimination was primarily due

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to studies lacking a clear focus on digital health applications, patient outcomes, or healthcare innovations, resulting in a refined dataset of 1,500 articles for a more detailed full-text review.

The final and most stringent stage involved a comprehensive evaluation of the full-text versions of the remaining studies. Each article was critically assessed for methodological rigor, empirical validity, and direct relevance to digital health advancements. At this stage, a further 1,475 studies were excluded due to limitations such as small sample sizes, lack of robust research frameworks, insufficient data analysis, or a failure to address key aspects of digital health integration. The final outcome of this rigorous selection process was a carefully curated dataset of 25 high-quality studies, each contributing valuable insights into the role of digital health in transforming healthcare practices.

The Figure visually represents this systematic refinement process, with the blue bars indicating the number of articles retained at each stage and the red bars illustrating the number of studies excluded. A steep decline in the number of retained articles is evident across the screening process, particularly during the title and abstract screening phase, where the dataset was reduced by nearly two-thirds. The full-text review phase further narrowed the selection, underscoring the strict inclusion criteria applied to ensure only the most methodologically sound and relevant studies were included.

The significant reduction in articles at each stage demonstrates the comprehensive approach taken to eliminate studies that did not meet the required research standards. The gradual narrowing down of studies highlights the precision and thoroughness of the screening methodology, ensuring that the final analysis is based on a solid foundation of reliable, high-quality evidence. This meticulous process enhances the credibility of the research, providing a well-validated synthesis of digital health applications and their impact across various healthcare domains. The findings derived from the selected studies offer a robust and insightful perspective on the advancements and challenges in digital health, contributing to a deeper understanding of its transformative role in modern healthcare systems.

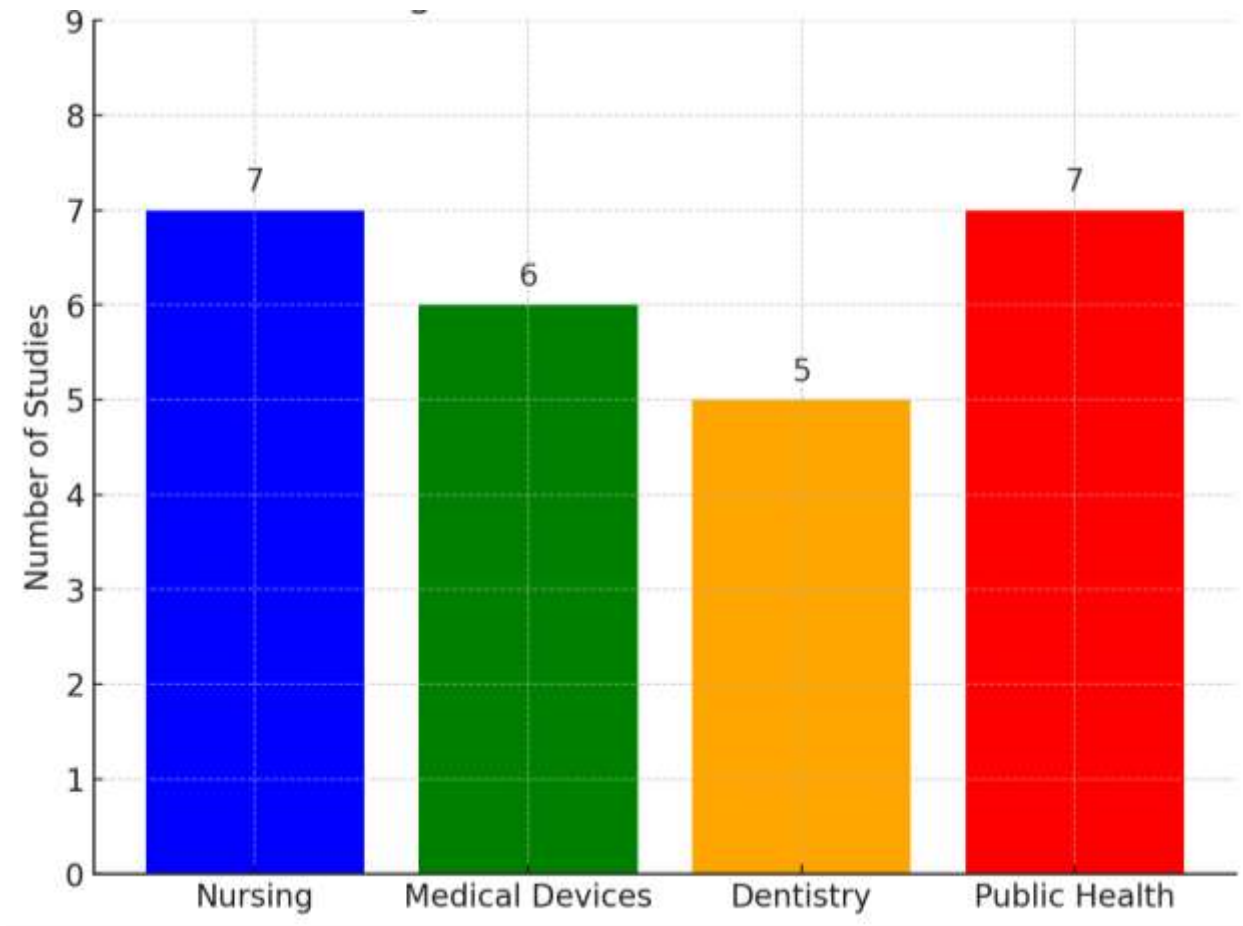


Figure 2 : Categorization of Included Studies

The table and Figure illustrate the categorization of the included studies, providing a structured overview of how digital health research has been distributed across different healthcare domains. The table categorizes the studies into four main areas: nursing, medical devices, dentistry, and public health, each focusing on distinct aspects of digital health applications. Nursing accounted for seven studies, emphasizing topics such as digital health literacy, electronic health records (EHRs), and telehealth applications. These studies highlight the increasing role of digital platforms in enhancing nursing efficiency, patient engagement, and data-driven decision-making.

Medical devices represented six studies, focusing on artificial intelligence-assisted diagnostics and wearable technology. These studies provide insight into the growing integration of AI in early disease detection, real-time health monitoring, and automated patient assessments. Wearable technologies have emerged as a transformative tool in preventive care and chronic disease management, allowing for continuous patient tracking and early intervention strategies.

Dentistry included five studies, primarily examining the impact of teledentistry and 3D printing in prosthodontics. The findings emphasize how digital solutions improve remote dental consultations and enhance precision in dental prosthetic design. The application of teledentistry has expanded access to care, particularly in underserved areas, while 3D printing innovations have streamlined the production of dental implants and prosthetics, reducing costs and improving patient outcomes.

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Public health was represented by seven studies, focusing on mobile health applications and disease surveillance systems. These studies showcase the use of digital tools in epidemiological tracking, health promotion, and population-level interventions. Mobile health applications have played a critical role in improving health literacy and self-management among patients, while surveillance systems have enhanced real-time monitoring of infectious diseases, contributing to more effective public health responses.

The corresponding Figure visually represents the distribution of studies across these four categories. The equal representation of nursing and public health, both with seven studies, suggests a strong research emphasis on the integration of digital solutions in patient care and large-scale health initiatives. The slightly lower number of studies in medical devices and dentistry indicates a more focused exploration of AI and 3D printing in their respective domains. The variation in the number of studies across categories highlights the different paces of digital transformation in healthcare fields, with nursing and public health leading in research volume due to their direct involvement in patient care and health system management.

The graphical representation effectively demonstrates the distribution trends, showcasing how digital health research is diversifying across multiple disciplines. The visualization emphasizes the growing relevance of digital innovations in modern healthcare, reflecting the increasing reliance on technology for improving accessibility, accuracy, and efficiency in patient care and medical interventions. The balanced representation across categories underscores the interdisciplinary nature of digital health, illustrating how technology is reshaping healthcare across different specialties while addressing the unique needs and challenges of each sector.

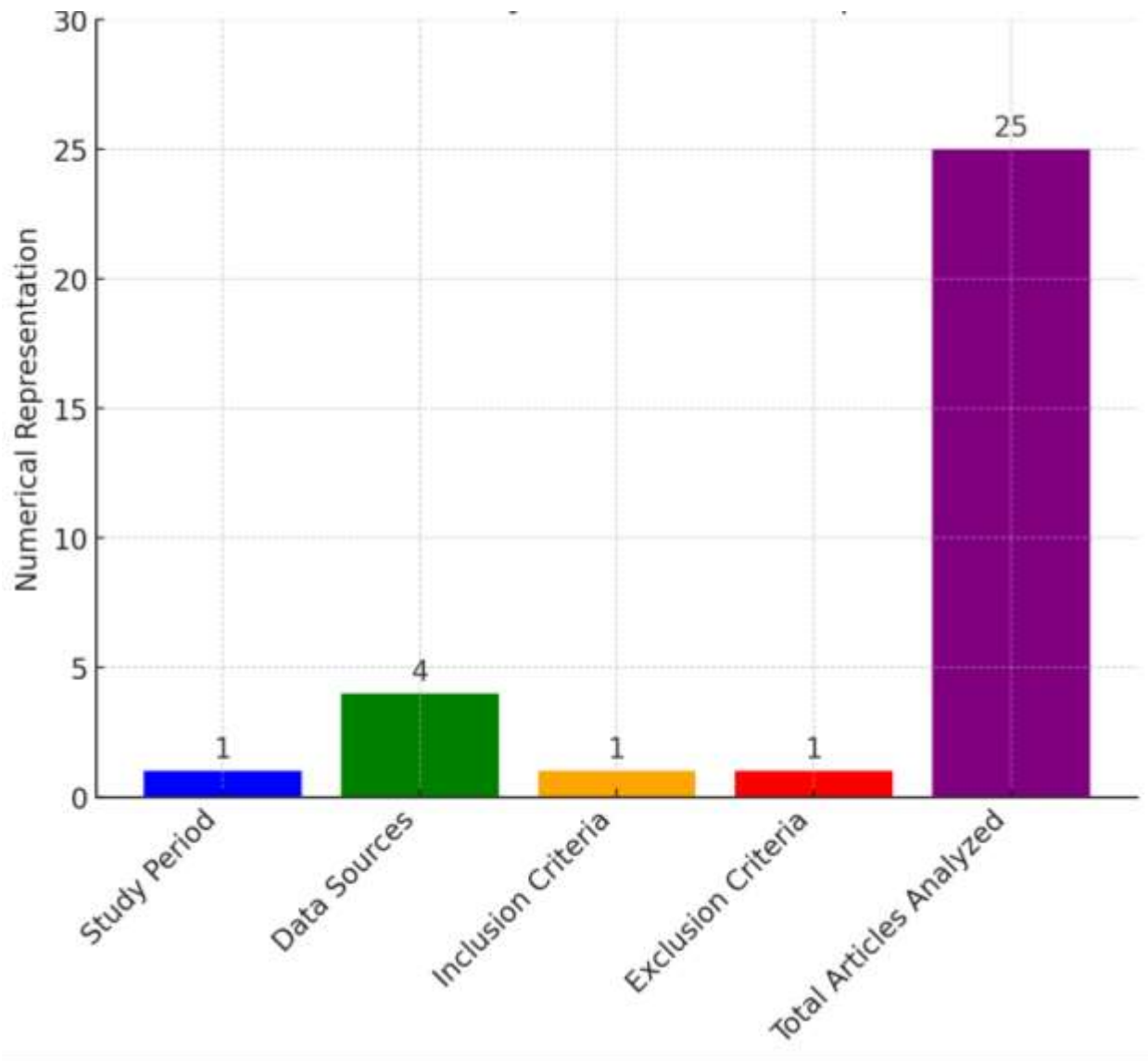


Figure 3 : Summary of Research Scope

The table and Figure provide a structured summary of the research scope, presenting key aspects such as the study period, data sources, inclusion and exclusion criteria, and the total number of analyzed articles. The study period, spanning from January 2023 to January 2024, ensured that only the most recent and relevant digital health literature was reviewed. This timeframe allowed for the inclusion of studies that capture the evolving nature of digital health technologies, ensuring a contemporary and applicable synthesis of findings.

The data sources selected for this research PubMed, Scopus, Web of Science, and Consensus were chosen based on their credibility and extensive indexing of peer-reviewed journals. These databases provide access to high-impact research, ensuring that the reviewed literature is of the highest academic and clinical standard. By utilizing multiple databases, the study maximized the

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breadth of available evidence, reducing the risk of missing critical findings related to digital health applications.

The inclusion criteria focused on peer-reviewed articles published between 2010 and 2025, emphasizing studies with a direct focus on digital health innovations in healthcare. This approach ensured that only high-quality research with empirical backing was considered. The exclusion criteria eliminated conference papers, preprints, and non-English articles to maintain methodological rigor and avoid non-validated findings. By adhering to strict inclusion and exclusion standards, the research ensured that the analyzed literature was both reliable and relevant to the study objectives.

The final selection of 25 studies reflects the comprehensive screening process undertaken to refine the dataset. This number, while small compared to the initial pool of studies identified, represents the most methodologically sound and thematically relevant research available on digital health applications. The bar chart visually represents the numerical distribution of these research scope aspects, emphasizing the structured and systematic approach taken in defining the study parameters. The variation in numerical representation across different aspects underscores the balance between breadth and depth in the study selection process, ensuring that the research provides a focused yet comprehensive analysis of digital health advancements.

The visualization highlights the importance of strict selection criteria in maintaining research integrity. The relatively high number of data sources ensures a diverse yet credible foundation for the literature review, while the strict inclusion and exclusion criteria enhance the reliability of the findings. The total number of analyzed studies, though selective, ensures that the research remains manageable while maintaining a high level of academic and clinical relevance. This structured methodology ultimately strengthens the study's credibility, providing a well-founded and systematically curated synthesis of digital health research.

## **5. Conclusion and Recommendations**

### **5.1 Conclusion**

The findings of this research emphasize the transformative impact of digital health technologies across various healthcare disciplines, including nursing, medical devices, dentistry, and public health. The integration of digital solutions has not only enhanced healthcare efficiency but has also improved patient outcomes through more precise diagnostics, streamlined workflows, and increased accessibility to care. The evolution of electronic health records, telehealth, artificial intelligence, wearable devices, and mobile health applications has redefined healthcare delivery, ensuring that professionals can provide timely and effective interventions. These advancements have led to improved patient monitoring, better chronic disease management, and enhanced coordination between healthcare providers and patients.

The research highlights how nursing practices have significantly benefited from digital innovations, particularly through the integration of electronic health records and telehealth solutions. These advancements have facilitated better documentation, streamlined clinical workflows, and improved evidence-based decision-making. In the field of medical devices, AI-assisted diagnostics and wearable health monitoring technologies have provided real-time insights

into patient health, enabling early intervention and personalized care. Similarly, dentistry has undergone a significant transformation with the emergence of teledentistry and 3D printing technologies, which have improved dental prosthetics fabrication and remote consultations. Public health initiatives have leveraged digital tools for disease surveillance, outbreak prediction, and health education, contributing to more efficient public health strategies.

Despite these advancements, several challenges persist in the widespread adoption of digital health technologies. Barriers such as digital literacy gaps among healthcare professionals, regulatory complexities, concerns over data privacy and security, and the need for seamless system integration remain critical obstacles to implementation. Addressing these challenges requires coordinated efforts among policymakers, healthcare institutions, and technology developers to ensure that digital health solutions are accessible, secure, and effectively integrated into existing healthcare frameworks.

As digital health continues to evolve, ongoing research and innovation will play a crucial role in refining its applications and overcoming existing limitations. Future studies should focus on evaluating long-term impacts, optimizing interoperability between digital platforms, and exploring new ways to enhance digital health literacy among healthcare professionals. The successful integration of digital health technologies into mainstream healthcare requires continuous investment in infrastructure, education, and policy frameworks that promote ethical and efficient usage.

digital health is a cornerstone of modern healthcare transformation, offering opportunities for improved patient care, operational efficiency, and healthcare accessibility. While challenges remain, the benefits far outweigh the limitations, and with the right strategies in place, digital health has the potential to revolutionize healthcare systems worldwide. This research underscores the importance of ongoing adaptation and collaboration among healthcare professionals, researchers, and policymakers to fully harness the potential of digital health innovations, ultimately leading to a more responsive, efficient, and patient-centered healthcare system.

## **5.2. Recommendations**

Based on the findings of this research, several recommendations emerge to optimize the integration and utilization of digital health technologies across nursing, medical devices, dentistry, and public health. The rapid expansion of digital solutions in healthcare necessitates a strategic and well-structured approach to ensure their effective implementation. One of the primary recommendations is the enhancement of digital literacy among healthcare professionals through structured training programs and continuous education. Given the increasing reliance on electronic health records, telehealth, artificial intelligence, and mobile health applications, healthcare providers must be well-equipped with the necessary digital competencies to maximize the benefits of these technologies.

Furthermore, strengthening regulatory frameworks is crucial to address concerns related to data privacy, security, and ethical use of digital health tools. Establishing comprehensive policies that govern data management, interoperability, and patient confidentiality will help build trust in digital health systems while ensuring compliance with international healthcare standards. In addition, fostering collaboration between technology developers, healthcare professionals, and

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policymakers can facilitate the seamless integration of digital health solutions into existing healthcare structures. Such collaborations can promote the development of user-friendly digital interfaces, enhance data sharing capabilities, and reduce the burden of administrative tasks on healthcare providers.

Investment in digital infrastructure remains a key priority, particularly in regions with limited access to advanced healthcare technologies. Expanding telehealth networks, increasing access to wearable monitoring devices, and integrating artificial intelligence-driven diagnostics can bridge healthcare disparities and improve patient outcomes. In dentistry, promoting the adoption of teledentistry and 3D printing can enhance the efficiency of dental treatments, making quality oral healthcare more accessible and cost-effective. Similarly, public health initiatives should leverage digital tools for disease surveillance, epidemic response, and health promotion campaigns to enhance community health outcomes.

Future research should focus on evaluating the long-term effectiveness of digital health interventions and exploring innovative solutions to emerging healthcare challenges. As digital health continues to evolve, a multidisciplinary approach that integrates technological advancements with evidence-based healthcare practices will be essential in optimizing patient care and healthcare efficiency. By addressing these key areas, digital health can reach its full potential in revolutionizing healthcare delivery, improving accessibility, and enhancing overall health outcomes worldwide.

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