

FACTORS INFLUENCING THE EFFECTIVENESS OF DIGITAL HEALTH IMPLEMENTATIONS

Scoping Review and Key Considerations



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Dr Mary Hughes, Dr Isil Coklar Okutkan
mhughes7@tcd.ie

Authors and Advisory Group

Dr Mary Hughes, Associate Professor in Children's Nursing, Trinity School of Nursing and Midwifery*

Dr Isil Coklar Okutkan, Research Fellow, Trinity School of Nursing and Midwifery*

Ms Loretto Grogan, National Information Officer for Nursing and Midwifery*

Professor Richard Greene, Chief Information Officer HSE*

Mr Maurice Faran, Assistant National Director, Community Operations*.

Mr Des Mulligan, Clinical Programme for Care of the Older Person (on behalf of Mr PJ Harnett)

Ms Cariosa Murray, Nursing and Midwifery Information Officer IEHG (on behalf of Mr Paul Gallagher)

Ms Sarah Kelly, PMO Project Support, Community Operations

Ms Sarah McBride, Chief Officer Midlands Community Operations

Ms Martina Burns, Director EHealth Delivery

Ms Priscilla Mary Crosbie, National Digital Operations Lead*

Dr Susan Connolly, Consultant Cardiologist, Integrated Health Lead Galway

Expert Group (in addition to members of advisory group*)

Mr Liam Woods National Director RHA Implementation

Mr Ray Bonar, RHA Delivery Team

Ms Jo Shortt, Programme Lead RHA Project

Table of Contents

Glossary of Terms.....	2
Executive Summary.....	4
1.Introduction	8
1.1. Background and Rationale	8
2. Literature Review and Expert Consultation	9
2.1. Research Question	9
2.2. Aim and Objectives	9
2. 3. Methods.....	9
2.3.1. Design and Search Strategy	9
2.3.2. Study Selection.....	10
2.3.3. Data Extraction and Synthesis	11
2.3.4. Charting:.....	11
2.3.5. Data Synthesis.....	11
2.3.6. Expert Consultation.....	12
3. Results.....	12
3.1. Overview of Included Studies	12
3.2. Analysis and Initial Findings	12
3.3. Themes and Patterns Identified.....	13
3.3.1. Themes and Subthemes.....	13
Theme 1. Organisational readiness	13
<i>Subtheme 1.1. Advancing the Implementation of National Digital Health Strategies</i>	14
<i>Subtheme 1.2 Infrastructure readiness</i>	14
<i>Subtheme 1.3. Interoperability Maturity</i>	15
Theme 2: Financially viable business model	15
<i>Subtheme 2.1. Budgeting</i>	16
<i>Subtheme 2.2. Effective Procurement Approaches</i>	16
Theme 3. Evidence-based practice	17
<i>Subtheme 3.1. Effective Monitoring and Evaluation</i>	17
<i>Subtheme 3.2. Healthcare Research</i>	18
Theme 4: Data management efficiency	18
<i>Subtheme 4.1. Privacy and Security Protections</i>	19

<i>Subtheme 4.2. Data standardization</i>	19
Theme 5: Motivation and Knowledge of Health Professionals.....	19
<i>Subtheme 5.1. Positive attitudes</i>	20
<i>Subtheme 5.2. Advanced IT skills</i>	20
<i>Subtheme 5.3. Clearly defined organisational roles</i>	20
Theme 6: Patient engagement and inclusion	21
<i>Subtheme 6.1. Value based systems</i>	22
3.3.2. Key Considerations of Experts and Senior Decision Makers.....	22
4. Discussion and Conclusion	24
4.1. Summary of Evidence	24
4.1.1 Key Considerations:.....	24
4.2. Conclusion: Implications for Practice.....	26
References	29
Appendices.....	37
Appendix 1	37
Table 3. Distribution of Countries	37
Appendix 2	38
PRISMA Flowchart.....	38
Appendix 3	39
Table 4: Summary of initial findings.....	39

Glossary of Terms

Term:	Definition:
Artificial Intelligence (AI)	A field of computer science, dealing with all aspects of mimicking cognitive functions for real-world problem solving and building systems that learn and think like people.
Business model	A plan that outlines a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined market
Clinical trials	Research studies in which human subjects are prospectively assigned to one or more interventions to evaluate the effects of those interventions on health-related biomedical or behavioural outcomes.
Cybersecurity	The application of technologies, processes, and controls to protect critical systems and sensitive information from digital attacks
Data management	The process of collecting, organizing, storing, protecting, and maintaining data to support productivity, efficiency, and decision-making.
Data Protection Impact Assessment (DPIA)	A process for identifying and mitigating risks associated with the processing of personal data as early as possible.
Data standardization	The process of converting data to a common format to ensure its interoperability and usefulness. the process of converting data to a common format to enable users to process and analyse it
Digital health ecosystem	An infrastructure of resources working together to improve health outcomes and patient experiences.
Digital health implementation	The process of adopting and integrating digital health technologies and solutions into healthcare systems.
Digital health leadership	The practice of guiding and directing digital health initiatives and strategies to sustain and scale up digital health efforts
Digital health platform	A software or hardware system that enables the delivery of healthcare services
Digital Health Strategy	A plan establishing the foundations for a sustainable digital health system that constantly improves.
Digital literacy	The ability to use information and communication technologies to find, evaluate, create, and communicate information.
Electronic Health Records	A comprehensive medical record in electronic form that captures care encounters for an individual across different healthcare providers.
Equality Impact Assessments (EIAs)	A systematic and evidence-based approach to assessing the impact of policies, practices, and services on different demographic groups to ensure fairness, equity, and inclusion.
European Health Data System (EHDS)	A system that enables the collection, storage, and sharing of health data across European Union countries to support research, public health initiatives, and healthcare improvements.

Evidence-based practice	The implementation of research findings to guide clinical decision making and enhance patient outcomes.
Healthcare organisation	A structured system that provides healthcare services by specialised workforces, including hospitals, clinics, physician practices, and other healthcare facilities.
Healthcare professional	An individual suited by education, training and the necessary licensing to provide medical services or care to patients.
Health Technology Assessments (HTAs)	A multidisciplinary evaluation process that collects and summarises information about a health technology to inform healthcare policy and decision-making.
Inclusion	The process of actively involving people from diverse backgrounds in decision-making, planning, and implementation to ensure equitable access and participation.
Information Communication Technology (ICT)	A diverse set of technological tools and resources used to transmit, store, create, share or exchange information.
Innovation adoption	The process of integrating new ideas, technologies or trends into an organization or system.
Interoperability	The ability of different systems, devices, applications or products to exchange and use information or data effectively.
IT systems capacity	The storage and transaction processing capability of computer systems and the network in an organisation or system.
Open-source digital health platforms	Publicly accessible and modifiable software platforms allowing for collaborative development and innovation in the field of digital health.
Patient	An individual receiving or registered to receive medical treatment.
Preventing interventions	Actions or measures aimed at reducing risks or threats to health
Procurement	The process of obtaining or purchasing goods and services or other works from an external source for business purposes.
Regional Health Authorities (RHAs)	Government agencies responsible for administering and delivering healthcare services in a specific region or area.
Self-management platforms	Digital platforms that provide tools and resources for patients to manage their own health, such as tracking symptoms, treatment, physical and psychosocial consequences.
User engagement	The process of involving users in the design involving assessment of an individual's response to a digital service, product or website
Virtual and telehealth services	Healthcare services provided remotely over the telecommunications infrastructure.
Workflow	The sequence of steps or tasks enabled by the systematic organization of resources into processes that transform materials, provide services, or process information

Executive Summary

Digital health refers to the use of technology in healthcare services to manage illnesses and health risks and to promote wellness. Digital health implementations have the potential to revolutionize the healthcare industry by providing innovative solutions to long-standing challenges. However, the effectiveness of digital health implementations is still a subject of ongoing discussion and health systems face unique, complex challenges in adopting, implementing, and operationalizing digital health tools. Addressing these factors is crucial to the success of digital health implementation.

A scoping review and evidence synthesis was conducted to examine the factors influencing digital health implementations and identify the key considerations of experts in the healthcare system in Ireland both at national, regional, and local levels. The aim of the study was to review the literature and identify the key factors influencing the effectiveness of digital health implementations and explore the barriers and enablers that impact the implementation process. The priorities and considerations that healthcare organisations should consider when implementing digital health technologies are addressed, with input from experts.

Key considerations when implementing digital health technologies include ensuring organisational readiness, developing a financially viable business model, using evidence-based practices, managing data efficiently, motivating and educating healthcare professionals, and engaging patients and including them in the process. The importance of expediting the establishment of an enabling governance for good digital health, to advance the establishment of a national digital health authority, and enable digital health at national, regional, and local levels aligned with the HSE strategy is highlighted. Additionally, it is proposed that a life-cycle approach should be adopted for both financial and human resource perspective, and strategic financial longitudinal investments should be confirmed.

Furthermore, it is essential to establish national and regional leadership, utilize user-friendly technological tools, develop a national infrastructure for data and information management, enable cybersecurity, and define organizational roles clearly and enable and mandate strong leadership at the organizational and system level. Patients should be treated as a resource and involved in co-design, enabling informed choice, and ensuring appropriate representation of users at the governance level. Finally, partnerships with academic

stakeholders, expedited programs of research and financial support, and ensuring developments are evidence-based are critical for successful digital health implementations.

Main themes developed via evidence synthesis can be seen in Figure 1.

Figure 1. Six main themes developed through thematic analysis



Two advisory group meetings were conducted, along with one meeting with senior decision makers and a workshop that involved advisory group members. During these sessions, the initial results of the scoping review and refined themes developed via thematic analysis were presented and discussed. The key considerations of experts, which were identified through a thematic analysis of the literature review, were also integrated into the data synthesis. Table 1 shows the key considerations of experts for each theme.

Table 1. Key Considerations

Themes	Considerations
1.Organisational Readiness	• Expedite the establishment of enabling governance of good digital health. • Advance the establish of a national digital health authority. • Advance the establish of digital health structures across the HSE. • Enabling digital health at national, regional, and local levels aligned with HSE strategy (connectedness not siloed)
2.Financially viable business model	• Ensure the adoption of life-cycle approach for both financial and human resource perspective. • Confirmed strategic financial longitudinal investments. • Awareness of EU policy and standards

	• Good procurement process/SLAs/Relationship management/industry governance
3.Evidence based practice	• Assessment of the system • Establishment of national health technology assessment framework • Expedite programmes of research and financial support • Ensure developments are evidence based. • Partnership with academic stakeholders
4.Data management efficiency	• Developing a national infrastructure for data and information management • Standard definition and utilization across the system • Expedite finalisation of data strategy • Enabling cybersecurity (learning) • Developing a national ethical framework
5.Motivation and knowledge of healthcare professionals	• National and regional leadership • To support/encourage a positive attitude with staff. • User friendly technological tools • Utilisation of trained staff (e.g., digital masters Level 9/CMIO roles) • Education of healthcare staff. Building a digital health care literate staff across the workforce- • Defining organisational roles clearly and enabling and mandating strong leadership at organisational and system level
6. Patient engagement and inclusion	• Aim for centred approach with co-design. • Ensuring informed choice of patients • Appropriate representation of users at the governance level. Service Users reference group. • Treating patients as a resource/PPI/Self-care and self-management • Enabling the infrastructure to permit this. • Enabling the healthcare staff to be advocates

Table 1 outlines key considerations for the effectiveness of digital health implementations in RHAs. Experts' opinions are summarized below:

- To ensure organisational readiness, a national governance structure should be established across the public sector to encourage more citizen focus, with strong policies and governance to support policy implementation. This should include the establishment of a National Digital Health Authority to standardise policy and processes and establish enabling good governance for digital health.
- To ensure financially viable business model, which is sustainable and consistent, the implementation of a digital health strategy should be informed and participatory, utilizing EU policies and standards. Procurement, sustainability, management of

service level agreements, relationship management, and industry governance should be taken into consideration.

- It is important to ensure that the language used in local operational workflows is consistent with a national framework and that the impact of digital health implementations is measurable.
- National data management structures and ethical data security frameworks should be developed to manage digital health data. An iterative process should be established to assess the system and establish a national framework for digital health research, with a focus on partnership with academic and industry stakeholders.
- To ensure that staff are equipped to implement digital health initiatives, utilization of trained staff and adoption of digital literacy should be encouraged. This can be achieved by building digital capacity within the service, mandating training, and enabling education for healthcare staff.
- Finally, it is important to ensure appropriate representation of users at the governance level, with a reference group for national older persons. By considering these key factors, digital health implementations can be effectively established and improved upon to enhance the quality of healthcare services provided.

1.Introduction

1.1. Background and Rationale

Digital health refers to the use of technology in healthcare services to manage illnesses and health risks and to promote wellness (Ronquillo et al, 2022) and has a broad scope including the use of wearable devices, mobile health, telehealth, health information technology, and telemedicine. With the help of digital health implementations, the integration of various digital tools into digital health is meant to revolutionize the way healthcare is given by reducing expenses and increasing patient outcomes. As such, digital health is an area of significant interest to healthcare professionals, policymakers, and patients alike. While the digitalisation process in healthcare is still ongoing, it is expected to have a significant impact on various phases of healthcare delivery such as health promotion, prevention, primary care, specialized care, long-term/social care, and self-care (Ricciardi et al, 2019).

Digital health implementations have the potential to revolutionise the healthcare industry by providing innovative solutions to long-standing challenges. Despite the many advantages, the effectiveness of digital health implementations is still a subject of ongoing discussion and health systems face unique, complex challenges in adopting, implementing, and operationalizing digital health tools (Marwaha et al, 2022). The effectiveness of digital health implementation is dependent on a range of factors such as limited access to technology, concerns about privacy and security, resistance to change, issues about technological infrastructure, level of stakeholder engagement, implementation strategy, digital literacy of patients and healthcare staff (Ross et al, 2018; Smith & Magnani, 2019). Addressing these barriers and leveraging enablers such as supportive leadership, collaboration among stakeholders, and patient-centred approaches is crucial to the success of digital health implementation (Papavasiliou et al, 2020). Additionally, the priorities and considerations for digital health implementation vary across different contexts and settings (Murray et al, 2016). Understanding these priorities and considerations can help healthcare organisations develop effective implementation strategies that meet the needs of patients, providers, and other stakeholders.

The healthcare system in Ireland is structured in a way that ensures access to healthcare services for all citizens. One of the key elements of this system is the establishment of Regional Health Authorities (RHAs), which are responsible for the planning and delivery of healthcare services within their respective regions. As RHAs are responsible for managing healthcare resources and services, it is important to examine the impact of digital health on their operations. A scoping review was conducted to examine the factors influencing digital health implementations and identify the key considerations of experts. Scoping reviews can be used to map the key concepts underlying a field of research and to clarify working definitions and/or conceptual boundaries (Arksey & O'Malley 2005). Expert consultation was conducted, and the results were incorporated into the final report, which mapped and summarised the data.

2. Literature Review and Expert Consultation

2.1. Research Question

The research question is “What are the factors influencing the effective implementation of digital transformation in health systems?”

2.2. Aim and Objectives

The aim of this study is to review the literature to identify the key factors influencing the effectiveness of digital health implementations and explore the barriers and enablers that impact the implementation process. The priorities and considerations that healthcare organisations should consider when implementing digital health technologies is addressed, with input from experts.

2. 3. Methods

2.3.1. Design and Search Strategy

This review was guided by the Joanna Briggs Institute (JBI) reviewer's manual (Munn et al, 2019). With the assistance of an experienced information specialist, a comprehensive literature search strategy was developed (see Table 2). The databases MEDLINE; PsycINFO; Cumulative Index to Nursing and Allied Health Literature (CINAHL); EMBASE; ASSIA (Applied Social Sciences Index & Abstracts) and Web of Science will be searched with a time constraint

(only articles published between 2018-2023 will be included). Grey literature consisting of digital health strategy documents was also included.

Table 2. Search Terms

Concept 1	Concept 2	Concept 3
Digital health	Healthcare System	Implement*
Health technol*	Health System*	Govern*
Health informatic*	<i>Health Services</i>	Adopt*
Digital transformation	<i>Delivery of Healthcare Services</i>	
Digital revolution	<i>Nursing Services+</i>	
Digital innovation	<i>Health Planning</i>	
<i>Medical informatics</i>	<i>Healthcare Delivery</i>	
<i>Nursing informatics</i>		
Health informatics		

Note: Italicised items relate to subject headings which were explored in relevant databases

*Truncation i.e., locating all terms that begin with the given string of text, Boolean Operator AND was used to conduct searches using all concepts ["Implementation" AND "Digital Health" AND "Health System"]

2.3.2. Study Selection

The review included all primary experimental, cohort, and case-control studies that met inclusion criteria. These criteria were that the records primarily focused on factors influencing the implementation of digital health in health services, were published between 2018 and March 2023, were peer-reviewed empirical research, and were published in English. The articles and digital health strategy documents were examined to gain a comprehensive understanding of the subject.

The protocol pertaining to this scoping review was registered on the Open Science Framework (OSF) Registries (<https://osf.io/hb6wx>). All the articles identified during the search were imported into Covidence for review. Two levels of screening were employed: title and abstract screening (level one) and full-text screening (level two). During level one screening, a standardised questionnaire was created for study selection using predefined eligibility criteria. Using a minimum of 25 articles, a pilot exercise was conducted prior to screening, to ensure reliability and consistency between reviewers. Agreement between reviewers was sufficient (>80%), therefore reviewers proceeded to screen articles for inclusion. Records were screened by pairs of reviewers independently, with a discussion to

resolve any discrepancies. This entire process was repeated during level two screening, using full texts of all records which have been included at level one. The search strategy for grey literature included searching in websites of existing networks and organisations that disseminate strategy and planning documents to improve the effective use of digital health technologies among healthcare professionals.

2.3.3. Data Extraction and Synthesis

Two independent reviewers used the standardised data extraction tool from JBI SUMARI (Munn et al., 2019) to extract qualitative data from the papers included in the assessment. The data that were extracted contains specific information about the populations, context, society, geographic location, research methodologies, and phenomena of interest that are relevant to the review question and specific objectives.

2.3.4. Charting:

A standardised charting form was developed, which included the following: study characteristics (e.g., study name, first author, year of publication, study design, country of conduct), population characteristics (e.g., number of participants, age of participants, professions), intervention characteristics (e.g., data available, interoperability) and outcomes (e.g., barriers & facilitators). A pilot exercise amongst all reviewers was conducted prior to data charting using 8 studies. When the review team determined that there is sufficient agreement between reviewers, the reviewers proceeded to chart data from the included articles. Pairs of reviewers charted data from each included article independently. Discrepancies were discussed and if consensus was achieved.

2.3.5. Data Synthesis

Qualitative research findings were combined using JBI SUMARI (Munn et al., 2019) and the meta-aggregation method. By assembling the findings and classifying them based on similarity in meaning, the synthesis or aggregation of findings produced a set of statements that represent that aggregation. To create a singular comprehensive set of synthesised findings that can serve as the foundation for evidence-based practice, these categories were then subjected to a synthesis. The analysis was run by NVivo 12 Software, results were presented in narrative fashion in cases and thematic map.

2.3.6. Expert Consultation

When conducting a scoping review, it is essential to consider a range of factors to ensure its integrity and support well-informed decision-making (Peters et al., 2021). Preliminary findings from the scoping study were discussed in two meetings with advisory groups made up of professionals and an expert meeting with policy makers with extensive knowledge and experience of the implementation of digital health. Key considerations of experts were integrated into the final analysis.

3. Results

3.1. Overview of Included Studies

Records from 30 nations and various regions were included; Table 3 provides details. (Appendix1). PRISMA flowchart (Appendix 2) demonstrates the numbers of studies and results of the selection and screening process. Total number of records identified through databases is 4396; total number of records identified through grey literature search is 63. After removing duplicates 3731 records screened for titles and abstracts and full texts of 218 records selected for eligibility were screened and 42 research articles and 8 health strategy documents were selected for thematic analysis.

3.2. Analysis and Initial Findings

A thematic analysis of records was carried out in accordance with Braun and Clarke's (2006) method. This approach is theoretically adaptable and can be applied to research questions that combine exploratory and confirmatory approaches. (Braun and Clarke 2006). Phase 1 involved becoming familiar with the data content. Preliminary concepts were noted and used to create initial codes in Phase 2. This entailed a dual deductive-inductive process (Braun and Clarke 2006), in which coding was done with knowledge of overarching categories based on the data. The third phase involved theme searching, which was accomplished by clustering original codes based on thematic similarity. Higher-order themes were labelled as "enablers", "barriers", "considerations", and "priorities" with themes grouped beneath them. These categories can be seen in Table 4 (see Appendix 3). All themes and sub-themes were reviewed in Phase 4. Diverse ideas were expanded, while redundant themes were merged or dropped. This made it possible to identify unique and comparable concepts across all records.

In Phase 5, descriptions of each theme and subtheme were finalized and ultimate interpretation were reported in Phase 6.

3.3. Themes and Patterns Identified

Themes identified through thematic analysis consist of organisational readiness", "evidence-based practice", "financially viable business model", "data management", "patient engagement and inclusion" and "motivation and knowledge of professionals." Figure 1 demonstrates the mind map of themes and subthemes. All themes will be explored considering the literature findings.

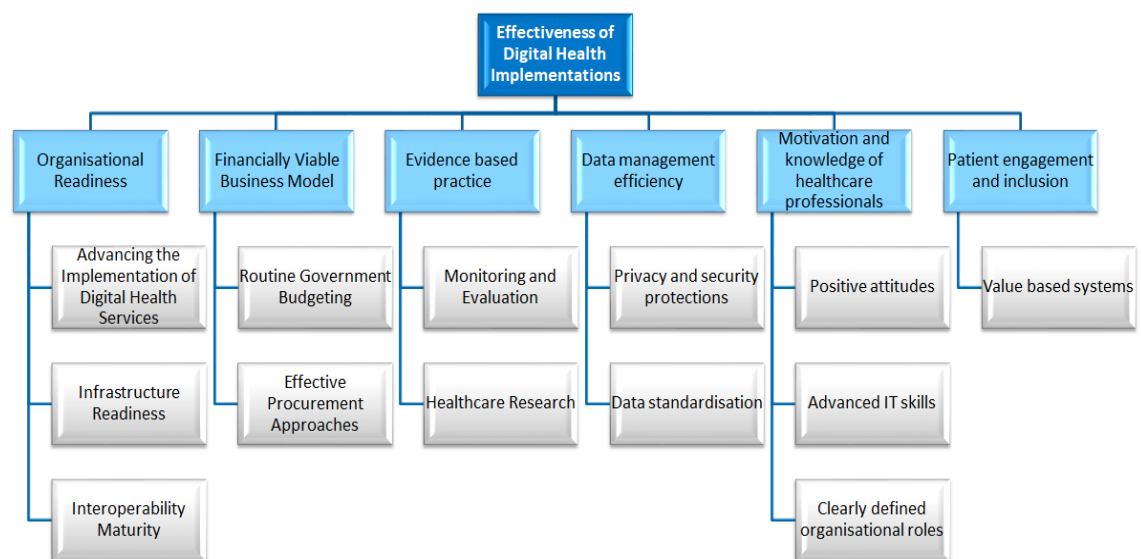


Figure 1. Themes and subthemes developed

3.3.1. Themes and Subthemes

The scoping review informed the development of this framework via thematic analysis of the literature and expert consensus reached through discussion. Themes and subthemes are explained with relevant references below.

Theme 1. Organisational readiness

Organisational readiness is a critical enabler for the successful implementation of digital health services. Findings from the thematic analysis show that having a culture of innovation and established clear policies encouraging the use of digital services, a clear

organisational structure, and a roadmap to achieve long-term sustainability (Digital Europe, 2022), a prominent level of interoperability (Gudi et al., 2021; Kouroubali, & Katehakis, 2022; Schlieter et al., 2022) and integration in existing workflows (Schlieter et al., 2022), partnership readiness (Lokuge et al., 2019), harmonisation between separate departments (Muinga et al., 2020) and enhanced IT capacity (Alhuwail, 2020; Lokuge et al., 2019) allowing digital health ecosystem monitoring are key factors that contribute to organisational readiness.

Subtheme 1.1. Advancing the Implementation of National Digital Health Strategies

One of the primary barriers reported in empirical studies was poor organisational and management policies (Baltaxe et al., 2019) which included underdeveloped health strategies lacking an information management plan (Alhuwail et al., 2020), unclear and undefined processes for innovation (Schlieter et al., 2022), the persistence of paper-based systems (Van Velthoven & Cordon, 2019), lack of communication (Halwani & Mouawad, 2021), and lack of awareness about ethical considerations. These findings suggest that healthcare organisations need to develop clear policies and strategies to encourage innovation and establish a roadmap to achieve long-term sustainability (Stroetmann, 2019).

Establishing a deliberate and actionable digital health strategy is considered critical to advancing the use of digital health technologies in healthcare. To achieve this, strong government support and policies (Asthana et al., 2019; Lee et al., 2022; Naumann et al., 2021; Odone et al., 2019; WHO, 2021) are needed to promote digital transformation and enhance the capacity to change. Policymakers' understanding of the level of digital health transformation is also crucial to bridge the gap between private and public institutions (Al-Kahtani et al., 2022). Strengthening governance for digital health at global, regional, and national levels can facilitate the adoption and implementation of digital health technologies. Developing new care models can build sustainable services in the long term, while leveraging existing assets and capabilities can lead to more efficient and effective healthcare delivery (Health Service Executive, 2022).

Subtheme 1.2 Infrastructure readiness

Infrastructure issues were identified as another significant barrier to the successful implementation of digital health solutions in healthcare. These issues included the

incompatibility of existing processes and innovation (Schlieter et al., 2022), the lack of digitisation in inpatient wards (Muinga et al., 2020), and problems regarding staff and patient access to the internet (Alhuwail, 2020). These findings suggest that healthcare organisations need to develop and invest in a robust infrastructure to support digital health solutions and enhance their IT capacity to allow for digital health ecosystem monitoring (Stroetmann, 2019) and ensure an elevated level of interoperability and integration in existing workflows (Schlieter et al., 2022). Furthermore, improving service planning and enhancing AI (artificial intelligence) capabilities can facilitate the delivery of personalised care plans (Digital Europe, 2022). Building combined digital solutions that connect IT systems can create a more local, cohesive, and effective health system. Finally, accelerating and expanding the use of virtual and telehealth services can improve access to care and enhance patient engagement and inclusion (Health Service Executive, 2022).

Subtheme 1.3. Interoperability Maturity

Low level of interoperability maturity was considered as a barrier in the empirical research. Closed systems lacking interoperability (Gudi et al., 2021; Nyangena et al., 2021; Schlieter et al., 2022) and refusal to share data (Van Velthoven & Cordon, 2019) were identified as significant challenges. Developing an integrated strategy that supports successful digital health initiatives and normative and regulatory frameworks that promote interoperability and streamline communication flows can ensure that the digital health system is accessible and reliable, and that data standardization is achieved (Department of Health, 2021). These findings suggest that healthcare organisations need to invest in developing an open-source digital health platform with transparency and ensuring accessibility to patient data and software by relevant healthcare units to share data.

Theme 2: Financially viable business model

A financially viable business model (Schlieter et al., 2022) is also an essential enabler for the successful implementation of digital health services. Inclusion in routine government budgeting (LeFevre et al., 2021), aligning funding structures (Desveaux et al., 2019) and resource readiness (Lokuge et al., 2019) are crucial factors that contribute to a financially

viable business model. Additionally, lack of investment in preventive interventions can be considered as a barrier for the success of the business models (Schlieter et al., 2022).

Subtheme 2.1. Budgeting

Poor budgeting strategies and problems regarding excessive costs and financial constraints (Halwani& Mouawad, 2021) appear to be a challenge for the digital health implementation in health services. To ensure the successful implementation and sustainability of digital health initiatives, it is crucial to prioritise planning economic investments (Odone et al., 2019). This includes addressing affordability issues with responsible partners and leveraging EU (European Union) support to invest in and coordinate with member states. Investing time and resources in building consensus to resolve economic issues at an early stage is essential.

To plan economic investments effectively, it is important to prioritise certain actions. Firstly, addressing affordability issues with responsible partners is crucial to ensure that investments are sustainable and accessible to all (Department of Health, 2021). For instance, the European Union can support member states with investment and coordination to maximize resources and avoid duplication of efforts (Digital Europe, 2022). Consensus building is also important, and time and resources should be invested in resolving issues at an early stage to prevent delays and unnecessary costs (Naumann et al., 2021).

Increasing investment in AI is another critical step to advance technological capabilities and improve health outcomes (Digital Europe, 2022). Finally, using taxpayers' money efficiently is essential to maximize the impact of economic investments and ensure that resources are allocated where they are needed most (Australian Digital Health Agency, 2018). By prioritising these actions, economic investments can be planned and executed effectively to advance the health sector and improve the well-being of individuals and communities.

Subtheme 2.2. Effective Procurement Approaches

Effective procurement approaches that consider affordability and sustainability, analysis of risks and benefits (Hughes et al., 2021), and refinement and removal of elements

that do not add value (Schlieter et al., 2022) were considered crucial factors for a solid financial model.

Theme 3. Evidence-based practice

Evidence-based practice is also an important enabler for the successful implementation of digital health services. The thematic analysis results reveal that complementing and extending healthcare research, assessing the clinical efficacy of implementations (Hughes et al., 2021), evidence-based intervention components, evaluating outcomes to guide future progress (Sheikh et al., 2021), and using assessment models and tools to evaluate organisational readiness (Bilgiç & Camgöz Akdağ, 2021; Dönmez et al., 2020; Lokuge et al., 2019; Mather & Almond, 2022; Woods et al., 2022; Kruszyńska-Fischbach et al., 2022), health system adoption (Liaw et al., 2021) health technology efficiency (Odone et al., 2019), patient engagement (von Wedel et al., 2022), attitudes towards digital health implementations and e-health readiness (Putteeraj et al., 2022) and the fit between individuals, tasks, technology, and environment (Prgomet et al., 2019) are crucial factors that contribute to evidence-based practice.

Subtheme 3.1. Effective Monitoring and Evaluation

Records reveal that effective evaluation and monitoring can help to identify areas where digital health systems can be improved. This includes not only the systems themselves but also the processes and policies (Odone et al., 2019) surrounding their implementation. By conducting regular evaluations, healthcare providers can identify areas where they may need to make changes to ensure that these systems are functioning optimally. Strategic documents highlighted the importance of the improved commitment by countries, while recognizing the impediments faced by the least developed countries. It is also seen that national strategies also need to focus on improving application fields and standards (Shin, 2019).

To effectively monitor and evaluate public health digital solutions, certain actions must be prioritised. Firstly, actionable insights are needed to improve evidence-based decisions. This requires the collection and analysis of data from digital solutions to inform decision-making processes (Panda Health, 2022). Secondly, medical AI software evaluation should be conducted in formal scientific settings to ensure the safety, effectiveness, and

ethical implications of these technologies (Sheikh et al., 2021). Finally, data-driven projects should be supported to advance timely and informed decision-making processes (Ministry of Health of New Zealand, 2022). This involves investing in the development of advanced data analytics tools and providing resources for data management and analysis. By prioritising these actions, public health digital solutions can be effectively monitored and evaluated, and evidence-based decisions can be made to improve health outcomes and advance the health sector (NHS, 2020).

Subtheme 3.2. Healthcare Research

Promoting innovation and decentralisation of clinical trials and investigations, optimising invasive procedures, and facilitating remote consultation, monitoring, and care are key factors prioritised especially by digital health strategy documents (Shin, 2019). It also includes promoting the faster development of devices and medicines, personalised care plans, and integrated care. By prioritising these actions, global collaboration can be promoted, and knowledge can be advanced to improve health outcomes and tackle global health challenges (Baltaxe et al., 2019; Kouroubali, & Katehakis, 2022). To advance the healthcare ecosystem, it is important for a variety of stakeholders to conduct scientific research, including academia, public research institutes, and private sector innovators who create new products and services (Digital Europe, 2022)

Theme 4: Data management efficiency

Data management efficiency is another critical enabler for the successful implementation of digital health services. The thematic analysis results suggest that expanding data handling processes (Sheikh et al., 2021), flexible design for evolving needs (LeFevre et al., 2021), open-source digital health platforms (Schlieter et al., 2022), and transparency (LaMonica et al., 2021), ensuring data privacy and security (Woods et al., 2022), and accessibility to patient data and software (Schlieter et al., 2022) are principal factors that contribute to data management efficiency.

Subtheme 4.1. Privacy and Security Protections

Lack of privacy and security protections and low-quality outcome monitoring were identified as significant barriers. The lack of transparency in privacy policies and strict data protection policies were identified as primary issues. These findings suggest that healthcare organisations need to develop and implement transparent privacy policies (LaMonica et al., 2021) and ensure strict data protection policies (Digital Europe, 2022; Woods et al., 2022).

Subtheme 4.2. Data standardization

To ensure the success of digital health interventions, monitoring and evaluation of public health digital solutions is essential. Actionable insights generated from such evaluations can improve evidence-based decision-making in healthcare. It is recommended that medical AI software evaluation (Shin, 2019) should be conducted in formal scientific settings to ensure reliable and accurate results. Additionally, data-driven projects should be supported to advance timely and informed decision-making processes in healthcare (Ministry of Health New Zealand, 2022).

To achieve high-quality health data (Scobie & Castle-Clarke, 2019), there is a need for accessible, reliable, and commonly understood information that is trusted by all stakeholders involved (Digital Europe, 2022). This requires the bolstering of cybersecurity and data security within the health system to protect sensitive information (HSE, 2023; Ministry of Health of Denmark, 2018). Additionally, data standardization should be prioritised to ensure interoperability and ease of use across different systems and stakeholders. By achieving high-quality health data, health systems can better inform decision-making, improve patient outcomes, and drive innovation in healthcare.

Theme 5: Motivation and Knowledge of Health Professionals

The analytical capacity and capability of the workforce (Scobie&Castle-Clarke, 2019) are also essential enablers for the successful implementation of digital health services. The thematic analysis results indicate that enhancing physicians' and nurses' facilitator role in innovation adoption (von Wedel et al., 2022), positive attitude of healthcare staff towards digital health implementations, willingness to adopt technology, and advanced IT skills

amongst healthcare staff (Halwani & Mouawad, 2021) are important factors that contribute to the analytical capacity and capability of the workforce.

Subtheme 5.1. Positive attitudes

Poor motivation and lack of knowledge of healthcare staff were identified as significant barriers. Healthcare staff's lack of motivation due to the time-consuming data entry process (Gudi et al., 2021), technical language (Halwani & Mouwad, 2021), and fear of change (Van Velthoven & Cordon, 2019) causing resistance was identified as the primary issue.

Subtheme 5.2. Advanced IT skills

Additionally, lack of experience in using health technology applications (Zayyad & Toykan, 2018), low levels of digital literacy (Gudi et al., 2021), and lack of trained personnel to handle health information systems (Gudi et al., 2021; Halwani & Mouawad, 2021) were identified as other factors affecting digital health implementations. These findings suggest that healthcare organisations need to invest in training and development programmes to upskill healthcare staff in using digital health solutions and improve their digital literacy (Nadav et al., 2021).

Subtheme 5.3. Clearly defined organisational roles

Clearly defined organisational roles (Desveaux et al., 2019), cultivating multiple champions of digital health (LeFevre et al., 2021), strong leadership at the organisational and system level (Desveaux et al., 2019) are crucial factors influencing effective digital health implementations by healthcare staff. To effectively engage professionals in the service and provide them with opportunities to influence others, several steps should be taken. First, professionals need adequate time and training to become familiar with the service and its capabilities (Nadav et al., 2021). Second, the new services should be integrated into the regular work of professionals to ensure they become a routine part of their work (Nadav et al., 2021). Third, professionals should be provided with clear justification for the use of the service (Nadav et al., 2021), with simple and monitored usage, and a focus on enhancing digital literacy (NHS, 2023). Fourth, sensitivity about ethical considerations (Sheikh et al., 2021) should be a top priority to prevent any potential negative outcomes. Overall, creating a positive attitude toward the service among professionals and ensuring their active

involvement in promoting it (von Wedel et al., 2022; Zayyad & Toycan, 2018) can lead to better adoption and success of the service.

Theme 6: Patient engagement and inclusion

Finally, user engagement is a critical enabler for the successful implementation of digital health services. The thematic analysis results indicate that equity of access (LeFevre et al., 2021; Sheikh et al., 2021), having a value-based (Schlieter et al., 2022), citizen-centred (Gudi et al., 2021), and user-friendly digital health system (LeFevre et al., 2021), patients being an active partner provided flexible interaction before and after treatment, and getting evaluation and feedback from users (The Ministry of Denmark, 2018) are crucial factors that contribute to user engagement.

The lack of user engagement was identified as a significant barrier to the successful implementation of digital health solutions in healthcare. Lack of digitally enabled self-management platforms, complexity of the digital health platforms, missing value of patients and lack of citizen centric digital health awareness programmes, lack of patient access to medical records or treatment plans, and lack of connectedness between physicians and patients (Woods et al., 2022) were identified as contributing factors. These findings suggest that healthcare organisations need to develop and implement user-friendly digital health systems that provide equity of access (LeFevre et al., 2021; Sheikh et al., 2021) and encourage active patient engagement (Hussein et al., 2022). Additionally, they should create citizen-centric digital health awareness programmes to increase patient awareness of digital health solutions (Gudi et al., 2021). To increase patient engagement and inclusion, there are several considerations that can be considered. Firstly, digital health technologies should be adopted to assist the elderly in accessing and utilizing health services (Shin, 2019). Secondly, health facility registries should provide patients with information about all possible diagnostic tests, services, and schemes available to assist them (Gudi et al., 2021). By doing so, patients can make informed decisions about their health and care. It is important to prioritise these considerations to ensure that patients are empowered to actively participate in their healthcare and are not excluded from accessing services due to lack of information or technology barriers.

Subtheme 6.1. Value based systems

To promote patient engagement and inclusion in the healthcare system, several priorities must be addressed. Firstly, providing value-based systems (Ministry of Health New Zealand, 2022) is essential to overcome inequities and ensure that patients receive high-quality care that meets their needs. This involves designing healthcare systems that prioritise patient outcomes and experiences, rather than simply focusing on volume or cost of care. Secondly, increasing transparency of health system performance is crucial to promoting patient engagement and inclusion. This involves providing patients with clear and accessible information about their health and the healthcare system (Gudi et al., 2021), including data on quality and safety of care (NHS, 2023). Valuing informed choice of patients is also an important priority (Ministry of Health of New Zealand, 2022), as patients should be empowered to make decisions about their health and care based on accurate and comprehensive information. To achieve this, healthcare systems should employ equality impact assessments (EIAs) to ensure that patient choice is not limited by factors such as race, ethnicity, gender, socio-economic status (NHS, 2023) or age (Shin, 2019). Finally, advocating for people-centred health systems is essential to promote digital health literacy among patients (Gudi et al., 2021) to improve engagement and inclusion. This involves designing healthcare systems and user-friendly platforms (La Monica et al., 2021) that prioritise patient needs and preferences, and that are responsive to feedback from patients and their families (von Wedel et al., 2022). By prioritising these actions, healthcare systems can promote patient engagement and inclusion, and improve health outcomes for all patients.

3.3.2. Key Considerations of Experts and Senior Decision Makers

Key considerations and insights discussed in advisory group meetings and the meeting held with the senior decision makers were summarised below:

Experts addressed the cruciality of implementation of the National Digital Health Strategy Framework, which promotes a clear organisational framework and an innovative culture. The importance of a digitalised workflow implementation plan, integration between various units, and collaboration with partners was emphasised.

For businesses and organisations to enable increased innovation, infrastructure readiness is essential. This is particularly true for healthcare institutions, which rely on high-performance IT infrastructure to provide patients with timely and efficient care. The

importance of cloud hospitals and digital health labs to offer patient care and support research and development was emphasised during meetings when discussing the importance of infrastructure readiness.

A well-defined organisational structure, efficient data sharing mechanisms, and a solution-based strategy are required for effective digital health implementations. Critical decision-making, as discussed in meetings with RHA (Regional Health Authorities) executives, is dependent on the availability of pertinent information that can help address issues without siloing of clinical and financial data. The need to develop a national framework was also discussed to have a consistent approach assisting procurement processes.

Experts addressed the significance of interoperability maturity assessments, emphasising particularly the interconnection between integrated care units. The significance of primary care models that integrate data from HSE facilities and private hospitals.

Experts addressed the importance of evidence and the need to establish spaces for innovation, and they proposed assessing innovation with "digital health laboratories". The importance of a health technology assessment framework which is a useful instrument for evaluating healthcare technologies and making informed decisions about their implementation was also highlighted when discussing the importance of evidence-based practice.

Data protection and safety is another important topic discussed during meetings. Experts stated that DPIAs (data protection impact assessments) are the key risk management tools and are mandatory in some cases. However, it is also important to consider other factors such as the need for a national framework.

In addition to promoting user engagement developing digital health systems is crucial to promoting the wellness of the population as suggested in meetings done with advisory group and policy makers. It is emphasized that such systems should adopt a preventive approach, addressing issues such as smoking and alcohol consumption. Moreover, public health investments that serve a wide population are important in the context of digital health.

4. Discussion and Conclusion

A scoping review was performed to investigate the scope and nature of a body of digital health literature, develop an evidence map, summarise findings, and inform future implications. (Munn et al., 2019). Following the presentation of the evidence summary, the findings will be discussed considering previous studies and practical implications.

4.1. Summary of Evidence

Thematic analysis has been applied to identify and develop common themes and patterns contributing to effective digital health implementations. The themes include organisational readiness, financially viable business models, evidence-based practice and research, data management, motivation and digital health literacy of healthcare staff, and patient engagement. Insights gained from discussions with the advisory group and senior decision makers suggested that the scoping review results were applicable, and the key considerations of experts were consistent with the conclusions achieved.

4.1.1 Key Considerations:

Themes developed through thematic analysis were discussed by experts during advisory group meetings and a workshop. Considerations and opinions of advisory group members were integrated in evidence synthesis. Main points of discussion can be seen below:

- Organisational readiness is a crucial factor determining the effectiveness of digital health implementations. Organisational readiness implies that healthcare organisations must be prepared to undertake digital health interventions and have the appropriate resources and infrastructure in place. Interoperability maturity, developing effective digital health strategies and infrastructure readiness are the most important components. The importance of a digitalised workflow implementation plan, integration between various units, collaboration with partners was emphasised by experts. Additionally cloud hospitals and digital health laboratories to give patient care and assist research and development is critical for infrastructure readiness.

- A national governance structure, across the public sector would encourage more citizen focus. Strong policies and strong national governance is required to support policy implementation. Expedite the establishment of digital health structures within the HSE to enable governance for digital health, and establish an approach for the implementation of the digital health strategy.
- A financially viable business model will ensure that digital health interventions are sustainable to ensure their long-term success. Experts emphasised the need to develop a national framework to have a consistent approach assisting procurement processes. Adopt a lifecycle approach to the resourcing of digital health from financial and human resources perspective. Confirm strategic funding for supporting longitudinal investment.
- Evidence-based practice and research is also crucial ensuring that digital health interventions are grounded in research and evidence-based practice to maximise their effectiveness. The importance of health technology assessment framework and the need for digital health laboratories is highlighted. Design, implementation and evaluation of digital initiatives through a focused programme of digital health research, in partnership with academic and industry stakeholders is advised.
- Data management is necessary for the proper handling and storage of patient data to ensure its security and privacy. Experts stated that DPIAs (data protection impact assessments) are the key risk management tools and are mandatory in some cases however it is also important to consider other factors such as the need for a national framework. Expedite the finalisation of the Data Strategy, and develop a national ethical data security framework. They advocated for national data management structures for data management, with standard of data definition and utilisation across the system.
- The motivation and digital health literacy of healthcare staff must be considered to ensure staff are knowledgeable about digital health interventions and motivated to use them effectively. This requires the utilisation of trained staff, to enabling learning infrastructure for a digital healthcare workforce. National and regional leadership is required to ensure transformation, support a positive attitude with staff, and adoption of user friendly tools.

- Patient engagement and inclusion is critical in the design and implementation of digital health interventions to ensure that they meet patient needs and preferences. Promoting the wellness of the population was suggested in meetings and experts emphasized that digital health systems should adopt a preventive approach, addressing issues such as smoking and alcohol consumption. Person-centred/PPI approach is central to the co-design of interventions. Treating service-users as a resource will be key in the development of services, and for self-care and self-management interventions in particular. An enabling infrastructure is required to permit this.

4.2. Conclusion: Implications for Practice

Digital health data management is critical for the success of digital health systems, but there are several challenges to be addressed. These include issues related to data management efficiency, privacy, security, and low-quality outcome monitoring. Achieving high-quality data is essential for realising the potential of digital health systems. It requires accessible and reliable information, bolstering cybersecurity and data security, and achieving data standardisation.

Evidence-based practice is essential for effective digital health solutions, including clinical efficacy assessment, outcome evaluation, and organizational readiness assessment (Cresswell et al., 2013; World Health Organisation, 2021). Effective monitoring and evaluation are also crucial to ensure that digital solutions achieve their intended objectives. To conduct an efficient evaluation process, stakeholders should consider several factors, including scientific research, impact on professionals' practices and workflows, patient feedback, digital health quality assessments, and contracting processes (Cresswell et al., 2013; Topol, 2019).

To promote patient engagement and inclusion in healthcare systems, a multifaceted approach is required that includes value-based systems, increasing transparency of health system performance, valuing informed choice of patients, employing equality impact assessments (EIAs), and advocating people-centred health systems (World Health Organisation, 2021). Value-based systems provide personalized care that considers the individual's unique needs and circumstances, which helps overcome inequities and promotes inclusivity. Patients should have access to information about the quality of healthcare services

and outcomes to make informed decisions about their care. Patients should also be involved in their care decisions and have access to accurate and relevant information about their health and treatment options. Employing EIAs is necessary to assess the potential impact of policies, programs, and services on individuals and groups. Finally, people-centred health systems ensure that services are designed to meet the patient's needs and preferences (von Wedel et al., 2022).

Digital health initiatives are vital in improving the quality of care and patient outcomes in healthcare organisations. However, the successful implementation of digital health requires organisational readiness and appropriate infrastructure (Woods et al., 2022). Therefore, healthcare organisations need to address poor organisational and management policies, infrastructure issues, and advance the implementation of national digital health strategies and promote global collaboration and advance knowledge to ensure the successful implementation of digital health initiatives (World Health Organisation, 2021).

Digital health strategies involve the use of different technologies such as telemedicine, remote monitoring, and electronic health records which require significant financial investment. Thus, a financially viable business model is critical for the sustainability and success of digital health initiatives. To achieve this, funds should be shifted from traditional administrative costs to digital healthcare platforms to enable increased access (Jin and Wang, 2022). Additionally, the price of medical devices should be appropriately reduced, and suppliers that can offer affordable, high-quality medical devices and associated supplies should be integrated to increase efficiency (Wu, 2023). Future financing models and procurement strategies must also be considered for consumer markets and/or governmental channels to adopt and use digital health apps and services (Lennon et al., 2017). Wu (2023) conducted research to measure the financial efficiency of hospitals and to identify factors and business strategies to improve profitability. Results suggest that (1) AI should be used to optimize healthcare services by predicting when patients will need to go to the hospital and using big data analysis to determine how to best utilize medical resources: (2) electronic medical records can be stored in the cloud to reduce space and processing costs, (3) medication management systems should be developed to reduce prescription errors, and (4) changes to the procurement system can be made to reduce inventory and improve the efficiency of medical equipment use.

Finally, to successfully implement digital health tools, healthcare professionals must be motivated and have an in-depth understanding of the field. Digital health tools are becoming increasingly important in healthcare and have been particularly crucial during the COVID-19 pandemic. Adopting these technologies can improve the efficiency, accessibility, and quality of care, but there are non-technical factors that need to be considered, such as political and cultural aspects that can impact the adoption and diffusion processes (Marwaha et al., 2022). To ensure successful adoption, all actors must improve their ability and confidence in recognizing and addressing concerns regarding quality, privacy, security, and safety in digital health care, as well as the ethical issues that surround them (Bouabida et al., 2021; Shaw & Donia, 2021). Furthermore, reskilling, learning, and changing professional responsibilities are required for the adoption of digital health technologies (Rainey et al., 2021).

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Appendices

Appendix 1

Table 3. Distribution of Countries

Country	Number of records
Europe (*miscellaneous)	6
Australia	6
UK	6
USA	2
Canada	2
Ireland	2
Türkiye	2
Kenya	2
India	1
Greece	1
Sierra Leone	1
Bhutan	1
Kuwait	1
Finland	1
Pacific Islands	1
Switzerland	1
Korea	1
African countries	1
Spain	1
Poland	1
Lebanon	1
Germany	1
Cyprus	1
South Korea	1
Saudi Arabia	1
Mauritius	1
Global	1
New Zealand	1
Denmark	1
Sweden	1
TOTAL	50

**Includes Croatia, Hungary, Netherlands, Spain, Germany, UK, Austria, Switzerland*

Appendix 2

PRISMA Flowchart

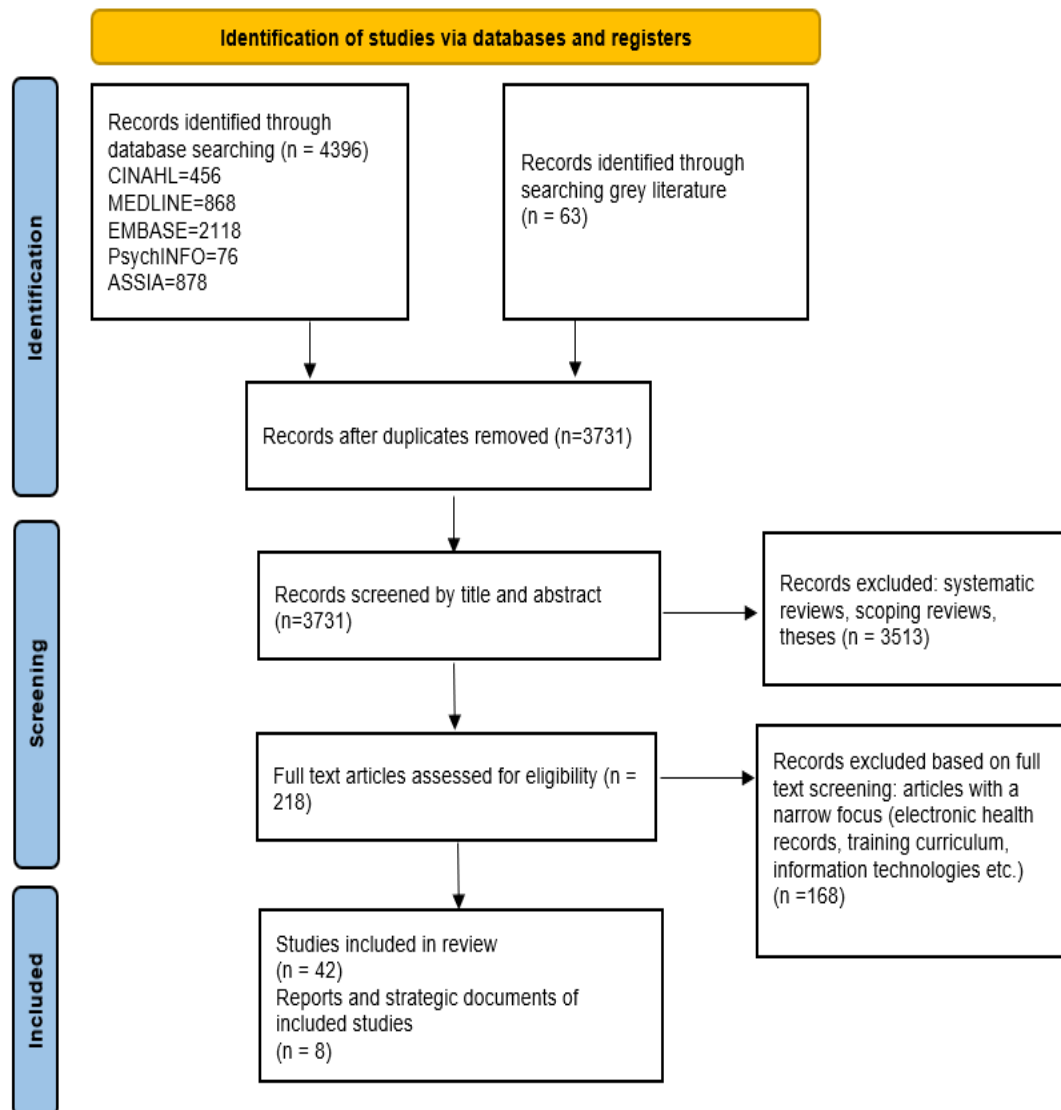


Figure 2. PRISMA Flowchart describing process for article selection.

Appendix 3

Table 4: Summary of initial findings

Overarching category	Subcategory	Description
Enablers	1. Organisational readiness	• Having a culture of innovation and established clear policies encouraging use of digital services • Clear organisational structure and a roadmap to achieve long-term sustainability • High level of interoperability and integration in existing workflows • Partnership readiness • Enhanced IT capacity allowing digital health ecosystem monitoring
	2. Financially viable business model	• Inclusion in routine government budgeting • Aligning funding structures and resource readiness • Effective procurement approaches: affordability and sustainability, analysis of risks and benefits • Refinement, and removal of elements that do not add value
	3. Analytical capacity and capability of workforce	• Clearly defined organisational roles • Cultivating multiple champions of digital health, strong leadership at organisational and system level • Enhancing physicians' and nurses' facilitator role in innovation adoption • Positive attitude of healthcare staff towards digital health implementations, willingness to adopt technology • Advanced IT skills amongst healthcare staff
	4. Data management efficiency	• Expanding data handling processes • Flexible design for evolving needs • Open-source digital health platforms and transparency • Ensuring data privacy and security • Accessibility to patient data and software
	5. Evidence based practice	• Complemented and extended health care research • Assessing the clinical efficacy of implementations • Evidence-based intervention components • Evaluating outcomes to guide future progress • Using assessment models and tools to evaluate organisational readiness, health technology efficiency, patient engagement, and attitudes towards digital health implementations
	6. User engagement	• Equity of access • Having a value-based, citizen centred and user-friendly digital health system • Patients being an active partner provided flexible interaction before and after treatment • Getting evaluation and feedback from users
Barriers	1. Poor organisational and	• Underdeveloped health strategies lacking an information management plan • Unclear, undefined process for innovation

	management policies	• Poor budgeting strategies, problems about high costs and financial constraints • No viable business model for preventive intervention • The persistence of paper-based systems • The lack of communication • The lack of awareness about ethical considerations • The lack of research
	2. Infrastructure issues	• Incompatibility of existing processes and innovation • The lack of digitisation in inpatient wards • The problems regarding staff and patient access to the internet
	3. Poor motivation and lack of knowledge of healthcare staff	• Poor motivation of healthcare staff because of the time-consuming data entry process, technical language and fear of change causing resistance • Lack of experience of healthcare workers in using health technology applications • Low levels of digital literacy • Lack of trained personnel to handle health information systems
	4. Low level of interoperability maturity	• Closed systems lacking interoperability • Refusal to share data
	5. Lack of privacy and security protections and low-quality outcome monitoring	• Lack of transparency in privacy policies • Lack of strict data protection policies
	6. Lack of user engagement	• Lack of digitally enabled self-management platforms • Complexity of the digital health platforms • Missing value of patients and lack of citizen centric digital health awareness programmes • Lack of patient access to medical records or treatment plans • Lack of connectedness between physicians and patients
3. Considerations	1. Establishing a deliberate and actionable digital health strategy	• Adopting an approach of a national digital health system • Ensuring consistency of implementation processes • Establishing the role of governments, development partners and industry • Developing the European Health Data System (EDHS) ecosystem
	2. Adoption of a streamlined, interoperable, and comprehensive health information system	• Adopting an e-health governance approach including interoperability guidelines • Transformation to a learning health care system: organisations should offer help from efficient resources and assist healthcare professionals, individually designed trainings should be provided based on skills and tasks • Customized interventions need to be provided for local contexts and requirements

		• Infrastructure issues need to be resolved through stabilising operational environment and building security operations centre • All health data need to be integrated
	3. Improving digital health data management	• Data accessibility should be increased to aid in advancements of practical health solutions • Privacy guidelines should be implemented to handle with data security and privacy issues • Conditions for the second-hand health data should be clarified and harmonised • The health records need to be used to support health and care policy and planning
	4. Conducting efficient evaluation process	• Scientific research should be conducted (not only for academic purposes, but stakeholders also run research) • The impact of digital implementation on the work of professionals should be assessed • A chance to give feedback should be provided to patients • Digital health quality assessments should be employed • New ways to quickly narrow the field should be found in a noisy crowded digital market and contracting processes should be evaluated
	5. Engaging professionals in the service by providing them with opportunities to influence others	• Professionals should be provided with enough time to become acquainted with the service and enough know how regarding the service • The new services should be incorporated into the routine work of professionals • Ensuring the professionals to have a positive attitude toward the service by providing justification of the use, simple and monitored usage and enhancing awareness about digital literacy • Jeopardizing should be prevented by ensuring sensitivity about ethical considerations
	6. Increasing patient engagement and inclusion	• Digital health technologies should be adopted to assist elderly • Health facility registry should provide information to patients about all possible diagnostic tests and services and schemes available
Priorities	1. Advancing the implementation of national digital health strategies	• Promoting digital transformation and enhancing the capacity to change with strong government support and policies • Promoting policymakers' understanding of the level of digital health transformation to fulfil the gap between private and public institutions • Strengthening governance for digital health at global, regional, and national levels • Developing new care models to build sustainable service longer term • Leveraging existing assets and capabilities • Developing an integrated strategy to achieve successful digital health initiatives

		• Developing normative and regulatory frameworks supporting interoperability and streamlining communication flows • Improving service planning, and enhancing artificial intelligence capabilities • Building combined digital solutions (connecting IT systems) to create a more local, cohesive, and effective health system • Accelerating and expanding the use of virtual and telehealth services • Building combined digital solutions (connecting IT systems) to create a more local, cohesive, and effective health system • Accelerating and expanding the use of virtual and telehealth services
	2. Planning economic investments	• Addressing affordability issues with responsible partners • EU can support with investment and coordination to member states • Investing time and resources in consensus building to resolve issues at early stage • Increasing investment in AI • Using taxpayers' money efficiently
	3. Monitoring and evaluation of public health digital solutions	• Actionable insights needed to improve evidence-based decisions • Medical AI software evaluation should be made in formal scientific settings • Data-driven projects should be supported to advance timely and informed decision-making processes
	4. Promoting global collaboration and advance knowledge	• Improving commitment by countries • Recognizing impediments faced by least developed countries • Improving application fields and standards; cell and gene therapies, digitalisation in surgery, innovation and decentralisation of clinical trials and investigations, optimising invasive procedures, remote consultation/monitoring/care, faster development of devices and medicines, personalised care plans, integrated care
	5. Promoting patient engagement and inclusion	• Providing value-based systems overcoming inequities • Increasing transparency of health system performance • Valuing informed choice of patients • Employing equality impact assessments (EIAs) • Advocating people centred health systems
	6. Achieving high quality data	• Accessible and reliable information which is commonly understood and trusted • Bolstering cybersecurity and data security within health system • Achieving data standardisation