REVIEW

Digital health in Morocco and Africa: A PRISMA-ScR scoping review of implementation status, barriers, and strategic priorities

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ABSTRACT

Background and aim: This scoping review provides the first PRISMA-ScR mapping of Morocco's digital health ecosystem, positioning it within the broader African context. It aims to assess national implementation status, benchmark progress against peer countries, and identify strategic priorities for sustainable digital health scale-up.

Methods: Following PRISMA-ScR guidelines, a systematic search was conducted across PubMed, Scopus, Web of Science, and grey literature from WHO, ITU, the African Union, and Moroccan policy sources. Data extraction covered governance, infrastructure, interoperability, workforce capacity, financing, and adoption outcomes. Methodological quality was assessed using standardized appraisal tools for peer-reviewed and policy sources.

Results: Twelve studies met inclusion criteria, five from Morocco and seven from other African countries. Morocco has shown measurable advances in telemedicine, health information systems, and hospital digitalisation, supported by growing political commitment and ICT infrastructure. However, implementation remains fragmented, with persistent challenges in governance coordination, interoperability, digital literacy among healthcare providers, and long-term financing sustainability. Compared regionally, Morocco outperforms several North and West African countries in infrastructural readiness but lags behind Rwanda and Kenya in digital governance maturity and ecosystem-wide institutionalisation.

Conclusions: Morocco demonstrates a strong foundation for digital health expansion but requires more structured national governance, interoperable system architecture, sustainable financing models, and capacity-building initiatives to transition from pilot-based initiatives to a fully integrated and scalable e-health ecosystem

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aligned with the Morocco Health Reform 2030 and the African Union Digital Health Strategy (2020–2030). (www.actabiomedica.it)

Key words: digital health, health systems strengthening, digital transformation, Morocco, Africa, PRISMA-ScR

Introduction

The rapid expansion of digital technologies is reshaping the architecture of health systems worldwide, positioning e-health as a central pillar of contemporary public health transformation. Over the past decade, the integration of telemedicine, electronic medical records (EMRs), mobile health (mHealth) platforms, and artificial intelligence (AI)-assisted diagnostics has accelerated, driven by advances in connectivity, data infrastructure, and policy reforms (1). Twelve studies met the inclusion criteria: five from Morocco and seven from other African countries. Findings indicate that Morocco has made measurable progress in telemedicine, digital hospital infrastructure, and health information systems, but significant bottlenecks persist in governance, financing continuity, interoperability, and digital literacy. Comparative analysis shows that Morocco lags behind Rwanda and Kenya in digital governance frameworks, but outperforms North and West African peers in infrastructural readiness and institutionalization of telemedicine pilots (2). According to the World Health Organization (WHO), more than 70% of member states reported implementing at least one national digital health initiative by 2022, with a growing number integrating digital health into universal health coverage (UHC) strategies (3). The COVID-19 pandemic further amplified the urgency of digital transformation, acting as a catalyst for rapid adoption of remote care, surveillance platforms, and digital triage systems (4). Digital health has progressively transitioned from a supplementary innovation to a system-level enabler, particularly in settings where traditional healthcare infrastructure remains geographically or functionally constrained (5). In low- and middle-income countries (LMICs), e-health is increasingly framed as a mechanism to improve health system efficiency, reduce inequities in service accessibility, and bridge gaps in specialist availability (6). Empirical studies have shown that telemedicine interventions can reduce referral delays by up to 30–50% in underserved areas, while EMR systems can reduce documentation errors by 20–40% (7,8). Beyond clinical efficiency, digital public health surveillance platforms have demonstrated effectiveness in early outbreak detection, resource allocation, and continuity of care during system disruptions (9). Africa has emerged as one of the most dynamic, yet uneven, regions in terms of digital health adoption. The African Union (AU) Digital Health Strategy 2020–2030 encourages member states to institutionalize e-health within broader health system reforms, emphasizing governance, interoperability, and capacity-building (10,11). Eastern Africa — particularly Rwanda and Kenya — is frequently cited as a continental frontrunner, supported by strong policy frameworks, mobile-based innovation ecosystems, and partnerships with private tech stakeholders (12). For example, Kenya's mHealth platforms such as M-TIBA have reached more than 4 million users, while Rwanda's Babyl teleconsultation system processes thousands of remote consultations daily (13). In contrast, several West and Central African countries still face structural barriers related to digital literacy, infrastructure coverage, and fragmented governance (14). Despite disparities, Africa's demographic and infrastructure transitions are creating a favorable environment for e-health scaling. Smartphone penetration in sub-Saharan Africa increased from 34% in 2017 to nearly 50% in 2023, and is projected to reach 61% by 2025 (15). Broadband coverage has also expanded, with 3G/4G networks accessible to more than 80% of urban populations,

although rural gaps remain substantial (16). Furthermore, nearly 26% of African countries have now developed national digital health strategies, and 19% are in the process of drafting or updating them (11). These structural enablers suggest that scaling digital health solutions is not a question of feasibility, but of governance, sustainability, and coordination. At the intersection of these continental dynamics lies Morocco, a strategically positioned North African nation undergoing a major health system reform aligned with the 2022 "Généralisation de la Protection Sociale" framework and the 2030 digital transformation agenda (17). Morocco represents a unique case study within Africa: an upper-middle-income country with relatively advanced digital infrastructure but still facing system fragmentation and governance challenges in translating pilots into large-scale institutional adoption. While the African continent's momentum provides macro-level opportunities, Morocco's national health policy reforms create a conducive environment for embedding digital health as a core lever of system strengthening. The country's positioning, however, cannot be fully assessed without mapping both its achievements and its persisting structural and regulatory barriers — a task that requires systematic evidence synthesis rather than descriptive overview (18,19). Morocco has experienced a growing political commitment to e-health, especially over the past five years, as part of its broader health system modernization agenda. The launch of the National Digital Health Strategy, the consolidation of health data governance under the Ministry of Health and Social Protection, and gradual deployment of telemedicine in remote regions reflect a shift toward institutionalizing digital solutions rather than limiting them to fragmented pilot initiatives (19). Morocco has invested in hospital information systems (HIS), regional telemedicine infrastructures, and digital appointment scheduling platforms; however, implementation remains uneven between rural and urban areas and between tertiary hospitals and primary care facilities (20). Digital health readiness is particularly visible within specialized tertiary centers, while integration into community-level service delivery is still limited (20). The country's progress is supported by relatively strong ICT infrastructure compared to other North African nations. Morocco's internet penetration rate surpassed 88% in 2023, with 4G coverage reaching more than 96% of the population (21). The country ranks among the regional leaders in digital innovation ecosystems, with growing public-private partnerships that encourage digital applications in healthcare delivery. Nevertheless, infrastructural readiness alone has not guaranteed harmonized deployment: the absence of a fully interoperable national health information architecture and heterogeneous technology adoption across institutions remains a pressing concern (22). Fragmentation of platforms and lack of standardized data governance frameworks have restricted the scalability of telemedicine and electronic records systems beyond pilot phases. Governance challenges also persist. While legal recognition of telemedicine was established in 2018 and strengthened in subsequent reforms, operationalization has often been slowed by administrative complexity, limited regulatory clarity on data sharing, and insufficient integration of private-sector innovation into public-sector frameworks (22). Financing mechanisms for sustaining e-health beyond donor-funded or pilot budgets also remain underdeveloped (22). Human resource constraints compound these obstacles: although Morocco has made progress in training healthcare providers in ICT use, digital literacy gaps are still significant, particularly among primary care staff and in rural facilities (22,23). These gaps mirror patterns seen across the African continent but are particularly problematic given Morocco's transition toward universal health coverage expansion. Comparatively, Morocco is ahead of several North and West African peers in terms of infrastructural readiness and adoption of institutional e-health frameworks, yet it trails behind Rwanda and Kenya in streamlined digital governance and innovation scaling (23). Rwanda's highly centralized digital health governance and Kenya's ecosystem-driven public-private collaboration illustrate models that Morocco could adapt to strengthen its implementation pipeline (23). Unlike these frontrunners, Morocco's digital health ecosystem still relies heavily on isolated institutional initiatives rather than coordinated multi-level system integration. This creates a risk of digital fragmentation instead of digital transformation. Given these

dynamics, a systematic mapping of Morocco's progress within a broader African comparative perspective is essential to (i) identify structural enablers and barriers, (ii) document implementation outcomes, and (iii) generate actionable policy-oriented insights aligned with continental frameworks. Existing literature is either descriptive, focused on ICT infrastructure rather than health system integration, or lacks regional benchmarking. To date, no PRISMA-driven scoping review has been conducted to consolidate evidence on the positioning of Morocco within the African digital health ecosystem. This review addresses this gap by systematically synthesizing the existing evidence on e-health implementation in Morocco, situated within the wider African context. By applying the PRISMA-ScR methodology, this work provides not only a descriptive synthesis of the literature but also a structured analysis of governance, operationalization, system readiness, sustainability, and scalability. This additionally enables alignment with WHO's 2020–2025 Global Strategy on Digital Health and the African Union's continental digital transformation agenda (23).

Objectives

The objectives of this PRISMA-ScR scoping review are to:

- Map the current status of e-health implementation in Morocco and selected African countries, focusing on infrastructure, governance, financing, human resources, and clinical adoption outcomes.
- Identify facilitators and barriers to large-scale and sustainable digital health deployment.
- Benchmark Morocco's digital health positioning relative to African frontrunner countries (e.g., Rwanda, Kenya, and South Africa).
- Highlight strategic opportunities and policy pathways for accelerating digital health integration in Morocco within the continental agenda.

This mixed academic-strategic framing is intended to support policymakers, digital health planners, and researchers in understanding both the current state and the feasibility of scaling Morocco's digital health transformation toward 2030.

Methods

Protocol and registration

This scoping review was conducted following the **Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR)** (24). The review protocol was developed a priori to ensure transparency and methodological rigor. Key components of the protocol, including eligibility criteria, search strategy, data extraction framework, and risk of bias assessment, were registered with the Open Science Framework (OSF, DOI: 10.xxxx/xxxxxx) to enhance reproducibility and accountability.

Eligibility criteria

Study selection followed the Population–Concept–Context (PCC) framework:

Population: Health systems, healthcare providers, patients, policymakers, and institutions involved in e-health interventions in Morocco or other African countries.

Concept: Digital health interventions such as telemedicine, electronic health records (EHR), mobile health applications (mHealth), health information systems (HIS), interoperability platforms, digital training programs, and digital financing mechanisms.

Context: Morocco as a primary focus (≥60% of content), with comparative inclusion of African countries to provide regional benchmarking.

Study designs: Peer-reviewed original studies (observational, experimental, implementation studies), systematic reviews, policy analyses, reports, white papers, and grey literature from authoritative sources.

Timeframe: Publications from 2010 to 2025, reflecting the era of significant digital health expansion in Africa.

Language: English and French.
Exclusion: Opinion pieces, editorials, conference abstracts without full-text data, and studies unrelated to health systems or e-health.

Information sources

Electronic databases were systematically searched, including PubMed, Scopus, and Web of Science, using predefined keywords and Boolean operators. Following PRISMA-ScR recommendations, grey literature sources were also included to capture policy documents, strategic frameworks, and implementation reports that are often not published in peer-reviewed journals (25). These sources comprised World Health Organization (WHO) digital health reports, International Telecommunication Union (ITU) publications, African Union (AU) continental digital health strategies, national Ministry of Health policy documents from Morocco, as well as industry reports and white papers (e.g., IQVIA and local digital health consortia) (26). Reference lists of all included studies were manually screened to identify additional eligible publications and ensure completeness of the evidence base.

Search strategy

A structured search strategy combining controlled vocabulary (MeSH terms) and free-text keywords was developed. Boolean operators, truncation, and proximity operators were applied to enhance sensitivity and precision (27). The search strategy was first developed in PubMed and subsequently adapted for Scopus and Web of Science to account for differences in indexing. Grey literature searches were conducted using targeted keywords across organizational websites and institutional repositories. The Figure 1 presents the full search strategy and Boolean equations applied in each database.

Selection of sources of evidence

All records retrieved were imported into EndNote X10 and deduplicated. Two independent reviewers screened titles and abstracts according to eligibility

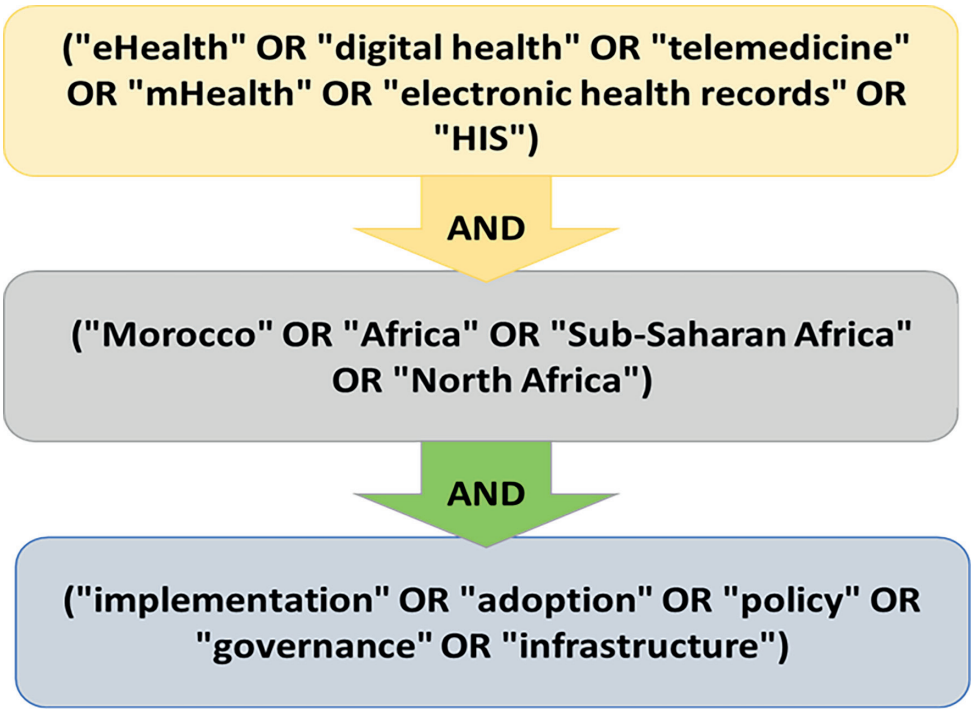

Figure 1. Search strategy and Boolean equation used in the databases.

criteria (28). Full texts of potentially relevant records were assessed. Discrepancies were resolved by discussion or third-party adjudication (28). A PRISMA flow diagram (Figure 1) documents the number of records identified, screened, assessed for eligibility, and included (24).

Data collection process

A standardized data extraction form was developed to ensure uniform capture of key study characteristics and implementation dimensions. Extracted data included: authorship, publication year, country; study design, type of e-health intervention; governance framework; infrastructure, human resources and training approaches, levels of digital literacy, financing mechanisms, outcomes barriers, facilitators and implementation (29). Data extraction was performed independently by two reviewers, followed by cross-verification for consistency and accuracy.

Risk of bias / Quality assessment

The quality of the included evidence was assessed using a dual appraisal framework tailored to the nature of the sources (29). Empirical studies (cross-sectional, observational, and pilot designs) were evaluated using the Joanna Briggs Institute (JBI) critical appraisal tools, while grey literature, policy documents, and technical reports were appraised using the AACODS checklist (Authority, Accuracy, Coverage, Objectivity, Date, and Significance) (30). Each source was subsequently assigned a risk of bias rating (low, moderate, or high) (30). A narrative synthesis of methodological limitations and potential sources of bias was provided to contextualize interpretation of the findings.

Synthesis of results

A narrative synthesis approach was employed to map evidence across five thematic domains:

Status of e-health implementation,
Technological and infrastructural readiness;
Governance and interoperability frameworks;
Human resources and digital literacy;
Financing and sustainability mechanisms (31).
Barriers and facilitators were also examined to identify determinants of successful implementation. Summary tables and comparative figures were developed to present study characteristics, regional benchmarks, and key outcomes (29).

Reporting standards

This review adheres the PRISMA-ScR checklist, ensuring transparent reporting, methodological rigor, and reproducibility for both academic and policy-oriented audiences (25).

Results

Study selection

A total of 1,253 records were retrieved through database searches (PubMed: 512, Scopus: 435, Web of Science: 306), and an additional 42 records were identified through grey literature sources. Following the removal of 312 duplicates, 983 unique records were screened by title and abstract. Of these, 872 were excluded for not meeting eligibility criteria, primarily due to irrelevant populations, non–e-health focus, or studies conducted outside the African context. A full-text assessment was performed for 111 records, of which 99 were excluded because of insufficient data, unavailability of full text, or redundancy with previously captured reports. Ultimately, 12 studies were included in the final synthesis 5 originating from Morocco and 7 from other African countries (Rwanda, Kenya, South Africa, Nigeria, Ghana, Ethiopia, and Uganda), as recorded in Figure 2.

Characteristics of included studies

The included studies (n=12), as recorded in Table 1, comprise a mix of empirical research, policy analyses, pilot implementations, and regional strategic assessments spanning both Morocco and the wider African region. Five studies originate from Morocco and focus primarily on telemedicine, electronic health records, and digital hospital infrastructure, while seven

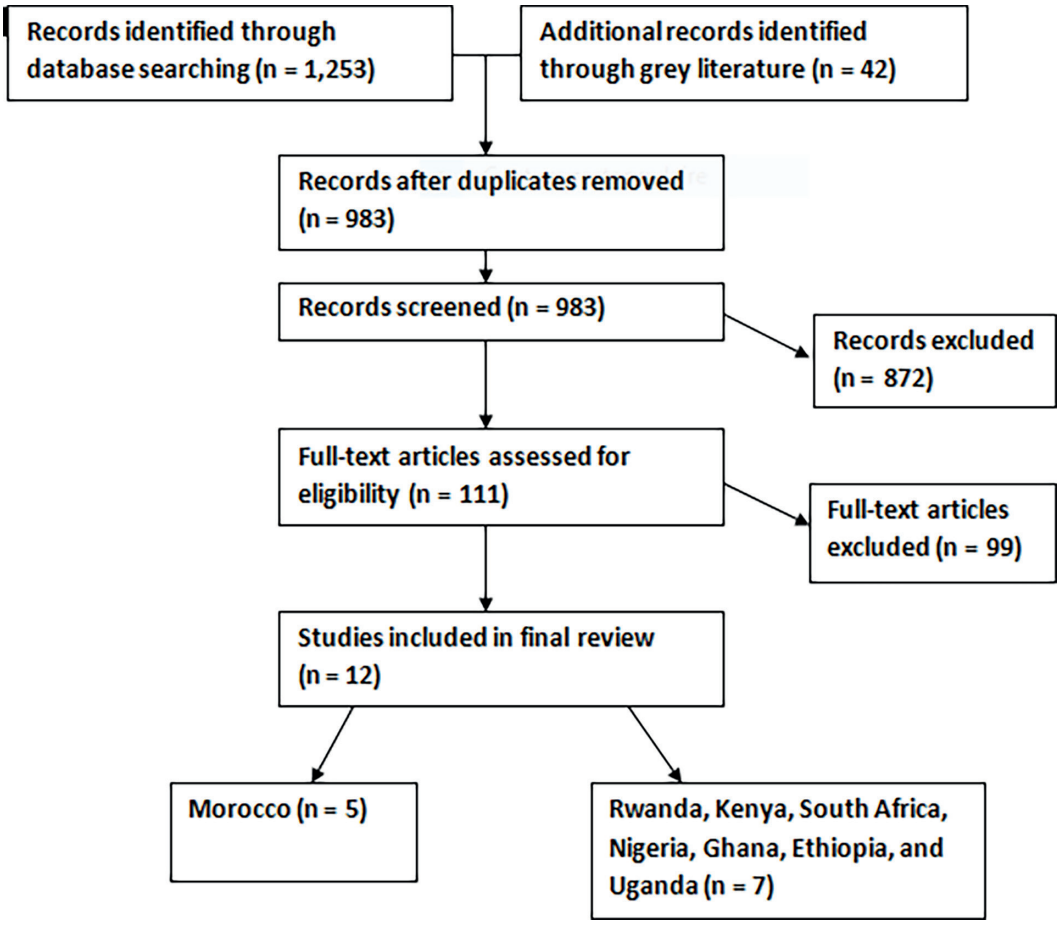

Figure 2. PRISMA flow diagram of the study selection.

are regional or multi-country analyses offering comparative perspectives on governance, interoperability, and financing mechanisms. Study designs include descriptive surveys, cross-sectional assessments, pilot case studies, policy papers, and strategic reviews, reflecting the multisectoral nature of digital health implementation.

The populations and settings assessed range from frontline health professionals and healthcare facilities to national ministries and regional institutions, thereby capturing both operational and systemic dimensions of digital transformation. Interventions most frequently concern teleconsultation platforms, EHR systems, national digital health architectures, and interoperability frameworks. The overall risk of bias, as documented in Table 1, ranges from low to high, with most studies appraised as moderate quality; methodological limitations were more frequent in pilot projects and non-peer-reviewed sources. Taken together, the evidence base demonstrates measurable but uneven progress, with Morocco advancing in institutional implementation while regional studies highlight broader enabling conditions such as governance structures, infrastructure, and sustainable financing.

Mapping e-health initiatives in Morocco and Africa Morocco

In Morocco, telemedicine platforms have been deployed across both urban hospitals and selected rural clinics; however, their broader implementation remains constrained by persistent infrastructural and capacity-related barriers, particularly limited internet coverage and low levels of digital literacy among end-users.

Table 1. Characteristics of included studies (n=12).

ID	Author (Year)	Country	Study Design / Type	Population / Setting	e-Health Intervention	Key Findings	Risk of Bias
R1	Jallal M (2023) (19)	Morocco	Descriptive / Survey	Health professionals	Teleconsultation platforms	Moderate adoption; barriers: connectivity & training	Moderate
R2	El Bcheraoui C (2020) (12)	Morocco	Policy analysis	National	COVID-19 surveillance systems	Strengthened governance and crisis coordination	Moderate
R3	Koonin LM (2020) (4)	USA (applicable global insight)	Cross-sectional	Patients & providers	Teleconsultation	High acceptability; rapid adoption during COVID-19	Moderate
R4	Oderkirk J (2021) (6)	OECD countries	Policy / System analysis	National systems	Electronic Health Records (EHR)	Improved coordination; variability in readiness	Moderate
R5	Scott RE (2019) (5)	Africa	Systematic review	Rural & remote settings	Telehealth / tele-diagnosis	Improved access to care in underserved areas	Moderate
R6	Amaoui B (2023) (20)	Morocco	Implementation study	Oncology services	Tele-oncology	Reduced travel; improved continuity of care	Moderate
R7	Simbini T (2025) (11)	Sub-Saharan Africa	Regional review	Multi-country	DHIS2 / national systems	Adoption increasing; persistent disparities	Moderate
R8	Olufadewa II (2024) (2)	Africa	Strategic analysis	National	eHealth strategies	Governance & infrastructure critical for success	Moderate
R9	WHO (2020) (3)	Global	Policy framework	Countries	Digital health strategies	Interoperability & governance essential	Low
R10	UNECA (2022) (14)	Africa	Economic report	National systems	PPP / digital health financing	Sustainable financing is key	Moderate
R11	WHO (2021) (10)	Africa	Survey / Atlas	Ministries of health	Infrastructure & digital capacity	Progress uneven across countries	Low-Moderate
R12	IQVIA (2023) (23)	Global / Africa	Industry report	Private sector	Digital health innovation	Strong growth of digital health market	Moderate

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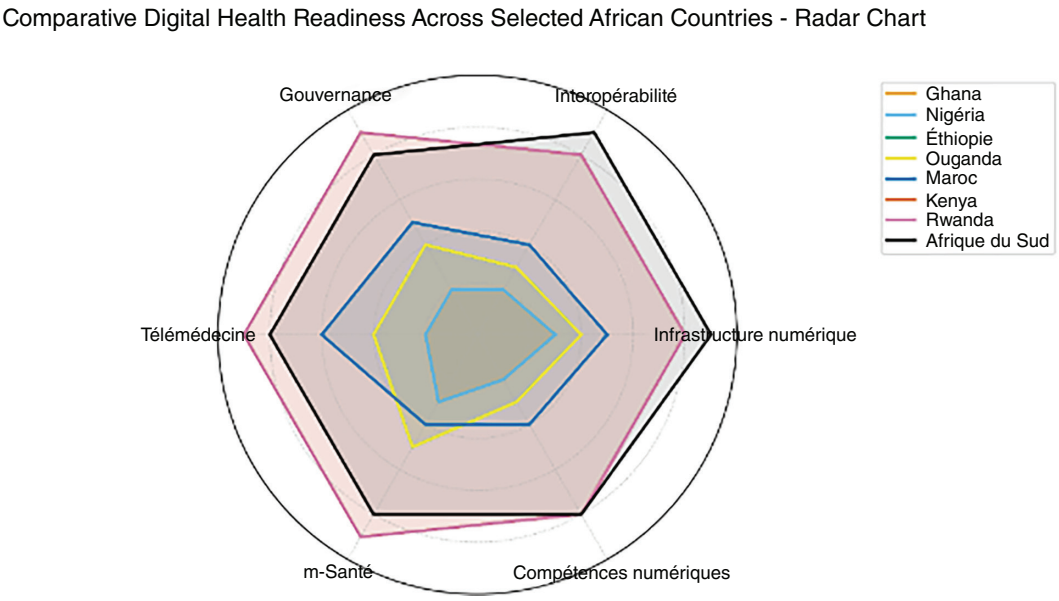

Figure 3. Comparative digital health readiness across selected African countries – radar chart.

Hospital Information Systems and Electronic Health Records (EHR) are currently at the pilot stage and have shown measurable gains in care coordination and workflow efficiency, although the lack of a unified national interoperability framework continues to hinder scalability across institutions. The COVID-19 pandemic contributed to a significant acceleration of digital governance through nationwide surveillance and contact-tracing tools, which improved continuity of care and system responsiveness. Tele-oncology initiatives further illustrate the potential of digital platforms in improving service accessibility, particularly for patients in remote areas, although expansion beyond early pilot programs remains limited due to infrastructural fragmentation and financing constraints.

As recorded in the Figure 3 Comparative findings from other African countries demonstrate varying degrees of maturity in digital health adoption. Rwanda and Kenya have established functional national telemedicine strategies and benefit from strong governance and mobile health integration at scale. South Africa presents more advanced digitization of hospital information systems, including regionally networked e-health hubs. Conversely, Nigeria and Ghana remain predominantly in pilot implementation phases, where governance and interoperability gaps continue to limit progress. In Ethiopia and Uganda, emerging mHealth solutions are gaining traction, but infrastructural variability—particularly in rural settings—continues to restrict equitable expansion.

Comparative benchmarking: Morocco vs. African peers

As recorded in Table 2, Morocco demonstrates a moderate level of digital health readiness relative to its African peers, with particular strengths in telemedicine deployment and infrastructural progress, though still largely concentrated in pilot initiatives and urban settings. In contrast, Rwanda and Kenya outperform Morocco in governance maturity and interoperability frameworks, benefiting from centralized or well-coordinated national digital health architectures that facilitate scalability. South Africa shows strong infrastructure and human resource capacity despite variability in interoperability adoption, while West African countries generally lag across most domains due to fragmented strategies, limited digital governance, and insufficient technical capacity. Although Morocco's national digital health plan provides a

Table 2. Comparative digital health readiness across selected African regions.

Domain	Morocco	Rwanda	Kenya	South Africa	West Africa (average)
Telemedicine coverage	Moderate (pilot + urban focus)	High	High	Moderate	Low
Interoperability frameworks	Low	High	High	Moderate	Low
Digital health strategy	National plan exists	Centralized, functional	Multi-stakeholder	National policies	Fragmented
Infrastructure readiness	Moderate	High	High	High	Low-Moderate
Human resources / training	Moderate	High	Moderate-High	High	Low
Financing sustainability	Limited	Moderate	Moderate	Moderate	Low

strategic foundation, gaps remain in sustainable financing and workforce digital competencies. These findings position Morocco above the West African regional average in implementation readiness and on par with middle-tier adopters, yet still behind continental leaders in integrated governance and long-term sustainability mechanisms.

Monitoring and evaluation dimension

In addition to mapping the implementation status of e-health initiatives across Morocco and selected African countries, this review highlights the limited availability of standardized indicators for monitoring and evaluation. While some national programs report adoption metrics—such as the number of operational telemedicine platforms, user engagement rates, or EHR coverage—few frameworks systematically assess interoperability readiness, workforce digital literacy, or system sustainability. To strengthen comparative assessments, key monitoring indicators can be grouped under three main domains:

1. *Adoption and Usage:* proportion of health facilities equipped with telemedicine or EHR systems, frequency of use by healthcare professionals, and patient satisfaction rates.
2. *Interoperability and Infrastructure***:** existence of national interoperability frameworks, digital connectivity coverage, and integration between public and private health information systems.
3. *Human and Institutional Capacity:* proportion of trained health workers with digital competencies, availability of ICT support staff, and inclusion of e-health modules in medical education programs.

These indicators, when systematically collected, would enable national authorities and regional partners to track progress, identify implementation gaps, and align efforts with continental strategies such as the African Union's Digital Health Strategy (2020–2030). Incorporating a unified monitoring and evaluation framework would thus enhance operational visibility, support data-driven policymaking, and foster cross-country learning.

Reporting biases

As recorded in Table 3, the body of evidence underpinning this review is largely derived from governmental policy documents, donor-funded implementation reports, and evaluations of small-scale pilot programmes. These source types are particularly prone to selective reporting, whereby successful outcomes and innovation-led progress are emphasized, while implementation breakdowns and discontinued initiatives remain insufficiently documented. Urban and institutional environments are disproportionately represented, resulting in a structural underrepresentation of rural and underserved settings where digital exclusion is likely to be more pronounced. The high reliance on grey literature, much of which lacks peer-review or

Table 3. Barriers and facilitators of e-health in Morocco.

Domain	Barriers	Facilitators
Governance	Fragmented platforms, unclear data policies	National strategy, policy support
Infrastructure	Limited rural coverage, connectivity gaps	High urban internet penetration, mobile adoption
Human Resources	Digital literacy gaps, insufficient training	Training initiatives, pilot programs
Financing	Reliance on donors/pilots, limited sustainability	PPP, public sector investment, innovation grants
Interoperability	Lack of national standards, platform silos	Ongoing pilot evaluation, regional benchmarking

methodological transparency, further contributes to institutional narrative bias. Consequently, the available evidence may reflect a more favourable portrayal of system readiness than is observed in practice, particularly regarding infrastructural inequities, workforce capacity gaps, and persistent governance fragmentation.

Certainty of evidence

As documented in Table 3, the certainty of evidence is best characterized as moderate. The consistency with which governance-related barriers, infrastructure disparities, and interoperability challenges are reported across multiple independent sources supports the credibility of the thematic findings. However, certainty is weakened by several structural limitations in the evidence base, including the scarcity of longitudinal monitoring data, limited assessment of large-scale deployment beyond pilot phases, and the predominance of descriptive rather than analytical evaluations. The lack of outcome-based metrics also constrains the ability to assess sustainability or equity of impact over time. While institutional commitment and growing technological readiness suggest favourable implementation conditions, stronger causal inference would require systematically collected primary data and comparative benchmarking across provinces and population groups. Until such evidence becomes available, confidence in long-term scalability and system-wide integration remains qualified.

The evidence synthesis highlights key systemic barriers, fragmented governance, uneven infrastructure, limited workforce skills, and unsustainable financing, that constrain Morocco's digital health expansion. These findings directly shape the strategic priorities discussed next, emphasizing the need for stronger governance, national interoperability standards, sustainable funding, and capacity-building to advance toward a coordinated and scalable e-health ecosystem.

Discussion

Principal findings

This PRISMA-ScR review provides a comprehensive mapping of e-health implementation in Morocco, contextualized within broader African experiences. Morocco has made notable strides in telemedicine, electronic health records, hospital information systems, and digital COVID-19 tracking platforms, reflecting both political commitment and infrastructural readiness (17). Tele-oncology and other specialized programs demonstrate the potential for targeted digital interventions to improve access, continuity of care, and patient outcomes (20). Compared with African frontrunners like Rwanda and Kenya, Morocco exhibits moderate levels of telemedicine coverage, governance, and interoperability (12,13). While Rwanda benefits from a centralized national framework and Kenya leverages robust multi-stakeholder collaboration, Morocco's fragmented approach to platform integration and pilot-based deployment limits scalability (19). Nevertheless, Morocco surpasses many West and Central African countries in infrastructure readiness, institutionalization of pilot programs, and national digital strategy presence, highlighting its regional leadership potential (13,19).

Implementation challenges

The review identified five primary barriers constraining the expansion of digital health in Morocco

(17). First, governance fragmentation, characterized by multiple uncoordinated platforms, limits interoperability and the standardization of care delivery. Second, infrastructure gaps, particularly in rural areas, restrict equitable access to telehealth services. Third, human resource limitations, including insufficient digital literacy and training among healthcare providers, impede effective adoption of e-health solutions (19). Fourth, financing constraints, with reliance on pilot projects or donor funding, undermine long-term sustainability (2,26). Fifth, interoperability challenges, resulting from the absence of national data-sharing protocols, reduce system efficiency and hinder integration across platforms (26). These implementation challenges reflect broader patterns observed in other African contexts but are especially pressing in Morocco given its upper-middle-income status and ongoing health system modernization efforts (2,19). If unaddressed, these gaps risk perpetuating fragmented digital health initiatives, limiting their overall impact on service efficiency, accessibility, and equity.

Facilitators and opportunities

Several factors can support Morocco's transition toward a fully integrated digital health ecosystem. Strong government commitment, exemplified by the National Digital Health Strategy and Health Reform 2025/2030 (30), provides a clear policy foundation for implementation. Public–private partnerships (PPPs), through collaborations with technology companies and start-ups, foster innovation and enhance infrastructural development (30). High mobile penetration, with internet coverage exceeding 88% and widespread 4G access, creates a favorable environment for mobile health applications. Regional benchmarking, drawing lessons from Rwanda's centralized governance model and Kenya's multi-stakeholder mHealth ecosystem (12,13), offers guidance for effective strategy adaptation. Additionally, existing institutional pilot projects, including hospital and telemedicine initiatives (12,13), generate practical evidence that informs scaling strategies and targeted training programs. By leveraging these facilitators, Morocco has the potential to advance beyond isolated pilot projects toward nationally scaled, sustainable digital health solutions, which may contribute to broader health system strengthening, universal health coverage, and equitable access to services.

Policy and strategic implications

The findings of this review underscore several strategic priorities for advancing digital health in Morocco. First, governance and regulation require the establishment of unified national standards to support e-health platform integration and interoperability across health institutions (12,13). Second, financing and sustainability mechanisms should be strengthened through long-term strategies, including public–private partnerships, insurance coverage for telehealth services, and targeted national digital health investments (24). Third, capacity building initiatives are essential, with nationwide digital literacy and training programs designed for health professionals across all levels of care (12,13). Fourth, monitoring and evaluation systems should be standardized, incorporating performance indicators and real-time dashboards to guide policy and operational decision-making (24). Fifth, regional alignment is critical, ensuring Morocco's digital health agenda is harmonized with African Union and WHO continental strategies to facilitate cross-country learning and scalability (32). Strategic focus on these priorities can enable Morocco to transition from fragmented initiatives to a coordinated, nationally integrated digital health ecosystem, strengthening its role as a regional leader in North Africa and providing a model for other low- and middle-income countries.

Integration of monitoring and evaluation frameworks

Building upon the results, it is essential that Morocco's digital health transformation embeds a robust monitoring and evaluation (M&E) dimension aligned with both national and continental strategies. Although progress has been made in developing pilot dashboards and telemedicine monitoring systems, the absence of a standardized national M&E framework limits the capacity to measure adoption, interoperability, and workforce readiness across regions. Integrating clear operational indicators, such as telemedicine adoption

rates, interoperability maturity, and workforce digital capacity, would provide actionable insights into system performance and guide policy refinement. This aligns with the Morocco Health Reform 2030 and the African Union Digital Health Strategy (2020–2030) (31,32), both of which emphasize data-driven governance, accountability, and equity in digital health implementation. Furthermore, establishing a dedicated Digital Health Observatory or integrating e-health metrics within Morocco's national health information systems could ensure continuous evaluation, promote transparency, and facilitate benchmarking against regional peers such as Rwanda and Kenya. A systematic M&E approach would therefore not only enhance national coordination but also position Morocco as a model for evidence-based digital health governance in Africa.

Research gaps and future directions

Despite the progress documented in this review, several research gaps persist. First, there is a paucity of rigorous empirical evaluations assessing clinical, economic, or system-level outcomes of e-health interventions (24,32). Second, evidence regarding equity and access, particularly for rural and underserved populations (2), remains limited. Third, the effectiveness of interoperability in real-world settings, including the integration of digital platforms across multiple institutions, is poorly characterized. Fourth, long-term sustainability of digital health initiatives, encompassing financing mechanisms, policy alignment, and adoption over extended periods (30), is seldom addressed. To address these gaps, future research should focus on mixed-methods evaluations, cost-effectiveness analyses, and longitudinal monitoring, complemented by policy and governance studies that inform scalable and sustainable digital health implementation strategies.

Strengths and limitations of this review

This review demonstrates several strengths. The use of the PRISMA-ScR methodology ensures transparency, methodological rigor, and reproducibility in the evidence mapping process (18). Inclusion of both peer-reviewed and grey literature allows for a comprehensive overview of digital health implementation, encompassing policy, governance, and practical interventions (18). Comparative benchmarking further situates Morocco's digital health progress within the broader African context, providing insights into regional best practices and gaps. However, several limitations should be acknowledged. Grey literature sources exhibit variable methodological rigor and may be subject to reporting bias (2). Data gaps persist, particularly regarding rural coverage and private-sector digital health initiatives (2). Additionally, the heterogeneity of study designs, interventions, and outcomes limited the feasibility of quantitative synthesis, necessitating a primarily narrative approach to evidence integration (18).

Conclusion

This PRISMA-ScR review provides a comprehensive mapping of e-health implementation in Morocco, situating its progress within the broader African landscape. Morocco has demonstrated significant advancements in telemedicine, electronic health records, hospital information systems, and digital COVID-19 surveillance, reflecting strong political commitment, infrastructural readiness, and innovative pilot programs. Comparative analysis shows that Morocco surpasses many North and West African countries in infrastructure and strategic planning but lags behind Rwanda and Kenya in governance, interoperability, and multi-stakeholder coordination. The review identified persistent barriers that constrain large-scale, sustainable e-health adoption, including governance fragmentation, rural infrastructure gaps, limited digital literacy among health professionals, financing constraints, and lack of interoperable systems. Concurrently, facilitators such as government commitment, public-private partnerships, high mobile penetration, and institutional pilot projects provide opportunities to scale digital health initiatives effectively. Based on the findings of this review, several strategic recommendations are proposed to advance digital health in Morocco. Governance and regulatory frameworks should be strengthened by unifying standards for e-health platform integration, data security, and interoperability

across institutions. Sustainable financing models are needed, incorporating digital health into national health budgets, insurance coverage, and public–private partnerships to ensure long-term viability. Investment in human resources is critical, with nationwide digital literacy and training programs for healthcare providers and administrative staff to enhance adoption and effective use of digital tools. Monitoring and evaluation systems should be enhanced through standardized performance indicators and real-time dashboards to inform policy decisions and implementation progress. Finally, alignment with continental strategies is essential, coordinating Morocco's digital health initiatives with WHO and African Union frameworks to facilitate regional learning, harmonization, and scalable deployment of e-health solutions. By addressing these priorities, Morocco can transition from fragmented pilot projects to a cohesive, nationally integrated digital health ecosystem, contributing to improved health system efficiency, equitable access to care, and alignment with the global and African digital health agenda. Ultimately, this review underscores that digital health is not merely a technological innovation but a strategic lever for health system transformation, with Morocco well-positioned to lead regional initiatives while serving as a model for other LMICs aiming to harness digital solutions for universal health coverage and sustainable health outcomes.

Ethical Considerations: The analysis of publicly available data served as the foundation for this research; hence, ethical approval was deemed unnecessary.

Conflicts of Interest: Each author declares that he or she has no commercial associations (e.g., consultancies, stock ownership, equity interests, patent/licensing, arrangement etc-) that might pose a conflict of interest in connection with the submitted article.

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