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Digital Health: Challenges and Barriers of Digital Health Implementation in Nigeria

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Digital health technologies are increasingly recognized as critical enablers of healthcare transformation, particularly in low- and middle-income countries striving to achieve Universal Health Coverage (UHC). In Nigeria, the adoption of digital health solutions—including electronic health records (EHRs), mobile health (mHealth) applications, telemedicine, health information systems, and digital financing platforms—has expanded considerably in recent years. This paper reviews the current state of digital health implementation in Nigeria, highlighting key trends, opportunities, and challenges influencing its effectiveness. Drawing on recent empirical studies, policy documents, and systematic reviews, the study examines factors affecting adoption, including infrastructure limitations, inadequate funding, workforce capacity gaps, interoperability concerns, data privacy and security issues, and regulatory challenges. The review further explores the role of digital health in strengthening healthcare financing, improving service delivery, enhancing patient outcomes, and supporting equitable access to healthcare services. Evidence suggests that while digital technologies have significant potential to improve healthcare efficiency and accessibility, persistent barriers such as low digital maturity, poor usability of health systems, gender disparities in technology utilization, and sustainability challenges among digital health startups continue to hinder widespread implementation. The paper concludes that strengthening governance frameworks, investing in digital infrastructure, promoting stakeholder collaboration, ensuring compliance with health information laws, and enhancing digital literacy among healthcare professionals are essential for maximizing the benefits of digital health innovations in Nigeria. These measures will contribute significantly to the development of a resilient, inclusive, and technology-driven healthcare system capable of advancing national health goals and achieving sustainable universal health coverage.

Keywords: Digital Health, Healthcare Technology, Electronic Health Records, Telemedicine, Universal Health Coverage, Health Information Systems, Data Security, Nigeria, Healthcare Innovation, Digital Transformation.

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INTRODUCTION

Digital health is about using technology to improve our health. This includes things like health applications, electronic health records and telemedicine platforms. The World Health Organisation says that digital health can help prevent, diagnose and manage diseases. (World Health Organisation [WHO], 2021. Nigeria is a country in Africa with a lot of people, over 230 million. Unfortunately, Nigeria has a lot of health problems and its healthcare system is not very good. Digital health can help solve some of these problems. Nigeria has tried to use health and it even made a plan to use digital tools to help everyone get the healthcare they need by 2020. Even with this plan, digital health is not being used as much as it could be in Nigeria. There are reasons for this and this paper will look at these reasons. (Uzochukwu et al., 2024).

BACKGROUND OF DIGITAL HEALTH IN NIGERIA

The WHO's Global Strategy on Digital Health 2020–2025 defines digital health broadly as the field of knowledge and practice associated with the development and use of digital technologies to improve health (WHO, 2021). In the Nigerian context, digital health encompasses tools such as mobile health (mHealth) applications, telemedicine, EHRs, health management information systems, and remote patient monitoring devices. These technologies are deployed across primary, secondary, and tertiary levels of healthcare. Oke et al. (2025), in a scoping review published in Advances in Public Health, traced a significant increase in digital health research and implementation in Nigeria, particularly since 2019. Their review of 230 literature sources noted that mHealth applications and EHR systems have been the most studied and deployed interventions, with documented benefits including improved treatment adherence, enhanced data collection, and expanded healthcare access in underserved communities. Despite these gains, the review simultaneously confirmed that persistent systemic challenges, including limited infrastructure, insufficient training for healthcare workers, and barriers to nationwide scale-up, continue to undermine progress (Oke et al., 2025).

A scoping review by Onumajuru et al. (2024), published in the African Journal of Public Health Nursing, similarly mapped the landscape of digital health utilisation in Nigeria and identified a recurring set of challenges at the system, provider, and patient levels. These findings reflect a broad consensus in the recent literature that, while digital health in Nigeria holds enormous promise, a complex web of interrelated barriers must be addressed before it can achieve its transformative potential.

CHALLENGES AND BARRIERS OF DIGITAL HEALTH IMPLEMENTATION IN NIGERIA

Inadequate Physical and Digital Infrastructure

Perhaps the most consistently cited barrier to digital health implementation in Nigeria is the inadequacy of foundational physical infrastructure, particularly the unreliable supply of electricity and the lack of robust internet connectivity. Without stable electricity, healthcare facilities cannot power the devices and servers on which digital health systems depend. Without reliable internet, data cannot be transmitted, stored, or accessed in real time. Wordsworth (2025), in a qualitative study of healthcare professionals across rural Oyo State published in BMC Digital Health, found that unreliable electricity supply and poor internet connectivity were among the foremost barriers reported by participants. Healthcare workers described scenarios in which power outages rendered digital devices non-functional for extended periods, disrupting patient care and data management workflows. Outdated technology and insufficient digital devices further compounded these infrastructure shortfalls (Wordsworth, 2025).

This finding is corroborated at the national level by the assessment of Nigeria's digital health maturity published on MedRxiv in 2025, which found that inadequate foundational infrastructure, including unreliable digital identity systems, weak cybersecurity architecture, and limited internet penetration continues to undermine digital health across ten Nigerian states. The report noted that internet connectivity problems and a lack of standardised data management practices persist as systemic challenges that impede the full realisation of digital health solutions (Assessing Digital Health Maturity in Nigeria, 2025). The problem is especially acute in rural and underserved areas. Onumajuru et al. (2024) documented that patients in rural communities cited the irregular supply of electricity needed to charge mobile phones as a key barrier to using mHealth applications, while healthcare workers pointed to the lack of reliable connectivity as making EHR systems difficult to use consistently. These dual infrastructure deficits affecting both providers and patients severely limit the reach and sustainability of digital health in Nigeria.

Low Digital Literacy and Inadequate Training

A second major barrier is the low level of digital literacy among both healthcare workers and the general patient population in Nigeria. Effective use of digital health tools requires a foundational understanding of how to operate digital devices, navigate software interfaces, and interpret digital data. Where this literacy is absent, technology adoption fails regardless of the quality of the tools themselves. Onumajuru et al. (2024) identified poor digital literacy as one of the most frequently reported barriers to digital health utilisation in the literature. Their review noted that studies targeting healthcare workers identified limited training opportunities and the high cost of staff training as significant obstacles. Specific barriers mentioned included difficulty adopting EHR terminologies and the absence of institutional enforcement policies mandating the use of digital systems.

The 2025 scoping review by Wordsworth published in BMC Digital Health reinforced this finding, with healthcare professionals in Oyo State reporting that insufficient training was a central concern. Even where training was provided, it

was often one-off and inadequate to build lasting competency with digital tools (Wordsworth, 2025). Babatope et al. (2024) further affirmed this in a scientific report examining factors militating against EHR implementation in Nigeria, finding that a lack of comprehensive training programmes and the absence of institutional policies on digital tool adoption were among the most significant contributors to low EHR utilisation rates. Among patient populations, Onumajuru et al. (2024) found that inadequate information on how to use digital health technologies, combined with low smartphone literacy, prevented many Nigerians from accessing and benefiting from mHealth platforms. Gender disparities are also notable: Udenigwe et al. (2022) demonstrated in a study published in Frontiers in Global Women's Health that women in rural Nigeria who carry a disproportionate burden of maternal and child health challenges faced compounded barriers related to both digital literacy and access to devices, limiting their ability to benefit from mHealth interventions designed for maternal care.

Financial Constraints and Inadequate Funding

The implementation, maintenance, and scaling of digital health technologies require substantial and sustained financial investment. In Nigeria, chronic underfunding of the health sector at the national and state levels, combined with limited household incomes, creates formidable financial barriers at both the supply and demand sides of digital health. The integrative scoping review published in PLOS Digital Health in 2025 (Olubiyi et al., 2025) identified financial constraints as one of the three most pervasive challenges hindering digital health implementation in Nigeria. Healthcare facilities lack the capital to procure devices, establish and maintain servers, and sustain licences for health information systems. Healthcare workers cited poor funding of the health system as a key barrier to engaging with digital platforms, while patients noted the cost of owning smartphones and paying for mobile data as significant deterrents to using mHealth services (Onumajuru et al., 2024).

A 2025 narrative review published in Health Economics Review by Okonkwo et al. analysed funding patterns in Nigeria's digital health startup ecosystem from 2019 to 2025. While noting a surge in venture capital peaking at $54.67 million in 2023 the review found that most investment was concentrated in early-stage seed funding and failed to translate into sustainable, scaled impact due to regulatory hurdles, infrastructural deficiencies, and systemic health sector limitations. The authors concluded that "mere capital infusion cannot overcome" these structural barriers, underscoring that financial solutions must be accompanied by systemic reforms (Okonkwo et al., 2025). Public expenditure on health in Nigeria has consistently fallen short of the Abuja Declaration target of 15% of the national budget. This underfunding cascades into insufficient resources for digital infrastructure, technology procurement, and human resource capacity building for digital health, all of which are prerequisites for effective implementation (Awosiku et al., 2025).

Regulatory and Policy Gaps

Effective digital health implementation requires a robust regulatory environment, including clear policies on EHR adoption, data protection, cybersecurity, and interoperability. In Nigeria, the policy and regulatory framework for digital health remains fragmented, inconsistent, and inadequately enforced, creating a challenging environment for both public sector implementers and private sector innovators. Onumajuru et al. (2024) found that the lack of a written institutional policy on the use of EHRs was a widely reported barrier among healthcare workers. Without formal mandates requiring digital tool adoption, most healthcare facilities default to paper-based systems, even where digital alternatives are available. The absence of clear national standards for interoperability the ability of different digital health systems to exchange and use data — means that applications developed by different stakeholders operate in silos, undermining the goal of a unified health information ecosystem.

On the issue of data protection, Ekolama and Ebregbe (2024), published in Magna Scientia Advanced Research and Reviews, noted that while Nigeria's National Data Protection Regulation (NDPR) provides a formal regulatory framework for personal data protection, compliance among healthcare providers remains poor due to infrastructural and financial constraints. Idoko et al. (2024) similarly found widespread non-compliance with NDPR provisions among Nigerian hospitals, driven by inadequate infrastructure and low awareness among healthcare workers. This regulatory gap creates patient safety risks and erodes public trust in digital health systems.

Data Security, Privacy, and Cybersecurity Concerns

As digital health systems collect, store, and transmit sensitive patient data, concerns about data security and patient privacy become paramount. In Nigeria, weaknesses in cybersecurity infrastructure, combined with low institutional capacity for data governance, have made healthcare data vulnerable and have fuelled patient reluctance to engage with

digital platforms. Onyeabor et al. (2025), in a study assessing the usability and performance of digital healthcare systems in Nigerian teaching hospitals published in Digital Health, identified interoperability issues as a major operational hurdle, with data exchange between different healthcare systems made difficult by the lack of standardised data formats. The study also noted that the absence of robust data protection and cybersecurity laws exacerbated the risks associated with digital health technologies, making healthcare institutions reluctant to fully commit to digital platforms.

Healthcare worker concerns about user data privacy and patient safety in the context of digital health have also been documented in several Nigerian studies (Onumajuru et al., 2024). These concerns are not unfounded; the broader landscape of healthcare cybersecurity incidents globally, including reported breaches affecting hospitals, reinforces the legitimacy of these fears (Waqar, 2024, as cited in Ekolama & Ebregbe, 2024). The Nigeria Data Protection Act of 2023 represents a legislative step toward stronger data governance; however, as Ekolama and Ebregbe (2024) noted, the gap between legislative intent and practical implementation is wide. Many healthcare facilities lack the technical infrastructure, such as secure server environments, encrypted data transmission protocols, and trained data protection officers needed to comply with the Act's provisions. Until this gap is addressed, data security will remain both a real risk and a perceived barrier to digital health adoption.

Sociocultural and Gender-Based Barriers

Beyond technological and regulatory challenges, sociocultural factors represent a significant but often underappreciated set of barriers to digital health adoption in Nigeria. Community attitudes toward technology, gender norms, religious beliefs, and trust in traditional healthcare systems all influence how patients and communities respond to digital health innovations. The PLOS Digital Health scoping review (Olubiyi et al., 2025) identified the need for culturally sensitive programme designs as one of the three core challenges in digital health implementation in Nigeria. Studies in that review found that digital health programmes that failed to account for local cultural norms, community hierarchies, and gender dynamics were less likely to be accepted and sustained by communities.

Udenigwe et al. (2022), in research published in Frontiers in Global Women's Health, explicitly examined gender dynamics in mHealth interventions in rural Nigeria. They found that patriarchal household structures, women's limited control over mobile phones (which were often shared with or owned by male family members), and societal norms around women's healthcare-seeking behaviour created compounded barriers to mHealth access for women a population with high unmet needs in maternal and reproductive health. The study argued that failing to integrate gender analysis into mHealth intervention design significantly undermines the sustainability and equity of digital health benefits (Udenigwe et al., 2022).

Cultural preferences for in-person consultations, particularly among older populations, and distrust of digital data systems — rooted in broader concerns about government surveillance and data misuse further limit voluntary engagement with digital health tools. Engaging traditional and community leaders as champions of digital health adoption has been identified as a facilitator, but this approach remains underutilised (Wordsworth, 2025).

Human Resource Deficits and Brain Drain

The effective deployment and management of digital health systems requires a skilled workforce both clinical professionals who can use digital tools and technical personnel who can install, maintain, and develop health information systems. Nigeria suffers from severe deficits in both categories. Onyeabor et al. (2025) identified a shortage of skilled personnel to implement and manage digital health interventions as a key barrier in Nigerian hospitals, with healthcare institutions lacking the technical staff needed to sustain EHR and telemedicine systems. This shortage is compounded by Nigeria's well-documented brain drain problem, in which trained health professionals emigrate to higher-income countries in search of better remuneration and working conditions. The 2025 BMC Digital Health study by Wordsworth echoed this finding, with rural Oyo State healthcare professionals citing staffing shortages as a significant challenge that intersected with digital health adoption challenges. In under-staffed facilities, the additional workload of learning and using new digital systems is perceived as burdensome rather than helpful, reducing motivation for adoption.

RECOMMENDATIONS

To overcome these barriers, a multi-pronged, evidence-based approach is required. First, significant investment in physical infrastructure, including reliable electricity (through solar-powered alternatives) and broadband internet connectivity in rural areas, is essential. Wordsworth (2025) documented that solar-powered equipment and NGO support

were among the most effective facilitators where they existed. Second, the government must prioritise mandatory, continuous digital literacy training for all cadres of healthcare workers, paired with institutional policies that mandate EHR adoption and set clear accountability frameworks.

Third, health financing reforms must allocate a dedicated and protected budget line for digital health infrastructure and maintenance. Donor-driven pilot projects must be replaced by nationally owned, sustainable programmes as recommended by the 2020 digital health capacity development workshop (Uzochukwu et al., 2024). Fourth, Nigeria's regulatory framework must be strengthened: the NDPR and the Data Protection Act 2023 must be actively enforced in the health sector, and a national interoperability standard for health information systems must be developed and mandated. Finally, digital health programme design must be gender-responsive and culturally contextualised, engaging community and traditional leaders as partners in adoption (Olubiyi et al., 2025; Udenigwe et al., 2022).

CONCLUSION

Digital health holds transformative potential for Nigeria's overstretched healthcare system. Evidence from recent literature (2020–2026) consistently demonstrates that mHealth applications, EHRs, and telemedicine platforms can improve treatment adherence, expand access to care in underserved communities, and enhance health data quality. However, this potential is severely constrained by a complex and deeply interrelated set of challenges: inadequate physical and digital infrastructure, low digital literacy, financial constraints, fragmented policy and regulation, cybersecurity vulnerabilities, sociocultural barriers, and critical human resource deficits. Addressing these challenges requires political will, sustained investment, multisectoral collaboration, and community engagement. Without deliberate, coordinated action on all of these fronts, digital health in Nigeria risks remaining a patchwork of donor-funded pilots that fail to achieve the systemic transformation the country urgently needs. As Olubiyi et al. (2025) concluded, community engagement, capacity building, and data-driven decision-making are critical to maximising the impact of digital health interventions in Nigeria.

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