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Toward Digital First Health Systems in Nigeria

A Focus on Adolescents and Young Adults

Helen Adesoba, January 2025

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Towards Digital First Health Systems in Nigeria:

A Focus on Adolescents and Young Adults

CONTENTS

1. INTRODUCTION

Adolescents and young adults are people between ages 10 and 24 and they constitute about a quarter of the world's population (Azzopardi et al., 2019). According to the World Health Organization (WHO), the majority of the medical conditions and behaviours that emerge in adolescence and early adulthood have detrimental effects that last a lifetime (WHO, 2021). Adolescents and young adults' (AYAs) lives have now been seen to become more and more entangled with technology where many seek and share health advice (Ridgers et al., 2016). According to a recent literature review, AYAs in high-income countries (HICs) make substantial use of digital tools to track their health and support their mental and physical well-being (Bitto Urbanova et al., 2022; Lupton, 2021).

As technology becomes more readily available to AYA, both AYA and medical personnel see the potential for leveraging these platforms to expand healthcare delivery and enhance patient involvement and education (Gagnon et al., 2016; Househ et al., 2014; Korenda, 2018). The *Lancet* Commission on Adolescent Health and Wellbeing have therefore concentrated on youth involvement in the conversation regarding digital initiatives in recent years, with the aim of achieving the sustainable development goals (SDGs), (Bandara, 2017; WHO, 2017). Young people value the variety of knowledge that is accessible through digital media, available whenever they want, with no middlemen involved, such as clinicians, thereby giving room to anonymity (Giovenco et al., 2021). Furthermore, young people value the opportunity to establish peer connections and form anonymous support groups which allow them to avoid stigmatization (Vornholt & De Choudhury, 2021). Additionally, the affordability of these technologies enables the younger generation to obtain health promotion services without having to pay for them (Koh et al., 2021).

One third of the population of Nigeria, the most populous country in Africa, is aged between 10 and 24 (FMOH, 2018). The *Lancet* Commission on Adolescent Health and Wellbeing has ranked Nigeria as a multi-burden country concerning the health status of its youth (FMOH, 2018). Among the primary health challenges facing Nigerian AYA

are sexual and reproductive health concerns, trauma and injuries, mental health issues, substance abuse, and dietary problems (FMOH, 2018). In recent years, the increasing availability of mobile devices in Nigeria − with 90.7 per cent of the population owning a mobile phone and 45.5 per cent having Internet access as of early 2024 (Kepios, 2024) − presents a significant opportunity to expand access to high-quality healthcare through Internet and mobile technologies for AYA (Adenuga et al., 2017; Olowoyo et al., 2024).

Recognizing this potential, Nigeria has begun to make strides toward digital health transformation by implementing initiatives such as the National Health ICT Strategic Framework and introducing digital platforms aimed at improving health service delivery. Examples include mobile health (mHealth) applications, telemedicine platforms, and digital registries aimed at improving data collection and patient tracking.

While these efforts have created a foundation for a digital first health system, their impact on AYAs remains underexplored. Digital health technologies could significantly benefit AYAs by addressing their unique health challenges through accessible and youth-friendly services. For instance, digital platforms can provide confidential sexual and reproductive health services, mental health support through teleconsultations or chatbots, and health education tailored to the needs of adolescents. Despite these opportunities, limited research exists on how AYAs engage with these technologies, the availability of AYA-specific digital health solutions, and the barriers — such as affordability, digital literacy, and trust — that may hinder their utilization.

This study, therefore, aims to assess AYA-centered digital first health systems in Nigeria by exploring the country's progress toward digital health initiatives.

2. OVERVIEW OF NIGERIA AND ITS HEALTHCARE SYSTEM

Nigeria, home to over 229 million residents, comprises 36 states and a Federal Capital Territory (Worldometer, 2024). These states are grouped into six geopolitical zones: North Central, North East, North West, South East, South South, and South West (National Population Commission(NPC)/Nigeria & ICF International, 2014). Nigeria operates a diverse healthcare system that includes both the public and private sectors, as well as modern and traditional healthcare practices. The public sector operates on three levels; local governments manage primary care; state governments handle secondary care; and the federal government oversees tertiary care. The private sector delivers around 60 per cent of healthcare services (FMoH, 2018).

2.1. Nigeria's Journey to Digital Health: Historical Milestones, Policies and Strategies Driving Digital Health Transformation

Digital health is a growing area of practice in the healthcare sector. As described by the World Health Organization (WHO), digital health encompasses the knowledge and activities related to the development and implementation of digital technologies to enhance health. This field broadens the scope of eHealth, which involves the cost-effective and secure use of information and communication technologies (ICT) in health and related areas, to include digital consumers and a broader array of smart, connected devices. Additionally, it integrates various digital technologies such as the Internet of Things, advanced computing, big data analytics, artificial intelligence (including machine learning), and robotics (*Global strategy on digital health 2020-2025. Geneva: World Health Organization*, 2021). Nigeria has achieved some digital health milestones which are summarized in Table 1.

2.1.1. Early Developments in ICT and Healthcare in Nigeria

Digital healthcare tools have become essential in tackling Nigeria's healthcare challenges, especially by improving access and minimizing disparities. The use of ICT in healthcare was almost non-existent in Nigeria until the development of ICT policies

for the telecommunications sector in 2000 and the establishment of the National Information Technology Development Agency (NITDA) to formulate a national policy for ICT in Nigeria in 2003 (Chioma, 2012). Additionally, some professionals who were members of the International Society for Telemedicine and eHealth founded the Society for Telemedicine and eHealth in Nigeria (SFTeHIN) on 6 April 2005, during the International Society for Telemedicine and eHealth general assembly in Luxembourg.

SFTeHIN took on the challenge of advocacy and communication: building momentum and raising awareness about e-health technology among the public and private sectors and government. Their sustained efforts led to the first national stakeholders meeting on telemedicine and eHealth on September 27, 2005, during President Olusegun Obasanjo's administration (*Society for Telemedicine and eHealth in Nigeria. History of SFTEHIN*).

2.1.2. National Strategic Frameworks and Policies

Recognizing the transformative potential of Information and Communication Technology (ICT) to strengthen Nigeria's healthcare system, the Federal Ministry of Health (FMoH), in collaboration with the National Information Technology Development Agency (NITDA), developed the **National Health Policy** and the **National Strategic Health Development Plan Framework (NSHDP), (2009–2015)**. This plan aimed to improve the health status of Nigerians by establishing a strengthened and sustainable healthcare delivery system through ICT integration (TWG [Technical Working Group] - NSHDP/Health Sector Development Team. Nigeria National Strategic Health Development Plan Framework 2009-2015, 2009). However, its implementation was hindered by limited governmental commitment and fragmented ICT applications within the healthcare sector. In response to these challenges, the government conducted a comprehensive assessment of the health ICT environment in 2014. The findings revealed a pressing need for a unified and coordinated strategy to guide ICT adoption in healthcare. Consequently, the **National Health Information and Communication Technology (Health ICT) Strategic Framework (2015–2020)**, also known as the **National e-Health Strategic Framework**, was ratified in 2016 during the 58th session of the National Council of Health (FMoH, 2016). This framework became

a roadmap for leveraging ICT to enhance healthcare delivery and achieve universal health coverage (UHC) by 2020.

2.1.3. The National e-Health Strategic Framework (2015–2020)

The National e-Health Strategic Framework (2015–2020) was modelled after the WHO-ITU eHealth Strategy Toolkit, which served as a guide throughout its development. The framework was designed to integrate ICT into Nigeria's health system, providing a vision and strategy for aligning technological investments within the sector to achieve a digitalised healthcare system that would facilitate UHC by 2020. Key objectives of the framework included easing the coordination of e-Health activities among government and stakeholders, reducing duplication of efforts, and enabling the implementation of standardised registries for health information exchange (FMoH, 2016).

Recognizing the risks posed by the uncoordinated proliferation of technology applications, the Federal Government established the National eHealth Steering Committee on September 14, 2016. The committee was tasked with setting policies, standards, and guidelines to guide eHealth implementations, ensuring coordination, and mitigating inefficiencies caused by resource duplication and wastage (Ogundipe, 2016).

2.1.4. The National Digital Health Policy and Strategy (2021–2025)

Building on the progress of earlier frameworks, the National Digital Health Policy and Strategy (2021–2025) was launched in 2022 to provide a comprehensive framework for integrating technology into healthcare. Its primary objectives were to strengthen the capacity of government bodies to oversee digital health technologies and to ensure the implementation of proven digital solutions across Nigeria's healthcare landscape. This policy represents a significant step toward a fully digitalized health system, reinforcing Nigeria's commitment to leveraging technology for improved healthcare delivery and equity.

2.1.5. Recent Initiative: The Nigeria Digital Health Initiative (NDHI)

On 18 March 2024, the Federal Government inaugurated a 20-member committee to lead the implementation of the Nigeria Digital Health Initiative (NDHI). The initiative aims to modernize and transform the nation's healthcare system through the development of a national digital health architecture. By leveraging digital technology, the NDHI seeks to enhance accessibility, efficiency, and the quality of healthcare services across the country. Its key objectives include: i) enabling electronic medical records (EMR) and data exchange systems for healthcare facilities; ii) providing a national EMR platform for facilities with inadequate or non-existent systems to improve healthcare access; facilitate data-driven decision-making, and deliver cost-effective services; iii) strengthening public health programmes to improve population health outcomes; and iv) streamlining workforce planning, training, and performance management using digital tools and analytics (FMOH, 2024).

The initiative targets the digitalization of over 720 healthcare facilities. This transition to digital health records is expected to enhance patient experiences, safeguard patient data, and improve health outcomes. It will also benefit healthcare providers, policymakers, and managers by increasing their efficiency and accountability. Historically, the lack of standardized data collection and management has posed major challenges for Nigeria's healthcare system, leading to fragmented information. The NDHI seeks to address this by creating a unified national EMR platform that will act as a central hub for data collection, storage, services, and regulation, thereby enhancing the efficiency of the healthcare system and improving public health monitoring (FMOH, 2024).

Nigeria has recognized the importance of establishing policies that support the integration and use of digital health tools to enhance healthcare delivery and accessibility. These policies aim to create a structured environment for the seamless adoption of digital technologies, ensuring improved coordination, standardization, and efficiency within the health sector. Supporting policies that facilitate the integration and use of digital health tools in Nigeria are shown in Table 2.

Table 1: Nigeria's Digital Health Milestones

Year	Milestone	Description
2000	Development of ICT Policies	ICT policies for the telecommunications sector were developed to lay the foundation for digital innovation.
2003	Establishment of NITDA	The National Information Technology Development Agency (NITDA) was created to formulate and implement a national ICT policy.
2005	Formation of SFTeHIN	The Society for Telemedicine and eHealth in Nigeria (SFTeHIN) was established to advocate for telemedicine and eHealth technologies.
2009	Launch of NSHDP Framework (2009–2015)	The National Strategic Health Development Plan aimed to integrate ICT into healthcare for improved service delivery.
2014	Health ICT Environment Assessment	A comprehensive assessment identified the fragmented state of ICT applications in Nigeria's health sector.
2015	Ratification of National eHealth Strategic Framework	The framework was designed to align ICT investments with the goal of achieving Universal Health Coverage (UHC).
2016	Establishment of National eHealth Steering Committee	The committee was tasked with coordinating eHealth activities, setting policies, and mitigating resource duplication.
2021	National Digital Health Policy and Strategy (2021–2025)	The policy provided a roadmap for integrating digital technology into healthcare to strengthen public health systems.
2024	Launch of Nigeria Digital Health Initiative (NDHI)	The initiative focused on modernizing healthcare through the development of a national digital health architecture, including electronic medical records (EMR).

Table 2. Supporting Policies that Facilitate the Integration and Use of Digital Health Tools in Nigeria

Policy Title	Date	Goal	Link
The National Health Act (NHA)	2004	To provide guidelines for healthcare development in Nigeria. This act is set to: mandate confidentiality for medical practitioners and data handlers; ensure patient access to their medical records; allow third-party access to patient data for legitimate purposes; require health facilities to prevent unauthorized access to patient data and criminalizes such access; permit use of patient data without authorization for scientific/research purposes unless de-identified.	NHA
The Nigeria Data Protection Act (NDPA)	2023	This is the main data protection act in Nigeria as of now. The Nigerian Data Protection regulation initiated in 2019 became an act in 2023. The purpose of the act is to ensure safe transactions involving personal data exchange and to provide a legal and regulatory framework for data protection aligned with international standards. This applies to Nigerian citizens both within Nigeria and abroad.	NDPA
Listed below are other indirect regulatory frameworks and policies that also have implications on data protection in healthcare and the use of ICT.			
The National Information Technology Development Agency (NITDA) Act	2007	Enacted to develop and regulate digital services in Nigeria. The act provides a legal framework for ICT systems development, sets standards for ICT systems and services, and regulates deployment and use of digital services in Nigeria. The importance of this act is also recognised in the digitalization of Nigerian healthcare.	NITDA
Cybercrimes (Prohibition, Prevention, Etc) Act. This was amended in 2024	2015	To provide for the prohibition, prevention, detection, response, investigation and prosecution of cybercrimes; and for other related matters including healthcare data	Cybercrimes Amended

Policy Title	Date	Goal	Link
National Health Insurance Act (NHIA) 2022 (which replaces the National Health Insurance Scheme Act of 1999)	2022	To promote, regulate and integrate health insurance schemes. It aim to ensure mandatory health insurance coverage for all Nigerians and legal residents. Additionally, it establishes a fund dedicated to supporting vulnerable groups by subsidizing health insurance for vulnerable individuals and covering premiums for indigent populations.	NHIA
Pharmacy Council of Nigeria (PCN) Act	2022	It is the foundational legislation that establishes and empowers the Pharmacy Council of Nigeria, granting it the authority to regulate all aspects of pharmacy practice and business across the country.	PCNA
Standard Organization of Nigeria (SON) – 32 International Standard Organisation Health Informatics Standard	2019	The Organization's mandate encompasses the development of standards for products, measurements, materials, processes, and services, as well as their promotion at national, regional, and international levels. It is also responsible for certifying products, supporting the production of quality goods and services, enhancing measurement accuracy, and disseminating information related to standards.	SON
National Agency for Food and Drug Administration and Control (NAFDAC) – Anatomical Therapeutic Chemical (ATC) code management	2024	It serves as a comprehensive and dynamic database, compiling detailed information on registered drug products.	NAFDAC-ATC Code

2.2. Practical Efforts by the Nigerian Government in Advancing Digital Health

While much of Nigeria's digital health transformation is currently being driven by the private sector, the Nigerian government has taken steps to implement policies, frameworks, and initiatives that promote digital health. These efforts, though limited, represent a foundation for integrating technology into healthcare systems to improve access, efficiency, and quality of care.

2.2.1. Telemedicine

The World Health Organization describes telemedicine as the delivery of healthcare services by professionals where distance is a significant factor. It involves the use of information and communication technologies to exchange accurate health information for diagnosis, treatment, prevention, and research (*Global strategy on digital health 2020-2025*, Geneva: World Health Organization, 2021).

In 2003, Nigerian Communication Satellite Systems (NigComSat) Ltd. partnered with China Great Wall Industry Corporation to launch NigComSat-1, a satellite designed to facilitate telemedicine by connecting Nigerian healthcare providers with global medical experts. By 2007, the Nigerian National Space Research and Development Agency (NASRDA) and the Federal Ministry of Health (FMoH) piloted a telemedicine project to improve healthcare delivery in rural areas. This initiative included the major teaching hospitals University College Hospital (UCH), Ibadan, and University Teaching Hospital (UTH), Maiduguri; six Federal Medical Centers across Nigeria's six geopolitical zones (Owo, Gombe, Makurdi, Yenagoa, Benin-Kebbi, and Owerri); and private facilities including Lagoon Hospital, Lagos, and Igbinedion University Teaching Hospital, Edo (Adekunle, 2016).

However, NigComSat-1 experienced technical failures in 2008, leading Nigeria to launch a replacement satellite, NigComSat-1R, in 2011. Despite these challenges, telemedicine adoption has steadily grown, particularly during the COVID-19 pandemic, which underscored its value in delivering healthcare to remote regions with limited resources (Adenuga et al., 2017; Adeyemo et al., 2021).

To further support telemedicine expansion, the Federal Ministry of Health is currently developing National Telemedicine Guidelines, as announced by the head of the eHealth and Inspectorate Division at the Africa Digital Health Summit (2024).

2.2.2. Telehealth

On 15 May 2023, the Nigerian Communications Satellite Limited (NigComSat), in collaboration with Ethnomet and Sawtrax, launched NigComHealth, a telehealth platform designed to enhance access to medical care for all Nigerians, regardless of location. NigComHealth enables users to book medical appointments, consult healthcare professionals, and receive medical advice using mobile devices, thus reducing the need for physical visits to healthcare facilities (Chika et al., 2024; Faboade, 2023). This initiative is part of the Nigerian government's National Digital Economy Policy and Strategy, which aims to drive the country's digital transformation.

2.2.3. Electronic Medical Records (EMR) and Electronic Health Records (EHR)

The National e-Health Strategy Toolkit developed by the World Health Organization (WHO) and the International Telecommunication Union (ITU) defines electronic medical records (EMRs) as computerized systems used to capture, store, and share patient information within healthcare facilities (Hamilton, 2013). EMRs play a crucial role in enhancing access to patient data and improving care quality, however, their adoption in Nigeria remains limited. Studies indicate that no state or federal public hospitals in Nigeria have fully implemented EMRs for consultations. Most healthcare facilities continue to rely heavily on paperwork, with discussions about EMR implementation outpacing actual progress. Notable exceptions include the Federal Medical Centre in Keffi, which has made significant advances, and private hospitals such as Abuja Clinics and NNPC Hospital, which have achieved full EMR adoption (Akwaowo et al., 2022; Egenti, 2022). A study by Akwaowo et al., 2022, highlights several barriers to EMR adoption in Nigeria, including weak ICT infrastructure, inadequate staffing of IT units, and insufficient training for healthcare providers. Perceived usefulness, ease of use, and awareness have been identified as critical factors driving adoption, despite these challenges. For successful EMR

implementation, it is essential to address these gaps through capacity building, improved ICT systems, and enhanced knowledge and training.

2.2.4. Lagos State Smart Health Information Platform (SHIP)

Lagos State has taken a leadership role in Nigeria's digital health initiatives with the launch of the Smart Health Information Platform (SHIP). SHIP aims to provide residents with faster, smarter, and more efficient access to healthcare while improving the monitoring of service delivery and provider performance. To achieve this, the Lagos State government signed an eHealth partnership agreement with Interswitch, a Nigerian digital payment company, to develop and implement SHIP. This platform reflects the state government's commitment to leveraging technology for improved healthcare service delivery.

2.3. Facilitators and Barriers to the Design, Implementation and Sustainability of Digital Health Transformation in Nigeria

Several studies exploring the facilitators and barriers to the implementation and sustainability of digital health in Nigeria have approached it either from a broader systemic perspective or by focusing on specific programmes or projects initiated within the country. According to Kaboré et al., 2022, these factors can be broadly categorized into three key areas. The specific factors within each area are detailed in Table 3.

1. Project design and implementation factors
2. Factors within the organisational settings
3. Factors in the broader community environment.

While the government has made commendable efforts to develop policies, frameworks, and regulations, these initiatives remain in their infancy. In contrast, the private sector, NGOs and researchers are leading the majority of digital health initiatives in the country. Despite this progress, sustainability challenges persist, with many projects stalling at the pilot stage or becoming inactive, underscoring the need for greater support and long-term planning (Chib et al., 2015; Labrique et al., 2013).

Table 3: Facilitators and Barriers to the Design, Implementation and Sustainability of Digital Health Transformation in Nigeria

Facilitators	Barriers
Project design and implementation factors	
Easy use of digital health initiatives (DHIs) (Adenuga et al., 2017; Chika et al., 2024)	System usability issues, (especially in lower-level health facilities) (Adenuga et al., 2017; Akinseinde, 2016)
Acceptability of DHIs (Akinseinde, 2016)	Internet access: Unavailable and unreliable or expensive Internet access (Akinseinde, 2016; Chika et al., 2024)
Availability of resources, including computers (Ravi et al., 2023)	Unreliable electricity in the workplace (Akinseinde, 2016; Ravi et al., 2023)
Perceived usefulness due to the functioning infrastructure (Mobile network/connectivity, transport system, electricity (Chika et al., 2024; Ravi et al., 2023).	Hybrid system of paper and DHIs (Akinseinde, 2016)
Availability of awareness creation (Adenuga et al., 2017)	Perception of no practical benefits of using the electronic system (Chika et al., 2024)
Supportive supervision and quarterly performance review meetings (Chika et al., 2024)	Inadequate training in data collection and use (Akinseinde, 2016; Chika et al., 2024)
	Insufficient understanding and infrastructure to scale up effectively and inadequate (Akinseinde, 2016)
Factors within the organizational settings	
Government, institutional, sectoral, stakeholders' support (Adenuga et al., 2017; Ravi et al., 2023)	Coordination challenges at the national level (Adenuga et al., 2017; Akinseinde, 2016; Ravi et al., 2023)

Facilitators	Barriers
Availability of sustainability plan	
Factors in the broader community environment This can be classified into three levels 1) Socioeconomic; (2) Political consideration; (3) Community participation.	
Socioeconomic	
Affordability of telecommunication services (Chika et al., 2024)	Limited resources (Adenuga et al., 2017; Akinseinde, 2016; Ravi et al., 2023)
Availability of financial resources (Akinseinde, 2016; Ravi et al., 2023)	Additional costs of resources like smartphones, data (Adenuga et al., 2017; Akinseinde, 2016; Chika et al., 2024; Ravi et al., 2023)
Reimbursement and incentives (Adenuga et al., 2017; Chika et al., 2024)	Abuse and corruption (Adenuga et al., 2017; Akinseinde, 2016)
Political consideration	
Availability of legislation and policy (phone usage, liability, funding mechanisms and reimbursement, data security and privacy, staff job description, partners) (Adenuga et al., 2017; Chika et al., 2024; Ravi et al., 2023)	Inadequate policies and gaps in policy effectiveness (Adenuga et al., 2017; Akinseinde, 2016; Chika et al., 2024; Ravi et al., 2023)
Involvement of government, institutional, sectoral, and stakeholders (Chika et al., 2024; Ravi et al., 2023)	
Community participation	
Perceived ease of use (Chika et al., 2024)	High level of staff attrition and limited human resources and expertise (Adenuga et al., 2017; Akinseinde, 2016; Ravi et al., 2023)
Positive attitude/ self- motivation (Akinseinde, 2016)	Myths, fears/phobias, misconceptions (Adenuga et al., 2017)

Facilitators	Barriers
Positive attitude interest (Akinseinde, 2016)	Lack of community and user integration with the technology (Adenuga et al., 2017; Akinseinde, 2016)
Privacy, confidentiality and trust with clients (Adenuga et al., 2017; Chika et al., 2024; Ravi et al., 2023)	No or limited incentives for health workers (Adenuga et al., 2017; Chika et al., 2024)
	Cultural diversity (Adenuga et al., 2017; Akinseinde, 2016)
	Lack of awareness (Adenuga et al., 2017)

Given the steady growth of Nigeria's ICT and telecommunications sector — where 90.7 per cent of the population owns a mobile phone and 45.5 per cent has Internet access as of early 2024 (Kepios, 2024) — there is a significant opportunity to leverage mobile and Internet technologies to expand access to high-quality healthcare. This creates a compelling case to explore how private sector-driven digital health initiatives are benefiting adolescents and young adults (AYA), a critical subpopulation in Nigeria. With the increasing adoption of mobile health solutions and improved broadband access, identifying digital health interventions targeting AYA and evaluating their impact on health outcomes is essential. Such an exploration will not only fill a crucial evidence gap but also inform future strategies for utilizing digital health technologies to achieve sustainable and equitable health outcomes in Nigeria.

3. METHODOLOGY

This study employed a desk-based literature review to gather information on digital health initiatives (DHIs) targeted at adolescents and young adults (AYA) in Nigeria. The desk review involved examining existing documents and data to collect and synthesize available information on these initiatives. The primary objectives were to identify relevant data sources, assess data quality, and highlight gaps requiring further research. Notably, the study did not adhere to the methodological rigour of a systematic review but instead aimed to provide an overview of how digital health interventions are utilized to address the health needs of AYAs in Nigeria.

3.1. Search Strategies and Data Collection

An initial search was conducted using PubMed and Google Scholar, employing a combination of keywords, including: adolescents, young people, young adults, young persons, teenagers, digital, telemedicine, mHealth, eHealth, telehealth, and Nigeria. However, this search yielded limited relevant articles. To broaden the scope, the review incorporated additional data sources, such as: pre-publication/not yet peer-reviewed materials, published articles, academic journals, press releases, conference presentations, organizational websites, random Internet searches, and social media blogs. These resources were filtered for quality and relevance to the research objective. Additionally, discussions with adolescents and digital health implementers helped identify further key references.

3.2. Data Analysis

The identified articles and materials were analysed using an inductive approach, as described by Braun and Clarke (Braun & Clarke, 2006). This bottom-up method generates themes strictly derived from the data, offering flexibility and allowing for a comprehensive understanding of the topic under investigation. Three main themes emerged during the analysis and were used to structure the findings:

(1) *Health Focus and Strategic Approaches*: The specific health issues addressed by DHIs and the strategies employed to reach their target populations.

(2) *Digital Platform Utilization*: The types of digital tools and platforms used in the initiatives, including owned and existing platforms.

(3) *Programme Maturity and Scope*: The stage of development of the programmes (e.g., pilot versus established) and the geographic or demographic coverage of the initiatives.

4. RESULTS

The desk-based literature review revealed a nuanced landscape of digital health initiatives (DHIs) targeting adolescents and young people in Nigeria. A total of eleven DHIs were identified, implemented primarily by seven private sector organizations. A notable characteristic of these initiatives is their predominantly non-governmental nature, with a significant reliance on donor funding. A detailed summary of these initiatives is provided in Table 4.

4.1. Health Focus and Strategic Approaches

Sexual and reproductive health (SRH) emerged as the predominant focus among these digital health initiatives, with seven out of the eleven initiatives including an SRH component. Of these, six focused exclusively on SRH, while one combined SRH with Human Immunodeficiency Virus (HIV) and Tuberculosis (TB). Additionally, two initiatives focused specifically on HIV, one targeted menstrual health and another addressed a broader range of health issues without a specific focus.

The organizational models demonstrated considerable diversity in service delivery mechanisms. Some organizations adopted a hybrid approach, maintaining their own health facilities while simultaneously establishing partnerships with public health institutions for comprehensive service referral and delivery. Conversely, other organizations constructed their service models entirely through collaborative partnerships with public health facilities.

4.2. Digital Platform Utilization

The digital strategies employed across the identified digital health initiatives (DHIs) revealed notable variations in platform utilization. Of the eleven DHIs identified, eight rely on privately-owned digital tools – including custom-developed mobile applications and dedicated websites – to deliver health-related information and services to adolescents and young adults. In contrast, three leverage existing platforms, such as social media channels (e.g., Facebook, Instagram, and TikTok), to address the health issues they target.

Notably, Education as a Vaccine, which implements four DHIs, demonstrates a diversified approach: three of its initiatives use privately-owned digital tools, while one leverages existing platforms to reach its target audience effectively.

4.3. Programme Maturity and Scope

An analysis of the initiatives' developmental stages revealed that two DHIs, implemented by FHI 360 and the Nigerian Institute of Medical Research, are in the pilot phase and focus primarily on HIV-related interventions. The remaining DHIs demonstrate greater maturity, with five currently ongoing and the others having concluded their project cycles.

Notably, most DHIs are implemented under donor-funded NGO projects, which typically operate within set timeframes. Among the eleven identified DHIs, the statuses of the Youth Connect website and the PPFN e-Health App remain uncertain — they may either be continuous or have also concluded.

Table 4: Detailed Summary of Identified Digital Health Initiatives Focusing on Adolescents and Young Adults in Nigeria

Organization/ Implementers	Project Name	Focus/Goal of Project,	Targeted Age	DHI/ Platform Used	Type of Study	Location	Period	Remarks
Education as a Vaccine (EVA) (Empowering adolescents through technology)	My Question and answer (MyQ) services,	A confidential, technology-driven platform designed to provide adolescents with expert SRH information. Allows young people to ask questions via calls or text messages and receive prompt, accurate responses from trained counsellors.	Adolescents and young people	Calls, text messages, Facebook, Instagram and TikTok	Online service provision	Abuja	2005 – Till date	Now have expanded its technological approach through the development of three applications
		Designed to educate young girls about their bodies and menstrual hygiene, helping them track their cycles and manage their health with confidence.	Young girls	Diva App				
		To empower users to assess their sexual health risks and make informed decisions about their sexual behaviour.		Frisky App can also be accessed via 080069783 78466 (TollFree), 08027192781 (WhatsApp), SMS to 3812				

Organization/ Implementers	Project Name	Focus/Goal of Project,	Targeted Age	DHI/ Platform Used	Type of Study	Location	Period	Remarks
		A service locator app that connects adolescents with youth-friendly SRH services across Nigeria which can be downloaded via Google Play store.		LinkUp App				
PharmAccess	Take Care Africa	To develop a Nigerian online health community for adolescents and young adults – *kulawa.ng website*		Kulawa online health community	Programme	Lagos	March 2019 – August 2022	
FHI 360 (Dulli et al., 2020)	Social Media to promote Adherence and Retention in Treatment (SMART) Connections	To improve HIV-related knowledge, social support, and ultimately, retention in HIV treatment and antiretroviral therapy (ART) adherence among Youth living with HIV (YLHIV)	Youth living with HIV (YLHIV) aged 15 to 24 years	Secret Facebook groups	Pilot	Akwa-Ibom (South Central)	22 weeks (two weeks per session)	A randomized controlled trial. Published 2020
Nigerian Institute of Medical Research (Idigbe et al., 2023)	4 Youth By Youth mHealth Photo Verification App for HIV Self-testing (HIVST) in Nigeria	To enhance HIVST result verification and connect young people who test positive for HIV with youth-friendly health services. Young people were involved in the design and development of mobile HIVST apps in order to take into account their choices and priorities.	14 to 24 years	Smartphone app	Pilot	Lagos	Three months	Published 2021

Organization/ Implementers	Project Name	Focus/Goal of Project,	Targeted Age	DHI/ Platform Used	Type of Study	Location	Period	Remarks
Planned Parenthood Federation of Nigeria (IPPF, 2022)		To guarantee the continuous supply of sexual reproductive health (SRH) information and services during the pandemic, PPFN developed innovative Digital Health Interventions (DHIs) by utilizing the potential of digital and mobile technology.	No specified age. AYAs	Youth Connect website		Not specified		Published April, 2021
				The PPFN e-Health App				
Association for Reproductive and Family Health (ARFH)	Integrated Child Health and Social Services Award (ICHSSA-2)	To provide adolescents and young people with high-quality, succinct, and accurate HIV/TB, sexual and reproductive health, and other pertinent health messaging information.	No specified age. AYAs	VibeSquare (App)	Programme	Lagos State	June, 2024	
Population Service International / Society for Family Health (PSI/SFH)	Adolescent 360 Learning Hub	To encourage more sexually active teenage girls between the ages of 15 and 19 to voluntarily use modern contraceptives.	Girls between the ages of 15 and 19		Five years programme	Four (4) Southern states—Lagos, Ogun, Osun, and Oyo	2016- 2020	

5. DISCUSSION

The findings from this study underscore the growing importance of digital health initiatives (DHIs) in addressing the health needs of adolescents and young people (AYA) in Nigeria. The identification of seven private sector organizations actively implementing DHIs highlights the potential of digital tools to bridge healthcare gaps for this population.

5.1. Innovative Approaches and Strategic Diversity

Education as a Vaccine (EVA) emerges as a pioneering organization in this domain, having established a comprehensive digital health approach targeting adolescents since 2005. EVA's strategic model exemplifies innovative digital engagement, leveraging a diverse range of platforms including social media (Facebook, Instagram, TikTok), toll-free phone calls, SMS, and three proprietary online platforms. This multifaceted approach highlights the importance of a flexible, multi-channel strategy in reaching adolescent and young adult (AYA) populations. EVA has served about 720,797 individuals with their programmes, including 464,925 youth and 70,671 adults.

5.2. Pandemic-Driven Digital Transformation

A significant observation is the timing of DHI implementations. While EVA represents a long-standing initiative, the other six organizations launched their digital health programmes during or after the COVID-19 pandemic. The Adolescent 360 programme implemented by SFH provides a compelling example of this digital pivot, transitioning from traditional face-to-face consultations to digital platforms like Facebook groups and SMS to ensure service continuity. This adaptability underscores the resilience and innovation inherent in digital health solutions, demonstrating their capacity to respond to external challenges and maintain critical health services aligning with findings from Smith et al (Smith et al., 2022).

5.3. Strategic Approach to Digital Tool Development

The study reveals a nuanced approach to digital tool development among the identified organizations. While four organizations developed custom digital tools and two relied exclusively on existing platforms, the emerging consensus points to the value of a hybrid approach. This strategy balances innovation with accessibility, recognizing the importance of creating tailored solutions while leveraging widely-used and familiar digital platforms.

5.4. User-Centered Design and Engagement

A noteworthy aspect of these initiatives is their commitment to user-centered approaches. As highlighted by Omonigho (Omonigho, 2023), the deliberate strategy of co-creating digital tools with the target population is pivotal for driving engagement, satisfaction, and overall application performance. Prioritizing the specific needs and preferences of adolescents will enhance the relevance and usability of the tools while fostering a sense of ownership and sustained engagement among the target population.

While the identified digital health initiatives (DHIs) showcase promising potential, they are largely characterized by time-bound programmes rather than comprehensive, sustainable interventions. This limitation restricts their long-term impact and ability to fully address the diverse health needs of adolescents and young adults across Nigeria. To achieve broader reach and sustained impact, it is essential to transition these pilot programmes into fully operational, scalable interventions. As digital health continues to evolve, the expansion and scaling of such initiatives will be pivotal in advancing adolescent health outcomes and ensuring a more inclusive and enduring approach to their healthcare needs.

6. LIMITATIONS

6.1. Methodological Limitation

The study was not based on a systematic search, making it likely that some DHIs targeting adolescents and young adults in Nigeria may not be captured. Also, since most of the DHIs are implemented by NGOs, there is a potential exclusion of initiatives not published or readily available in the public domain. In addition, older programmes that might provide valuable historical insights may not have been captured.

6.2. Evaluation and Impact Assessment

Many of the DHIs have not undergone post-implementation evaluations, leading to limited information on their effectiveness and impact on adolescent health outcomes. This highlights the need for robust monitoring and evaluation frameworks to assess programme success and inform future initiatives.

6.3. Gaps in Data Accessibility

Most of the DHIs identified are being implemented by NGOs, there is a potential exclusion of initiatives not published or readily available in the public domain. In addition, older programmes that might provide valuable historical insights may not have been captured as well as grassroots or community-level digital health efforts, further limiting the scope of this review.

6.4. Narrow Scope of Focus

The majority of DHIs target sexual and reproductive health (SRH), with limited attention to other critical areas such as mental health, substance abuse, etc. This limited scope may stem from the priorities of donor funding, which often emphasize specific health issues, thereby overlooking other crucial aspects of adolescent health. Expanding the scope of DHIs to address a broader range of health challenges is essential to meet the diverse needs of adolescents and young adults in Nigeria.

7. RECOMMENDATIONS

7.1. Enhance Public-Private Partnerships

Strengthening collaborations between the public and private sectors is crucial for expanding the reach of DHIs to adolescents and young adults (AYA) across all regions of Nigeria, ensuring inclusivity and equitable access. While private sector and NGO-driven initiatives have made commendable contributions, these efforts often remain fragmented and localized. The government must therefore play a pivotal role in creating a more universal and cohesive approach by developing and implementing national-level programs. Such initiatives would ensure broader coverage, sustainability, and equity in access to digital health services. Additionally, the government should foster strategic partnerships, allocate funding, and develop supportive policies that integrate DHIs into the national AYA health framework.

7.2. Regional Health Assessments

Conducting regional health assessments for AYAs can guide the design and implementation of more targeted, context-specific and effective interventions which address regional variations in health challenges. In addition, many DHIs are geographically restricted by being implemented only in specific states. This localized approach limits access for adolescents and young adults in other parts of Nigeria, a country with vast regional variations in health challenges. Expanding the reach of these initiatives is crucial to ensure inclusivity.

7.3. Evaluate Effectiveness and Impact

Future research should focus not only on the availability of DHIs but also on their effectiveness and long-term impact. Key areas of assessment should include scalability, user-satisfaction, health outcomes, and behavioural changes resulting from these initiatives. This will also enhance the development of evidence-based insights for future interventions.

7.4. Promote Co-Creation with AYAs

Building on the success of co-created DHIs, stakeholders should continue actively involving AYAs in the design and implementation processes. Incorporating their insights will ensure that solutions remain user-centered, culturally relevant, and aligned with their specific needs and preferences.

7.5. Assessment of Facilitators and Barriers of Identified DHIs

Further research should be conducted to explore the strengths and limitations of existing digital health initiatives (DHIs) targeting adolescents and young people (AYA) in Nigeria. This will help identify the main barriers and facilitators influencing the adoption and utilization of these initiatives. A deeper understanding of these factors is critical to addressing challenges, optimizing interventions, and ensuring that DHIs are effectively designed and implemented to meet the unique health needs of AYA in Nigeria.

7.6. Review Adolescent Health Policies for Digital Health Integration

A review of adolescent health policies is essential to explore their potential alignment with digital health innovations. While these policies do not explicitly prioritize digital health, they recognize the significance of innovative approaches in addressing adolescent health challenges. By examining the intersections between these policies and digital health, future research can uncover opportunities to strengthen adolescent health interventions through technology. This approach can also help highlight broader policy implications, guiding stakeholders in creating more robust, technology-inclusive frameworks that address the unique needs of adolescents.

8. CONCLUSION

This review highlights the growing role of digital health initiatives (DHIs) in addressing the health needs of adolescents and young people, demonstrating the potential of digital tools to bridge critical healthcare gaps for this population in Nigeria.

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About DTH-Lab

DTH-Lab is a global consortium of partners working to drive implementation of The Lancet and Financial Times Commission on Governing Health Futures 2030's recommendations for value-based digital transformations for health co-created with young people. DTH-Lab operates through a distributive governance model, led by three core partners: Ashoka University (India), DTH-Lab (hosted by the University of Geneva, Switzerland) and PharmAccess (Nigeria).

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