

LEVERAGING ON APPLICATION OF DIGITAL TECHNOLOGY IN MITIGATING THE IMPACT OF EMERGING HEALTH PROBLEMS

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Abstract

Emerging health problems driven by changing disease patterns, environmental exposures, and lifestyle transitions continue to challenge health systems globally, particularly in low- and middle-income countries. Leveraging digital health technologies has become a strategic response to these challenges. This paper examined the role of telehealth and personal health technologies in mitigating the impact of emerging health problems, with emphasis on disease prevention, health system resilience, and equitable access to care. Drawing on a narrative of review of global and Nigerian empirical evidence, the paper highlighted how telemedicine, mobile health applications, wearable devices, digital surveillance systems, and tele-nursing interventions support early disease detection, chronic disease management, continuity of care, and preventive health behaviours. It is of note that technology-driven healthcare delivery improves access to services, reduces geographical and financial barriers, enhances medication adherence, and promotes proactive personal health management. However, persistent challenges, including inadequate infrastructure, limited internet access, high data costs, low digital and health literacy, and data privacy concerns, limit effectiveness and disproportionately affect vulnerable populations. The paper concluded that sustained investment, inclusive design, capacity building, and robust policy frameworks are essential to maximise the impact of digital health technologies. The authors recommended that investments in digital infrastructure be increased, digital literacy programmes be strengthened, regulatory frameworks be improved, and inclusive implementation strategies be employed to ensure equitable and sustainable healthcare delivery.

Keywords: Technology, Digital health initiatives, Healthcare access, Emerging health problems

Introduction

The rapid advancement of digital technologies has significantly changed how healthcare is provided, particularly when it comes to tackling emerging global health issues. In order to maintain care continuity, improve access, and strengthen the resilience of health systems, telehealth which is the use of information and communication technology to deliver healthcare services remotely has emerged as a critical strategy (DeNicola, Grossman, & Marko 2020). Healthcare systems switched from traditional in-person approaches to remote, technology-driven care as a result of the COVID-19 pandemic's acceleration of telehealth's global adoption (Hall Dykgraaf, Desborough, & Toca 2021). This pandemic not

only accelerated the adoption of telehealth but also promoted the use of remote patient-monitoring devices, lowering the risk of infection and enabling healthcare delivery outside of physical facilities. Telehealth, which enables continuous clinical contacts through digital platforms like video conferencing, mobile applications, and remote monitoring tools, has become a crucial strategy for delivering care during lockdowns on a global scale (DeNicola, Grossman, & Marko 2020). The transition from traditional, facility-based care to technology-mediated healthcare delivery marked a substantial change.

According to Butler Tobah et al. (2019), telehealth has been successful in lowering healthcare expenses, cutting down on travel time, and improving access to healthcare services for underprivileged and rural communities. In Nigeria, telehealth programmes are increasingly seen as practical answers to persistent problems such as unequal distribution of medical experts, infrastructure difficulties, and barriers to receiving care in rural locations (Adewoye, 2020; Ademokoya, 2023). Telehealth systems, such as SMS services, video conferencing, and mobile consultations, have been used to offer disease surveillance, follow-up care, and health education, especially during public health emergencies. Telehealth has transformed personal health management by empowering people to take greater control over their health, in addition to facilitating interactions between patients and physicians. People may now watch vital signs, manage chronic illnesses, and adopt preventative health behaviours as a result of increasing usage of wearable technology, mobile health (mHealth) apps, and home monitoring tools (Xu et al., 2022). These tools promote the shift from facility-based, reactive treatment to preventative proactive personal health management.

However, while personal health technologies improve patient engagement and self-monitoring, they also raise issues of equity and access. The efficient use of telehealth and personal health technologies is hampered in low- and middle-income nations like Nigeria by differences in digital literacy, device affordability, and internet access (Ali et al., 2020). Individuals with impairments, older adults, and those with inadequate health literacy are especially at risk of exclusion, hence perpetuating existing health inequities.

Empirical data shows that digital health technologies are playing a bigger part in public health initiatives in Nigeria. For instance, despite infrastructural and technological obstacles like poor internet coverage and expensive data costs, Nigerian healthcare professionals have stated that telemedicine and mHealth applications, like Babylon Health and Safe Mother, are essential for improving care quality (Obi, 2024). In addition to improving access, telehealth has the ability to prevent disease through better follow-up, patient education, and continuity of care. Personal health technology is increasingly included in health management beyond telehealth exchanges. Wearable technology, health apps, and home monitoring technologies enable people to actively engage in self-monitoring and illness prevention. These technologies aid in the early detection and treatment of chronic illnesses by tracking vital signs, encouraging healthy habits, and promoting drug adherence (Xu et al., 2022). However, limitations in digital literacy and affordability continue to impede wider adoption, especially in Nigeria's rural and underprivileged areas.

The adoption of telemedicine and its role in illness prevention present both potential and challenges, according to recent research from Nigeria. Only about 40% of participants in a cross-sectional study of medical staff at a teaching hospital in North-central Nigeria planned to use telemedicine, although over half of them had adequate knowledge of it. This suggests gaps in preparedness and perceived utility among healthcare providers (Yila et al., 2025). Telemedicine successfully controlled chronic illnesses during the COVID-19 pandemic, according to a 2024 study on telemedicine for chronic disease management in Nigeria (Obinna, 2024). This suggests that telemedicine may lower complications and hospital admissions when follow-ups and preventive care are provided remotely. Improved medication adherence, a critical component of disease prevention and treatment effectiveness was demonstrated by a mobile health intervention aimed at individuals living with HIV/AIDS in Imo State (Ezelote et al., 2024). Systematic data from Nigeria shows that formal training and instruction for medical personnel are crucial for the successful deployment of telemedicine, with major obstacles to wider use posed by technology issues such as inadequate connectivity and power shortages. These studies offer empirical evidence for the preventive potential of telehealth and personal health technologies, showing that, when infrastructure issues are resolved, digital health solutions can improve medication adherence, improve chronic disease management, and increase access to preventive services.

Even with the established benefits, there are still serious equity problems. Rural populations and those with lower socioeconomic status are disproportionately affected by obstacles including restricted broadband access, expensive internet fees, and unstable power supplies, which may exacerbate already-existing health disparities (telecommunication infrastructure study, 2025). Accessibility for older folks, people with impairments, and people with low digital literacy are all included in ethical concerns, underscoring the necessity of inclusive design and focused health education. For disease preventive initiatives to be fair and successful across a range of demographics, digital health solutions must be flexible and culturally appropriate (Victorian Dept of Health, 2020; Ademokoya, 2023).

Equity, accessibility, and inclusivity must be carefully considered when integrating telehealth into personal health management. Researchers worldwide emphasise that access to technology alone does not guarantee better health outcomes; instead, digital health technologies must accommodate users with varying levels of literacy, physical capabilities, and cultural backgrounds (Victorian Department of Health, 2020). Evidence from Nigeria further underscores the importance of linguistically and culturally relevant telehealth interventions aligned with prevailing health attitudes and local realities (Ademokoya, 2023). Despite access to technology, people who lack basic health knowledge or digital skills may struggle to interpret health information, use digital tools, or make informed health decisions. For this reason, health literacy remains a crucial factor in the effective use of personal health technology (Lequetier et al., 2022). Additionally, concerns about data privacy, confidentiality, and cybersecurity significantly affect user trust and willingness to interact with telehealth platforms, highlighting the need for robust

legal frameworks and ethical principles to guide the adoption of digital health (Ademokoya, 2023).

Emerging Health Problems and the Role of Technology-Driven Solutions

When environmental exposures, pathogenic agents, bad lifestyle choices, and chronic illness states interfere with normal metabolic and physiological processes, health issues result. The metabolic mechanisms that enable growth, tissue repair, reproduction, and environmental adaptability are all part of metabolism. Vulnerability to communicable and non-communicable diseases is increased when these systems are disrupted (World Health Organization [WHO], 2022). Utilizing technology has become a crucial remedy for prevention, early diagnosis, management, and strengthening the health system in response to the increasing burden of emergent health issues. Digital health technologies have been demonstrated to improve disease prevention, early detection, chronic condition self-management, and overall health system performance (World Health Organisation, 2024; Khalid et al., 2023; UNICEF, 2024). These technologies include telemedicine, mobile health applications, and digital surveillance systems. Additionally, research shows that digital treatments can enhance integrated care for non-communicable diseases and enhance health outcomes for a variety of groups (WHO & ITU, 2024; BMJ, 2023). mHealth tools have been linked to better clinical and behavioural outcomes in the treatment of hypertension and diabetes (Khalid et al., 2023; Stephen et al., 2023).

Contemporary emerging health problems and technological interventions include the followings:

Communicable diseases: Due to insufficient sanitation, behavioural variables, population mobility, and inadequate surveillance systems, communicable diseases continue to pose serious worldwide public health issues (WHO, 2023). Early detection, contact tracing, and real-time reporting of infectious diseases like COVID-19, tuberculosis, and Ebola have been improved by digital disease surveillance platforms, mobile health (mHealth) applications, and artificial intelligence-supported outbreak prediction models (CDC, 2022; WHO, 2023). Through data-driven public health interventions, these technologies increase reaction time and decrease transmission.

Malnutrition: Despite improvements in food systems, malnutrition is still a major problem. Technological advancements, including data-driven food security surveillance systems, digital growth monitoring tools, and mobile nutrition education platforms, can identify at-risk groups early and encourage evidence-based dietary recommendations (UNICEF, 2023). It has been demonstrated that e-health interventions enhance eating habits and nutrition knowledge, especially in vulnerable populations like adolescents (WHO, 2022).

Environmental health challenges: The burden of disease is greatly increased by environmental pollution, which contaminates the air, water, and soil. Geographic information systems (GIS), satellite monitoring, and real-time water and air quality sensors

are examples of technological solutions that have enhanced environmental risk assessment and guided policy responses (WHO, 2023). Additionally, climate-informed digital tools reduce health risks associated with climate change by enabling early warning systems for extreme weather occurrences.

Mental health disorders: Digital advancements in mental health have contributed to minimising the rising incidence of mental health illnesses. Online cognitive behavioural therapy platforms, remote psychotherapy, and mobile mental health apps have increased access to mental health treatments, decreased stigma, and encouraged early intervention, especially in places with limited resources (WHO, 2023). These technologies provide scalable solutions for the delivery of mental health care and promotion.

Injuries and hospitalisation among older adults: In order to prevent and treat injuries in older persons, technological interventions are essential. Early detection of injury hazards and quick emergency response are made possible by wearable technology, fall detection systems, smart home technologies, and telemonitoring platforms (CDC, 2022). These developments help older populations to have better quality of life, fewer hospital admissions, and more safety.

Diabetes mellitus: Diabetes management and prevention have been revolutionised by digital health technologies. Digital lifestyle modification programmes, telemedicine platforms, and mobile glucose monitoring devices promote self-management, enhance glycaemic control, and enable early complication diagnosis (International Diabetes Federation [IDF], 2023). Clinical follow-up and adherence to healthy behaviours are two areas where technology-enabled care models excel.

Hypertension: Home blood pressure monitors, mobile health apps, and telehealth services that facilitate routine monitoring, patient education, and clinical feedback have all helped with hypertension management (WHO, 2023). At the population level, these technology-based approaches increase blood pressure control and treatment adherence.

Tele-Nursing, Personal Health, and Maternal and Child Care

One real-world use of telehealth that directly promotes individual health is tele-nursing, especially in the treatment of mothers and children. Nurses can improve continuity of treatment outside of traditional healthcare settings by using digital platforms to offer prenatal education, postnatal follow-up, child health monitoring, and mental health support (Fathizadeh et al., 2020). Tele-nursing enhances maternal health awareness, encourages health-seeking behaviour, and supports early diagnosis of problems, according to data from both international and Nigerian studies (Adewoye, 2020; Goblisch & Hand, 2021). However, tele-nursing also has drawbacks, such as fewer possibilities for in-person evaluation, difficulties in offering sufficient emotional support, and dependence on users' digital proficiency (Hall Dykgraaf et al., 2021). Davenport et al. (2020) reported that reduced in-person interactions during the COVID-19 pandemic contributed to feelings of

anxiety and loneliness among women. This underscores the necessity for blended care approaches that combine telemedicine with sporadic in-person treatments (Lequetier et al., 2022). Given the reported rise in maternal and perinatal mental health issues worldwide during the pandemic, these worries are especially important (Xu et al., 2022).

Challenges and Advantages of Telehealth

Chances to improve access, continuity of treatment, and disease prevention include the incorporation of telehealth into healthcare delivery; however, there are obstacles to overcome. Telehealth has shown significant benefits on a global scale, such as lowering financial and geographic barriers, improving healthcare access for underserved and rural populations, and ensuring continuity of care during public health emergencies like the COVID-19 pandemic (Butler Tobah et al., 2019; DeNicola et al., 2020). Through digital consultations, mobile health apps, and remote monitoring, telehealth also empowers patients to take a more active role in managing their own health, encouraging preventative health practices and managing chronic illnesses (Xu et al., 2022). Despite these advantages, telehealth has significant global obstacles. According to Ali et al. (2020) and Lequetier et al. (2022), those who lack dependable internet access, appropriate equipment, or sufficient digital literacy find it difficult to utilise telehealth successfully, making the digital device a significant obstacle. Concerns about privacy and cybersecurity are widespread, including impeding patient acceptance and trust (Ademokoya, 2023). Telehealth scalability is further limited by regulatory and legal restrictions, such as inconsistent reimbursement policies and cross-border licensure concerns (Elias, 2020). Furthermore, some detractors contend that telehealth could mimic traditional consultations without significantly raising the standard of care, particularly for ailments that call for in-person action or physical examination (Gyselaers et al., 2020).

The advantages of telehealth in Nigeria align with global trends, according to RSIS International (2025) and Obi (2024). Digital platforms can prevent disease, enhance medication adherence and chronic illness management, and make healthcare more accessible in rural areas. Wearable technologies, tele-nursing services, and mobile health apps have shown great promise in maternal and child health by reducing travel and wait times while giving patients guidance, information, and continuous monitoring (Adewoye, 2020; Goblisch& Hand, 2021).

However, Nigeria has additional context-specific issues that restrict telehealth's impact and widespread adoption. Service delivery is hampered by infrastructure flaws such erratic energy and inadequate internet connectivity, and low-income populations are less able to access telehealth due to the expensive cost of mobile data and equipment (Ademokoya, 2023). Effective use is hampered by gaps in digital literacy among patients and healthcare professionals, and there are serious concerns associated with the lack of defined legal frameworks and moral standards for cybersecurity and data protection (Yila et al., 2025). Additionally, disparities in access are made worse by linguistic and cultural obstacles as well as the exclusion of vulnerable groups such as older adults, people with impairments, and people living in rural areas (Victorian Department of Health, 2020). The penetration of telehealth in Nigeria is further constrained by resistance to adoption among

certain healthcare professionals, who are worried about the dependability of the technology.

Overall, telehealth offers revolutionary benefits both internationally and in Nigeria, especially by enhancing access, encouraging preventive care, and supporting personal health management; however, its success is limited by infrastructure, regulatory, and equity-related challenges. To maximise telehealth's potential to improve healthcare systems and advance equitable health outcomes, these obstacles must be addressed through investments in digital infrastructure, capacity-building for healthcare providers, inclusive design, and strong regulatory laws.

Conclusion

Responses to new health issues in Nigeria and around the world have changed due to digital technologies. Particularly during public health emergencies like the COVID-19 pandemic, telehealth and personal health technologies have emerged as essential instruments for maintaining healthcare delivery, increasing access, and promoting disease prevention. Telehealth has lowered geographical, cost, and time-related obstacles to healthcare access through remote consultations, follow-up care, health education, and monitoring. Empirical data from Nigeria demonstrates that telemedicine and mobile health apps can increase medication adherence, promote disease prevention, and manage chronic diseases. The transition from curative to preventive care is supported by personal health technologies, such as wearable technology and mobile applications, which further encourage individual participation in health management. However, due to issues including low digital literacy, inadequate internet connectivity, expensive data, erratic power supplies, and worries about data security and privacy, their advantages are uneven.

When digital health solutions lack inclusive design, vulnerable populations like people with disabilities, older adults, people living in rural areas, and people with limited health literacy run the danger of being excluded; therefore, equity and accessibility continue to be major considerations. Although tele-nursing has enhanced the provision of healthcare for mothers and children, its shortcomings highlight the necessity of blended care models that combine digital platforms with sporadic in-person services. Telehealth and personal health technologies offer efficient and long-lasting ways to deal with new health issues and improve disease prevention in Nigeria. However, their full potential requires consistent investments in infrastructure, capacity building, inclusive design, and supportive policy frameworks. In light of the reviewed evidence, the following recommendations are made:

- i. In order to ensure efficient telehealth delivery, government organisations and private sector partners should prioritise investments in dependable internet connectivity, a steady supply of electricity, and reasonably priced data services, especially in rural and underserved areas.
- ii. Improve uptake and utilisation, regular and structured training programs should be put in place to increase healthcare workers' proficiency and self-assurance when utilising telehealth and personal health technology.

- iii. Meet the needs of those with disabilities, the elderly, and those with low reading levels, telehealth platforms should be created utilising inclusive design principles. Multilingual alternatives, streamlined interfaces, and the use of visual aids should be promoted.
- iv. Help people use personal health technologies for disease prevention and continuous health management, public health education programs should include digital and health literacy components.
- v. To improve public confidence and acceptance of telehealth services, comprehensive national rules and ethical guidelines should be developed to address concerns of data privacy, confidentiality, and cybersecurity.

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