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Preface

The healthcare landscape is rapidly evolving, with technology playing an increasingly significant role in service delivery. Digital health is transforming traditional practices to provide more efficient, personalised and accessible care, and technological and connectivity advancements offer unprecedented capabilities in data transmission and network performance. This convergence has the potential to revolutionise the healthcare industry by addressing long-standing challenges and enabling innovative solutions.

This report explores the relationship between digital health and technological connectivity, analysing how the growing adoption and sophistication of digital health solutions create significant demand for advanced connectivity. It examines key components, specific applications benefiting from their synergy, and future challenges and trends, aiming to provide a comprehensive understanding of digital health as a driver for enhanced connectivity utilisation in healthcare. The scope includes a detailed analysis of definitions, features, applications, benefits, challenges and future trends associated with this convergence.

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Executive summary

Overarching key takeaways

Digital health is fundamentally transforming the healthcare landscape in Africa. Digital health integrates digital technologies into health systems, facilitating more efficient, personalised and accessible care. This transformation addresses long-standing challenges in healthcare delivery and enables innovative solutions, aiming to improve health outcomes, expand universal health coverage (UHC) and enhance overall well-being.

The interdependence of connectivity and digital health is pivotal. The increasing sophistication and adoption of digital health solutions drive significant demand for advanced connectivity. The functionality and efficacy of these technologies depend entirely on the availability, quality and type of connectivity, making robust and reliable network infrastructure essential for realising the full potential of digital health in Africa.

A holistic enabling environment is crucial for the success of digital health solutions. Successful integration and scaling require a comprehensive environment comprising sufficient workforce capacity, diverse services and applications, robust standards and interoperability, established digital public infrastructure for health (DPI-H), clear strategies and sustainable investment, appropriate legal and policy frameworks, and reliable ICT infrastructure. Strong leadership and governance underpin these components.

Digital health presents substantial economic potential in Africa. The economic impact of digital health technologies was estimated at $4.6 billion in 2024, with projections to reach approximately $5.7 billion under a baseline scenario and $6.5 billion under a positive scenario by 2030. This growth significantly contributes to the health sector's GDP regionally, underscoring the critical importance of continued investment and strategic development.

Systemic challenges persist, hindering digital health adoption in Africa. Issues such as chronic underfunding of healthcare, shortages and maldistribution of skilled health workers, inadequate and fragmented data infrastructure, low digital literacy, significant rural-urban disparities in connectivity and unreliable electricity supply at health facilities must be addressed to achieve equitable and widespread digital health outcomes.

The strength of digital health connectivity lies in synergy and adaptability. The true potential of digital health is unlocked through the synergistic interplay of various technologies, rather than relying on individual capabilities. A pragmatic, needs-driven approach is essential, tailoring solutions to local health challenges and contexts. For Africa, the optimal artificial intelligence (AI) strategy focuses on augmenting human healthcare workers, enhancing their efficiency and diagnostic capabilities in high-impact areas, rather than replacing them.

Key takeaways for policymakers and regulatory bodies

Digital health alone cannot remedy the profound challenges in Africa's healthcare landscape. Policymakers must address the severe shortage and uneven distribution of trained healthcare professionals, which is exacerbated by brain drain. Healthcare infrastructure improvements are needed, notably to update the fragmented, paper-based health information systems (HIS) in use and to improve unreliable electricity supply in rural facilities. Addressing chronic underfunding, which results in high out-of-pocket payments, is critical. Sustained investment in foundational infrastructure is crucial for technology to translate into improved health outcomes.

Reliable connectivity is essential for digital health solutions. Policymakers should coordinate cross-sector and industry partnerships for infrastructure investments, focusing on deploying and expanding network coverage, including 4G and 5G, and improving last-mile connectivity to health facilities. While 2G/3G coverage is extensive, 4G coverage remains limited, highlighting a gap for advanced solutions. Prioritising stable power and internet infrastructure is also of high importance, as unreliable electricity severely constrains digital health systems. Policies should aim to strengthen energy security, allowing private sector contributions to the grid, while strategic spectrum allocation is vital for a supportive infrastructure environment.

Strong leadership and political will are crucial for digital health transformation. Policymakers should prioritise and allocate resources to embed digital health units within the Ministry of Health or establish partnership agreements with ICT ministries. While many countries have data protection laws, challenges such as enactment delays and regulatory capacity limitations persist, so it is essential to develop robust data privacy policies specific to healthcare data. Current regulations can also impede digital solutions, such as restrictions on the home delivery of medications. Therefore, in addition to policies promoting equitable access, including affordable data packages, policymakers must develop a 5G regulatory roadmap and guidelines for AI in healthcare.

Interoperability is essential for effective data sharing and holistic patient views. Policymakers should develop a health normative standards framework to ensure digital health initiatives (DHIs) conform to international standards, such as HL7 FHIR and ICD-10. Many countries currently lack a national health information exchange (HIE), hindering data sharing and creating silos.

Low digital literacy among healthcare workers and end users, especially in rural areas, hinders effective digital health use. Policymakers should incorporate digital literacy and health intervention onboarding into professional training. Empowering the Ministry of Health with ICT skills, developing digital health career pathways, and integrating training into pre- and in-service education are vital.

Innovative financing models are needed to address chronic healthcare underfunding. Public–private partnerships (PPPs) leverage private resources and expertise, particularly in infrastructure and specialised services, but they require good governance. Policymakers should signal specific needs to ecosystem stakeholders to foster collaboration and resource mobilisation. Consider incentives for digital health adoption, such as those in the US Health Information Technology for Economic and Clinical Health (HITECH) Act, which incentivised electronic health record (EHR) adoption. Allow health providers to propose zero-rated solutions using mobile network operator (MNO) networks, potentially receiving tax incentives for impact packages.

Key takeaways for MNOs

MNOs are fundamental enablers of digital health, playing a strategic, multi-layered role across the entire digital health value chain. MNOs' core function in developing and maintaining network infrastructure is key for digital health services, encompassing the deployment and expansion of network coverage, enhancing backhaul and last-mile connectivity, and implementing dedicated network solutions. By investing in hybrid connectivity solutions, such as 4G, fixed wireless access (FWA), and satellite, MNOs provide the necessary bandwidth for telemedicine and digital logistics, bridging the coverage-to-capacity gap and ensuring health providers have the required network access and performance.

There is significant market opportunity and economic potential for MNOs in the growing digital health sector in Africa. The digital health market in Africa is projected to grow from $2.049 billion in 2023 to $3.237 billion by 2030, with a compound annual growth rate (CAGR) of 6.7%. This growth offers MNOs opportunities to redefine their business models, enhance market influence and unlock new revenue streams, especially in the business-to-business (B2B) sector.

MNOs must diversify their revenue models beyond traditional voice and SMS to fully capitalise on the digital health opportunity. Key alternative revenue models include IoT-enabled health solutions, digital health platforms and value-added services (VAS), mobile money and fintech integration, data analytics and insights, network-as-a-service (NaaS) and strategic partnerships. These models allow MNOs to tap into new markets and revenue streams, leveraging their existing infrastructure and expertise.

Despite high 2G/3G coverage, a significant usage gap and coverage-to-capacity gap exists, particularly for advanced digital health solutions. There is a substantial gap in high-speed connectivity, which is necessary for data-intensive applications such as real-time patient monitoring, high-resolution diagnostics and immersive AR/VR training. Low smartphone penetration and high data and device costs are significant barriers to digital health adoption. MNOs are encouraged to co-invest in physical infrastructure scaling with other MNOs and engage in large-scale procurement of 3G/4G/5G-enabled devices to lower costs.

MNOs play a critical role in addressing digital literacy and supporting the enabling environment for digital health. Supporting digital literacy training efforts and co-investing in digital literacy programmes can bridge the gap in user readiness for digital health solutions. Additionally, MNOs can contribute to policy and regulation by allowing health providers to propose zero-rated solutions utilising their networks, potentially receiving tax incentives for impact packages. Their capabilities in cloud hosting/data warehousing and selling anonymised call centre data can enhance language capabilities of large language models (LLMs) for healthcare. Furthermore, by co-investing in stable power and internet infrastructure, MNOs can help address the lack of reliable electricity at many health facilities, which severely constrains digital health systems and network operations.

Key takeaways for digital health providers

Digital health providers in Africa are at the forefront of innovation, navigating significant challenges that necessitate strategic development and collaborative approaches. There is an ongoing need for focused efforts on workforce capacity building, given the low digital literacy among healthcare workers and end users, especially in rural areas. Implementing Train the Trainer models is a key insight into how community health workers (CHWs) and other professionals can be adequately equipped to effectively utilise digital tools.

Developing contextually relevant applications is a critical insight for digital health in Africa. There is a pressing need to create applications that leverage existing open-source data in local languages to train LLMs. This approach directly addresses the inaccuracies and biases that can arise when applying Western-trained AI models in Africa, largely due to a scarcity of high-quality local datasets.

Innovative financing models can overcome financial barriers and ensure the sustainability of digital health initiatives. Providers are increasingly exploring models that facilitate cost-sharing between public and private sectors, which is vital for enhancing the scalability and accessibility of digital health solutions.

Strategic partnerships with MNOs provide insight for data enhancement within the digital health landscape. Collaborating with MNOs to digitise community-led monitoring (CLM) data can significantly improve the quantity and quality of datasets, particularly in rural and remote areas where data is often scarce. This partnership is instrumental in driving informed decision-making and tailored health interventions.

Community-led design and buy-in are essential insights for developing effective digital health solutions. Involving communities in the creation of digital health tools fosters a robust understanding of the local context, including language, digital literacy levels, pain points and accessibility. This approach encourages user buy-in and ensures solutions are culturally appropriate and effective.

Addressing interoperability and fragmentation remains a critical insight for digital health providers. While some progress has been made, a persistent lack of interoperability standards continues to be a barrier. Providers are increasingly focusing on advocating for and building solutions that adhere to national and international health data standards (e.g. HL7 FHIR, ICD-10) to enable seamless data exchange and integration.

Addressing infrastructure gaps is key for the success of digital health solutions. While MNOs contribute significantly to connectivity, providers are challenged to design solutions that can function effectively even with inconsistent electricity supply and varying internet quality, particularly in rural areas. Ensuring adaptability in diverse infrastructure environments is key to broadening the reach and impact of digital health initiatives.

1 Introduction: the confluence of healthcare and technology

1.1 Defining digital health

Digital health has emerged as a key field, using information and communications technology (ICT) to support health. Mobile health (m-health) specifically uses mobile wireless technologies for public health.

> **"Digital health is the systematic application of information and communications technologies, computer science and data to support informed decision-making by individuals, the health workforce and health systems to strengthen resilience to disease and improve health and wellness."**
>
> **WHO, Digital Implementation Investment Guide, 2020**

Digital health has expanded to include e-health, m-health and emerging areas such as big data, genomics, and AI. This evolution reflects the integration of sophisticated technologies into healthcare delivery. The World Health Organization (WHO) defines digital health as "the systematic application of information and communications technologies, computer science and data to support informed decision-making by individuals, the health workforce, and health systems to strengthen resilience to disease and improve health and wellness." The overarching goal is to improve health outcomes, extend UHC and enhance overall well-being through the strategic use of digital tools. This involves a shift towards patient-centred, outcomes-focused and sustainable systems; not just digitising records but transforming health operations and integrating digital technologies into health systems.

1.2 Technology and devices

Implementing digital health applications relies on a diverse and rapidly evolving ecosystem of technologies and devices. These instruments are the primary interface for data capture, user interaction and intervention delivery, forming the backbone of the digital health revolution. The sophistication and proliferation of these devices drive the demand for robust connectivity solutions, which are essential for transmitting vast amounts of data and enabling real-time interactions.

Table 1:

Key categories of digital health technologies and devices

Category	Description
Wearable technology	Devices worn on the body to collect data (physiological, behavioural, environmental).
Consumer-grade wearables	Smartwatches and fitness trackers monitoring heart rate, SpO2, ECG, sleep, stress and activity.
Medical-grade wearables	Clinically validated wearables such as CGMs, ECG monitors, smart patches, and biosensor clothing.
Mobile devices	Smartphones and tablets used for digital health apps, communication and patient data access.
Smartphones	Host m-health apps for adherence, symptom tracking, telehealth and EHR access.
Tablets	Used in clinics for EHRs, registration, imaging, telehealth and patient education.
Remote patient monitoring devices	Medical devices for home use, including BP cuffs, smart scales, oximeters and disease-specific monitors.
Diagnostic and therapeutic devices with connectivity	Connected diagnostic/therapeutic tools for data transmission and remote monitoring.
Point-of-care diagnostic devices	Portable tools, such as ultrasound, mobile X-ray, analysers and digital stethoscopes.
Implantable and ingestible medical devices	Pacemakers, ICDs, neurostimulators and ingestible sensors with wireless connectivity.
Smart medication delivery systems	Smart inhalers and injectors that track medication usage and technique.
Telehealth and communication hardware	Hardware for remote consultations, including cameras, microphones, telepresence robots and kiosks.
Internet of Medical Things (IoMT)	Network of connected medical devices, applications and health systems.
Smart hospital infrastructure	Smart beds, medication systems, environment monitors and RTLS for hospitals.
Ambient sensors and home monitoring	Sensors for elderly care tracking motion, door usage and bed pressure.
Advanced imaging and therapeutic technology	High-data technologies requiring connectivity for imaging and procedures.
Digital imaging systems	MRI, CT, PET and X-ray systems linked to PACS and AI tools.
Robotic surgical systems	Real-time connected surgery systems, such as da Vinci.
AR/VR systems	Immersive tools for surgical planning, training, patient education and therapy.
Drone delivery systems	Unmanned aerial vehicles (UAVs) used to transport essential medical supplies, diagnostics or samples.

The functionality and efficacy of these technologies and devices are linked to availability, quality and type of connectivity. Communication protocols range from short-range technologies such as Bluetooth Low Energy (BLE) and near-field communication (NFC) for device-to-device pairing (e.g. wearable to smartphone), to Wi-Fi for local data transfer within hospitals or homes, and cellular networks (including 4G LTE and 5G) for mobile access and real-time data streaming. The data volume – from continuous physiological streams and behavioural logs to high-resolution medical images – underscores the need for scalable, reliable, high-bandwidth infrastructure. Moreover, applications involving real-time remote control, critical alert delivery or interactive telehealth demand ultra-low latency and high reliability.

In essence, technologies and devices in digital health are not merely isolated tools but active, interconnected participants in a complex ecosystem. Their increasing sophistication, miniaturisation and integration into daily life, clinical workflows and data generation drive the development and deployment of advanced connectivity solutions, ensuring that digital health's transformative potential to make healthcare more personalised, predictive, participatory and preventative is fully realised.

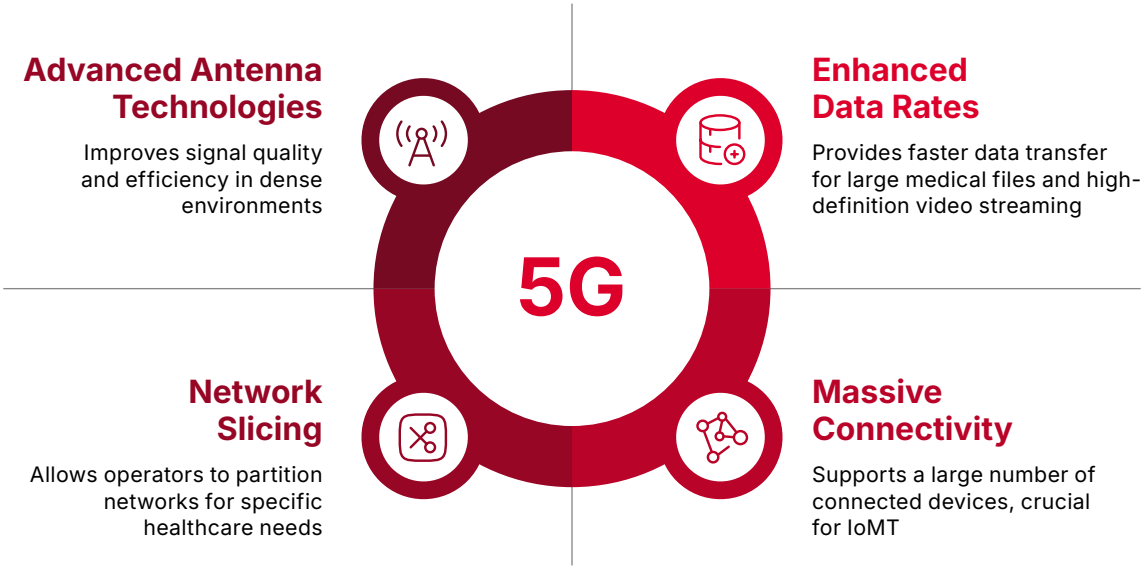
5G: key features and capabilities for healthcare

5G, the fifth generation of mobile communications, builds on 4G LTE and is designed to virtually connect everyone and everything, encompassing machines, objects and devices within smart networked communication environments. 5G offers wider coverage, reliable connections and significantly faster data speeds, making it an essential upgrade for the future digital world.

5G's unique mix of enhanced mobile broadband (eMBB), ultra-reliable, low-latency communications (uRLLC) and massive machine-type communications (mMTC), along with innovations such as network slicing and edge computing, address critical healthcare needs. Delivering data speeds up to 100 times faster than 4G, 5G advances the transfer of large medical files such as MRIs and CT scans, and supports high-definition video streaming for telehealth. Its low latency, down to 1 millisecond, is vital for real-time healthcare applications such as remote surgery and instant alerts from monitoring devices.

Figure 1

Key features and capabilities of 5G



Source: Genesis Analytics

5G's capacity to support numerous connected devices is key for the healthcare sector, which has seen rapid growth in Internet of Medical Things (IoMT) devices. For critical applications, 5G ensures high reliability and minimal delay. Network slicing allows operators to create virtual networks with specific performance characteristics tailored to different healthcare needs, ensuring optimal service even during congestion. This is essential for maintaining effective telemedicine services and prioritising healthcare traffic for emergency and critical consultations.

Additionally, 5G uses advanced antenna technologies such as beamforming, which focuses signals directly to devices, enhancing efficiency and signal quality, especially in dense healthcare environments. These features provide a strong foundation to support the growing demands of digital health applications.

2 Understanding the healthcare and digital health landscape in Africa

2.1 Healthcare landscape in Africa

This chapter introduces a comprehensive analysis of the health landscape in Africa, neatly framed against WHO's six building blocks for health systems: (1) service delivery, (2) health workforce, (3) health information systems, (4) medical products, vaccines and technologies, (5) health financing and (6) leadership and governance. This is a robust lens to use to analyse the complex interdependencies and nuances that characterise the continent's health systems.

2.1.1 Service delivery

Public and private provision

Africa's healthcare landscape features a mixed delivery system with significant roles for both public and private sectors, though often lacking coordination and consistent quality.

The private sector significantly contributes to financing and service delivery, with about 60% of healthcare funding coming from private sources, primarily through high out-of-pocket health expenditure (OOPHE).[1] Around 50% of total health expenditure goes to private providers, including for-profit hospitals, clinics, pharmacies, non-profits such as FBOs and NGOs, social enterprises and a vast informal sector with traditional healers. Despite perceptions, the private sector serves a broad population spectrum, including many poor and urban dwellers.

The healthcare infrastructure in Africa is severely deficient in quantity, distribution and capability, limiting access and quality of care. The facility network includes hospitals (public, private, FBO), health centres, posts and clinics. However, accurate data on numbers, types and locations is challenging to obtain. Most African countries lack a complete, geolocated and updated health facility database (HFDB) or master facility registry (MFR), hindering effective system planning, resource allocation, access monitoring and strategic intervention deployment, including digital health solutions such as telemedicine hubs or EHR rollouts.

This fragmented health sector presents opportunities for increased capacity and innovation, but raises concerns about quality control and equitable access, as effective regulation and oversight is difficult. Digital health initiatives can bridge gaps between

1 The Business of Health in Africa: Partnering with the Private Sector to Improve People's Lives, IFC, 2008

sectors with shared EHR platforms, standardised reporting or telemedicine networks, improving quality and adherence to standards.

PPPs are promoted to leverage private resources and expertise for public health goals, particularly in infrastructure and specialised services such as diagnostics. Success depends on the public sector's ability to manage these complex arrangements effectively, a capacity often limited by governance weaknesses in Africa. Digital health PPPs, especially those involving large-scale data systems, require careful design and oversight to prevent inequities, ensure data privacy and protect public health objectives from commercial interests.

Rural-urban disparities and service gaps

Facilities are concentrated in urban areas, disadvantaging rural populations. While over 95% of city dwellers live within 30 minutes of a facility, only 65% in villages and rural areas have such access, with 10-15% facing over three-hour travel times. For nearly 10% of older adults, reaching a hospital takes over six hours.[2]

Facility capabilities are compromised by severe infrastructure deficits, with many rural facilities understaffed and poorly equipped. This is reflected in the low density of hospital beds, averaging only 10 per 10,000 population, compared to a global average of 27.[3] They also lack essentials such as medical oxygen, which was evident even before the Covid-19 pandemic, as the existing oxygen supply equipment only met half of the patients' needs in Africa.[4] Specialised equipment such as CT scanners or MRI machines in the continent is also scarce. A study of Ethiopian hospitals found only 25.6% of expected equipment available, with approximately 25% non-functional due to lack of spare parts, maintenance and training.[5] Poor buildings and unreliable electricity further hinder operations and digital tool use, while reliance on imported medical goods adds cost and complexity.

These capability gaps are acute in maternity care. Limited access to well-equipped facilities with skilled personnel contributes to high maternal mortality rates. Many rural women deliver at home or in under-resourced facilities, with hospital use for childbirth low (ranging from 2-29% across 18 countries) and inequitable, particularly affecting poorer women.[6]

Maternal, newborn and child health (MNCH) outcomes remain extremely poor. Africa accounts for 70% of global maternal deaths and half of under-five child deaths.[7] Slow progress in reducing neonatal mortality is linked to inadequate care access during pregnancy, childbirth and the postnatal period.

Such deficits critically affect digital health. Sophisticated tools deployed in environments without reliable power, functional equipment or adequate staffing may offer limited benefits. Digital interventions rely on facility and system capacity. Thus, digital health investments must align with strengthening foundational infrastructure to ensure technology translates into better health outcomes.

2 Florio, P., et al. (2023). Estimating geographic access to healthcare facilities in Africa by Degree of Urbanisation. Applied Geography, 160
3 Health Inputs and Processes, WHO AFRO, 2022
4 "Medical oxygen scarce in Africa, Latin America amid virus," World News, February 2021
5 Woldeyohanins, A.E., et al. (2025). The availability and functionality of medical equipment and the barriers to their use at comprehensive specialized hospitals in the Amhara region, Ethiopia. Frontiers in Health Services, 4
6 Straneo, M., et al. (2024). Inequalities in use of hospitals for childbirth among rural women in sub-Saharan Africa: A comparative analysis of 18 countries using Demographic and Health Survey data. BMJ Global Health, 9(1)
7 Maternal Mortality, WHO, 2025

2.1.2 Healthcare workforce

Africa faces a complex healthcare landscape marked by a high global disease burden. Despite bearing 24% of the world's disease burden, Africa has only 3% of the global health workforce and less than 1% of global health expenditure.[8] This is compounded by a double burden of infectious diseases such as HIV/AIDS, tuberculosis (TB) and malaria, alongside rising non-communicable diseases (NCDs) and high maternal and child mortality rates.[9]

The human resources for health (HRH) in Africa are significantly constrained by a severe shortage of trained professionals across nearly all cadres. The density of core health workers (physicians, nurses and midwives) is between 1.3 and 1.55 per 1,000 population, far below WHO's recommended minimum of 4.45 per 1,000 needed for essential services and progress towards UHC. Only four African countries (Seychelles, Namibia, Mauritius and South Africa) meet the WHO target.[10] If trends continue, a shortage of 6.1 million health workers is projected by 2030.

Maldistribution worsens this shortage, with health professionals concentrated in urban centres, leaving rural areas underserved.12 For instance, 80% of ear, nose and throat (ENT) specialists in Cameroon are in just two regions of the country. Rural pipeline programmes aim to address this imbalance by recruiting rural students and exposing them to rural practice, but face funding and support challenges. For example, in Africa, there is approximately one hearing healthcare professional for every 1 million people, despite a high prevalence of hearing loss. Key informant interviews (KII) through Genesis Analytics (2025) noted that Nigeria alone faces a mass emigration of healthcare workers, with around 40,000 preparing to leave or ready to leave annually, leading to a high shortage of healthcare workers.

The phenomenon of brain drain further exacerbates the crisis, as professionals migrate to high-income countries. This is driven by push factors such as low pay, poor conditions and instability in Africa, and pull factors that include better salaries and opportunities abroad. This migration represents a significant loss for Africa, which bears the training cost only to lose these professionals, with 80% of African countries failing to meet WHO workforce recommendations partly due to emigration.

Digital health providers consistently report low digital literacy levels among healthcare workers and end users in Africa, especially in smaller and rural centres (KII, Genesis Analytics, 2025). Low digital literacy can manifest as basic challenges, such as healthcare workers needing to be taught how to log in or use a web browser. It also impacts the effective use of solutions. For instance, staff might wrongly conclude that a system is not working due to their own lack of familiarity (KII, Genesis Analytics, 2025). For CHW, issues like old or low-end smartphones with insufficient memory or short battery life further hinder effective use. One KII noted that while users grasp app concepts easily, a large portion of training time is spent on basic tasks like setting up Google accounts or managing phone memory. Beyond just digital skills, there are also cultural and behavioural barriers to technology acceptance and change among healthcare workers.

Training capacity has improved, with more doctors graduating annually, but still falls short of needs or compensating for migration losses. Innovative training methods like e-learning and m-learning expand reach and reduce costs, allowing skill upgrades without leaving posts.

CHWs play a key role in basic diagnosis, treatment, education and linking communities to formal facilities, especially in remote areas. Large-scale CHW programmes exist in Africa, with initiatives such as the One Million Community Health Workers Campaign aiming to scale up rural coverage.

However, increasing training alone is insufficient without addressing retention and distribution. Digital health can enhance the efficiency and reach of the existing workforce. Examples include telemedicine connecting rural nurses with specialists, AI diagnostic aids and mobile tools for administrative tasks. The reliance on CHWs presents opportunities for targeted m-health interventions. Equipping CHWs with mobile tools for data collection, communication, accessing information, decision-support and remote training can significantly improve primary care services.

8 Adebisi, Y.A., al. (2022). Revisiting the issue of access to medicines in Africa: Challenges and recommendations. Public Health Challenges, 1(2)

9 Nyirenda, M.J. (2020). Non-communicable diseases in sub-Saharan Africa: Understanding the drivers of the epidemic to inform intervention strategies. International Health, 8(3)

10 Ahmat, A., et al. (2022). The health workforce status in the WHO African Region: findings of a cross-sectional study. BMJ Global Health, 7 (Suppl 1)

2.1.3 Health information systems

Healthcare systems in Africa lag globally in capacity and performance, due in part to historical factors such as colonialism, which have caused infrastructural deficits and disparities in access and outcomes. The Covid-19 pandemic highlighted these systems' fragility, disrupting essential services.

Africa's data infrastructure is inadequate and only a few countries have extensive vital registration systems in place. Many clinics still depend on paper-based record-keeping, which contributes to data loss, inaccessible records, poor legibility and operational inefficiencies (KII, Genesis Analytics, 2025). Furthermore, the implementation of national EHRs, particularly in countries such as Nigeria, remains largely in discussion rather than active deployment, resulting in fragmented HIS (KII, Genesis Analytics, 2025).

There is a lack of knowledge on how the population can access their own health information, while limited internet access, particularly in rural areas, means a lack of access to up-to-date healthcare information. Data quality for patient diagnosis and treatment is further undermined by a widespread shortage of modern diagnostic equipment, including X-ray, CT and MRI machines, as well as a shortage of trained radiologists in most countries in the continent.[11] This directly affects the completeness and accuracy of clinical data.

In response to these challenges, key priorities for strengthening health systems have emerged, guided by frameworks like the Sustainable Development Goals (SDGs). Achieving UHC – ensuring access to necessary health services without financial hardship – is central. Strengthening primary healthcare (PHC) is seen as the best strategy towards UHC. Other priorities include enhancing preparedness for health emergencies, improving HIS for decision-making and monitoring, addressing health inequities and increasing sustainable domestic financing.

These issues are compounded by data challenges. Many countries lack robust systems for collecting, analysing and utilising high-quality health data, including vital statistics such as births and deaths. This deficit hinders planning, resource allocation and accountability, and obstructs the development of data-intensive digital health solutions like AI-driven diagnostics, which require large datasets for training. Improving basic HIS is therefore crucial for unlocking advanced digital tools.

Strengthening PHC offers a pathway for digital health integration. Tools that support CHWs, facilitate remote consultations or improve referral systems can align with PHC goals. However, digital solutions must integrate seamlessly with existing PHC structures rather than creating parallel systems. Table 2 illustrates the health challenges in Africa compared to global averages and targets, providing context for digital health interventions.

Table 2:

Key Africa health indicators (continental averages)[12]

Indicator	Africa average	Global average	Target
Maternal mortality ratio (per 100,000 live births)	533 (70% of global deaths)	197	<70 (SDG)[13]
Under-five mortality rate (per 1,000 live births)	75 (varies) (50% of global deaths)	38	25 (SDG)
Health worker density (doctors/nurses/midwives per 1,000)	1.3-1.55		> 4.45 (WHO min. for UHC)
Average life expectancy at birth (years)	60-65 (varies)	73[14]	
UHC service coverage index (0-100)	46	68	

11 World Report on Hearing, WHO, 2021
12 Values are approximate regional averages or representative figures; significant variation exists between countries and data years may vary.
13 The Healthcare Crisis in Sub-Saharan Africa, African Mission Healthcare (n.d.)
14 Atlas of African Health Statistics 2022: Health situation analysis of the WHO African Region, WHO, 2022

2.1.4 Medical products, vaccines and technologies

Africa has a complex epidemiological profile, with a persistent high burden of communicable diseases and a rapidly rising prevalence of NCDs, alongside high maternal and child mortality and significant injury burdens. This double burden, or triple burden when including injuries, strains overstretched health systems, requiring multifaceted prevention and care. This has resulted in heavy demand for medicines for disease treatment and prevention. Africa accounts for a small fraction (3%) of drug production in the world despite bearing 24% of the global burden of diseases.[15]

The availability and affordability of essential medicines to vulnerable populations such as women and children remains a persistent challenge across Africa. The continent is heavily reliant on imported pharmaceuticals, which often predisposes the vulnerable population group to shortages. [16] And with new technologies and ways to fight diseases emerging, health products are constantly changing.

Digital innovations are addressing these gaps in the health supply chain, with applications such as logistics management information systems (LMIS) providing real-time stock data for proactive inventory management. Mobile tools enable health workers to report stock levels quickly, improving visibility. Many African countries are integrating LMIS with platforms such as District Health Information Software 2 (DHIS2), enhancing decision-making and reducing stockouts, as seen in Uganda. South Africa's Stock Visibility System (SVS) and the SMS for Life initiative in Kenya and Tanzania improve medicine availability through real-time monitoring.

Drones are another innovation for last-mile delivery to remote areas, delivering blood, vaccines and medicines swiftly in countries including Rwanda and Ghana. Health tech startups are digitising the pharmaceutical supply chain, connecting manufacturers, distributors, pharmacies, clinics and patients, and offering solutions for online ordering, inventory management, demand forecasting, quality assurance and financing. These innovations improve medicine availability, reduce wastage, speed up delivery and enhance planning.

2.1.5 Health systems financing

Healthcare financing in Africa is marked by chronic underfunding, inefficient resource allocation, reliance on external aid and high direct payments by households, posing barriers to achieving UHC and equitable access. Financial barriers hinder healthcare access, with over 40% of health financing coming from out-of-pocket payments, leading to some of the world's poorest health outcomes.

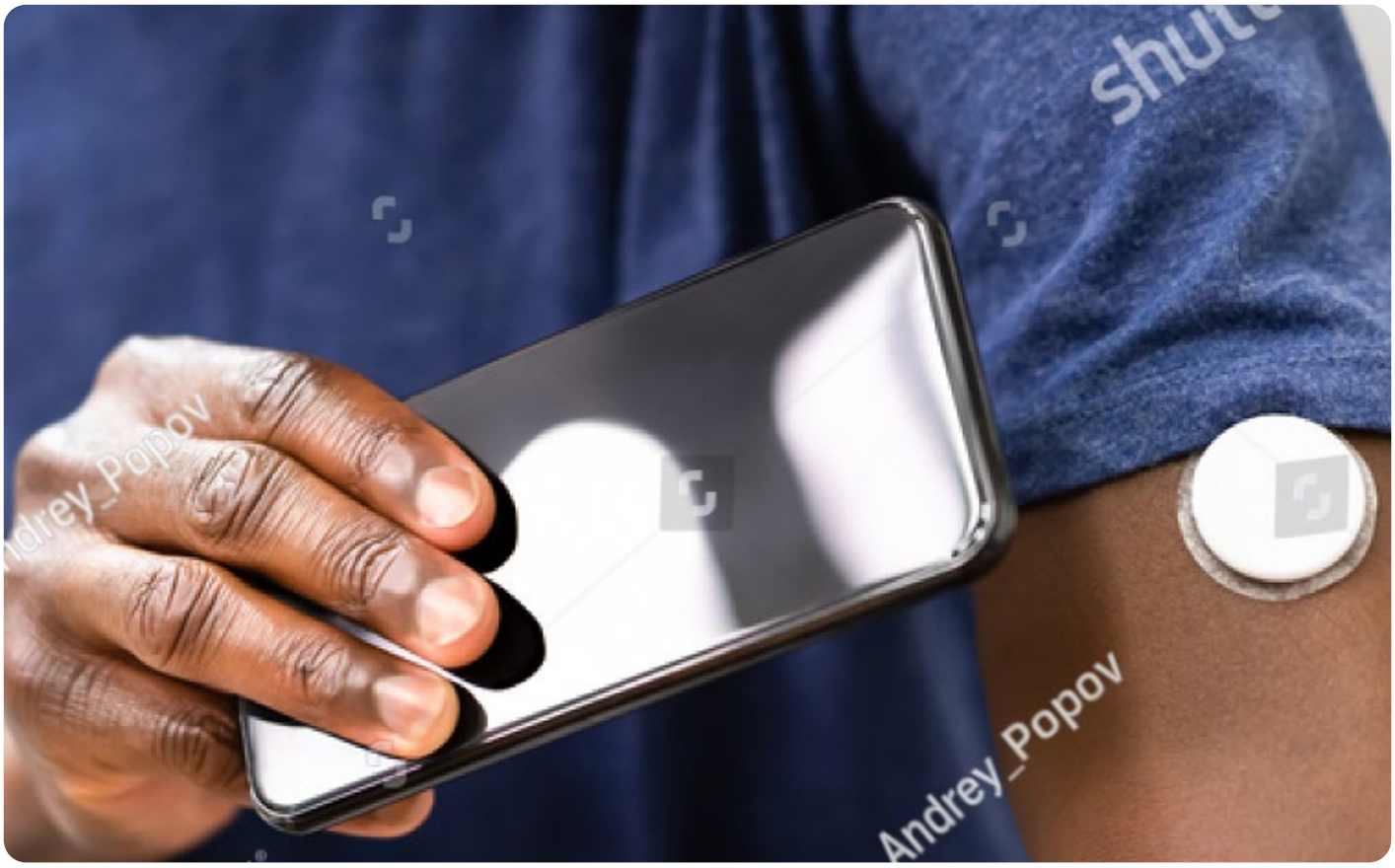
Funding levels are also critically low. Africa accounts for less than 1% of global health expenditure despite its disease burden. Many governments fail to meet the 2001 Abuja Declaration benchmark of allocating 15% of budgets to health; the continental average is 4.8%. Per-capita spending often falls below the WHO minimum of $34–40 for a basic health package.

The sources of health financing reveal a challenging landscape:

- Government health expenditure (GHE): While increasing in some countries, GHE as a share of GDP remains low, especially in central, eastern and western subregions.
- OOPHE: This often exceeds 40% of total expenditure, creating financial barriers and driving poverty. Increased GHE reduces OOPHE long term, but external aid provides immediate relief.
- Donor funding/external health expenditure (EHE): Many countries rely heavily on development assistance, with over a third of expenditures externally financed across half of the continent. Growth has slowed to 4.6% post-2015, creating funding gaps that domestic spending cannot fill.
- Health insurance: Formal mechanisms such as social health insurance (SHI) and community-based health insurance (CBHI) are nascent and fragmented. Population coverage is low (Ghana ~40%, Uganda ~7.6%), far from UHC levels. Challenges include enrolling the informal sector, ensuring financial sustainability and managing costs.

15 Adebisi YA, et al. (2022). Revisiting the issue of access to medicines in Africa: Challenges and recommendations. Public Health Challenges. Jun 15;1(2)

16 Arias, A., Wright, A. and Waszak, J. (2023) Digital health systems in Africa: A convergence of opportunities. [White Paper]. IQVIA. Available at: https://www.iqvia.com/-/media/iqvia/pdfs/mea/white-paper/iqvia-digital-health-system-maturity-in-africa.pdf.



This precarious financial landscape, with high OOPHE and diminishing donor support, makes long-term healthcare investment challenging. Funding digital health initiatives requires proving value and exploring innovative models such as blended finance or PPPs. Mobile money platforms (e.g. M-Pesa) can enhance insurance efficiency but cannot fully address affordability or build necessary trust. Broader financing reforms are needed to increase pooled funds and reduce reliance on direct payments.

Table 3 shows the challenging financing structure, highlighting low government investment, high patient costs, donor dependence and limited insurance risk pooling.

Table 3:

Africa healthcare financing overview

Indicator	Africa value	Target/benchmark
Govt health exp. (% of total govt exp.)	4.8	15% (Abuja Declaration)
Govt health exp. (per capita)	Often < $34[17]	$34-$40 (WHO minimum for basic package)
OOPHE (% of total health exp.)	> 40%	Minimise (WHO UHC goal)
External health exp. (% of total health exp.)	> 33%[18] (in half of Africa countries)	Reduce dependency
Health insurance coverage (%)	Generally low (<50%)	Maximise towards UHC
UHC financial protection (% of population with >10% income on health)	7.8%	Minimise (SDG target)

17 The Business of Health in Africa: Partnering with the Private Sector to Improve People's Lives, IFC, 2008
18 Africa's Health Financing Gap, Think Global Health, August 2024

2.1.6 Leadership and governance

Africa has made significant strides in developing strong public policies aligned with global health objectives. However, the implementation of these policies remains a substantial challenge. Major hurdles in implementing these policies are monitoring capacity, insufficient funding and inconsistent leadership.[19] Current legislation can occasionally impede the functionalities of digital solutions; for example, Angolan regulations restrict the home delivery of prescribed medications, thereby limiting digital solutions to solely providing information (KII, Genesis Analytics, 2025). Regulators have, at times, demonstrated a limited understanding of novel telemedicine models. This has resulted in the imposition of irrelevant requirements on digital health providers; for example, mandating waste management certificates for telemedicine services that generate no physical waste on-site (KII, Genesis Analytics).

Despite anticipated declines in official development assistance (ODA), domestic resource mobilisation and innovative funding have gained precedence. PPPs are key, but require good governance to manage risks such as data commercialisation and align with public health goals.

Supportive legal and policy structures are advancing, as most African countries have passed data protection legislation, commonly guided by GDPR, and continental structures recognise the sensitivity of health data and regulatory requirements. Challenges involve delays in enactment, constraints on handling foreign companies and capacity limitations for regulatory authorities. Data governance specifically in the health sector is more highly emphasised, with the Africa CDC in development of a continental framework.[20],[21] Poor regulatory control, particularly for business players in online health, threatens to outrun regulation with its pace of innovation.

In-depth ICT infrastructure is essential, but while mobile penetration is robust, high data and device prices, limited digital literacy and a digital gender divide result in a usage gap. Particularly noteworthy is the lack of reliable electricity at most health facilities, undermining digital health systems. Public and private investment is needed to bridge these infrastructure gaps.

Good government leadership and political will are critical to digital health transformation, often more so than a country's income level. Good leadership entails prioritising digital health, allocating resources, influencing policies and fostering collaboration. The Ministry of Health and ICT typically has a governance role, and the presence of specialised digital health units could enhance coordination. Digital health requires multi-stakeholder engagement, such as development partners, private sector, academia and civil society. Continental actors such as the African Union (AU) and Africa CDC are increasingly assuming harmonisation, knowledge sharing and investment campaigning roles. By addressing these challenges and seizing opportunities, Africa can leverage digital health to build more robust, resilient and equitable health systems.

2.2 Connectivity landscape

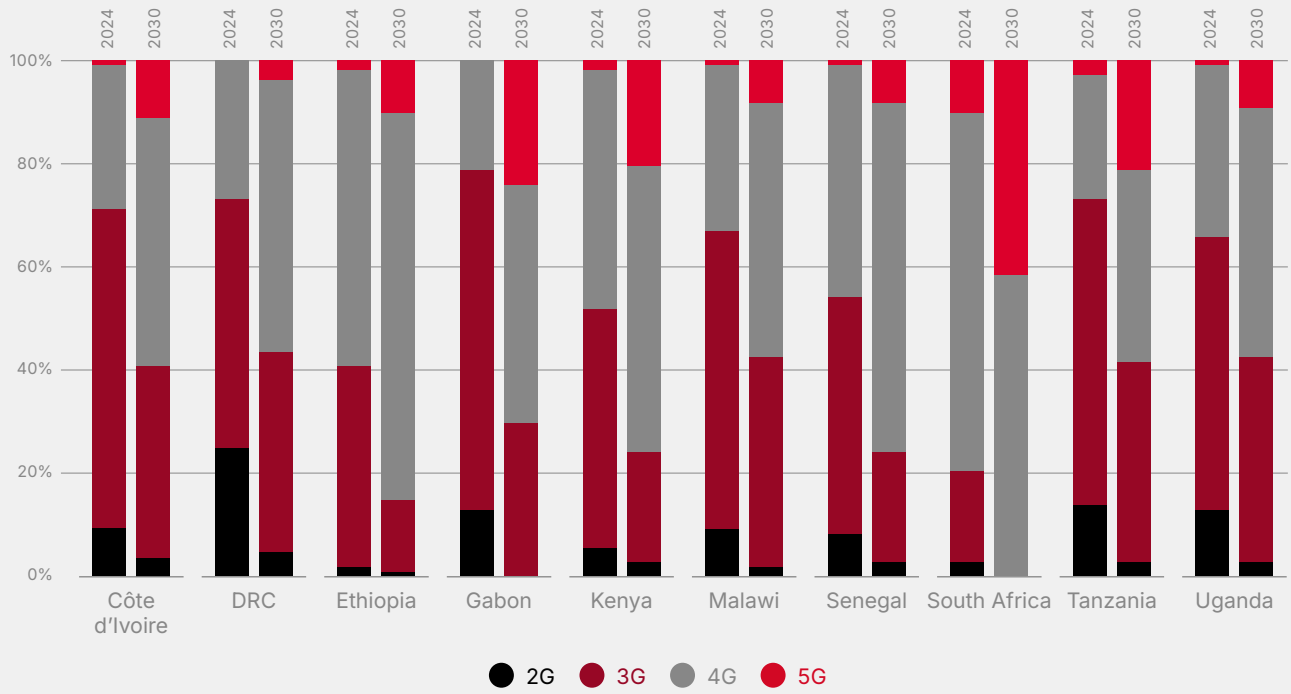
Connectivity is pivotal for implementing digital health solutions, enabling secure data transmission, real-time communications for remote patient care, and patient engagement. In Africa, mobile technology is the predominant form of connectivity, with over 95% of the population covered by mobile networks, offering a gateway to mobile-based digital health solutions. However, less than 2% of households have access to fixed-line broadband, highlighting the need for mobile solutions in rural areas.

The continent has seen significant investment in 4G technology, now accounting for around 45% of mobile connections and projected to rise to 55% by 2030. The affordability of 4G devices remains a challenge, although the availability of sub-$100 devices is improving access. Meanwhile, 5G deployment is progressing, albeit slowly, with commercial services launched in 23 countries. Figure 2 depicts changes in the connectivity landscape of the 10 focus countries between 2024 and 2030 in terms of 2G/3G/4G/5G rollout. Coverage is mostly confined to urban centres, except in Mauritius and South Africa, which boast over 50% coverage. By 2030, 5G adoption is anticipated to reach 18% regionally, with higher uptake in countries like Nigeria and South Africa.

19 Otorkpa, O., al. (2024). From Policy to Practice: A Review of Africa's Public Health Policy. Central African Journal of Public Health, 10(2), pp.90–9
20 Digital Transformation Strategy, Africa CDC, 2023
21 Mamuye, A.L., et al. (2022). Health information exchange policy and standards for digital health systems in Africa: A systematic review. PLOS Digital Health, 1(10)

Figure 2

Connectivity landscape in the 10 focus countries between 2024 and 2030



Source:

Despite improvements, connectivity gaps persist in remote areas. Satellite connectivity offers a promising solution, enhancing access to digital health services such as vaccine cold chain monitoring and health worker coordination, and telecom-satellite partnerships are increasingly important for extending connectivity where terrestrial networks are lacking.

The shift towards 4G and 5G facilitates more sophisticated digital health applications. Each generation improves speed, latency and reliability, aiding applications such as remote surgery, real-time AI diagnostics and smart care facilities. The potential of these technologies to transform healthcare delivery across the continent is significant.

2.3 Digital health landscape

Healthcare in Africa is shaped by demographic, economic and environmental factors. Unique healthcare needs include the continent's young, tech-savvy population, rising NCDs, and climate challenges. Digital technologies are essential tools in addressing these challenges, leveraging the continent's openness to innovation.

2.3.1 Mobile health (m-health)

M-health describes the use of mobile wireless technologies for public health and is a dominant digital health trend in Africa. High and growing mobile phone penetration allows m-health to bypass infrastructure limitations to reach large populations, including remote areas. Smartphone adoption is projected to reach 87% by 2030, expanding app-based interventions.[22]

M-health applications are varied and impactful. SMS technology is used for appointment reminders, vaccination prompts, medication adherence and health education, with positive effects. Studies indicate SMS reminders improve vaccination coverage and timeliness, with m-health potentially doubling childhood vaccination uptake in Africa. Case studies from Nigeria, Kenya, Burkina Faso and Côte d'Ivoire support these findings.

M-health is crucial for CHWs, who link communities to the formal health system. Mobile tools facilitate remote data collection, improve supervision, and provide decision support and education. In Malawi, the YendaNafe app increased antenatal care (ANC) visits and facility-based births. A systematic review found m-health use by CHWs increased ANC, facility births and postnatal care across Africa.

Maternal and child health is a major focus area for m-health. South Africa's national MomConnect programme uses SMS and WhatsApp to deliver stage-based pregnancy and early childhood information to over 5 million registered users across 95% of public health facilities. Evaluations suggest positive impacts on ANC attendance, vaccination coverage, breastfeeding practices and family planning uptake. Other examples include Kenya's Totohealth (SMS/voice for maternal and child health (MCH) and developmental monitoring) and PROMPTS (two-way SMS for pregnancy support), and Uganda's WinSenga app for foetal heart rate monitoring.

M-health also supports chronic disease management, notably HIV care. The WelTel Kenya1 trial showed weekly SMS check-ins improved ART adherence and viral load suppression.

The rise in m-health use is empowering e-patients, who are now actively researching their conditions and asking informed questions (KII, Genesis Analytics, 2025). This shift makes healthcare conversations patient-focused, moving beyond passive acceptance to collaborative treatment decisions.

Overall, m-health is a foundational layer in Africa's digital health ecosystem, leveraging mobile infrastructure to deliver benefits in communication, behaviour change, data collection and service utilisation, bridging digital health interventions amid infrastructure challenges.

22 The Mobile Economy 2023, GSMA, 2023

2.3.2 Telemedicine and telehealth

Telemedicine and telehealth have gained significant momentum in Africa, particularly accelerated by the Covid-19 pandemic. This trend addresses the need to connect limited healthcare resources, concentrated in urban areas, with dispersed rural populations. Telehealth helps overcome geographical barriers, reduce travel time and costs, improve specialist access and enhance healthcare delivery efficiency.

Applications include patient-provider consultations via video, phone or messaging, provider-to-provider consultations for specialist advice, remote diagnostics and patient monitoring. Technologies range from telemedicine platforms to WhatsApp, SMS and m-health apps. Key applications cover primary care, specialist referrals, chronic disease management, mental health, maternal and child health, and remote diagnostics.

Notable case studies highlight telemedicine's impact in Africa. In Rwanda, a partnership with Babyl provided nationwide access to doctors and nurses through mobile phones, registering over 2 million users and delivering over 1 million consultations.

In South Africa, Vula Mobile connected primary care providers with specialists, facilitating thousands of referrals during the pandemic and supporting teleconsultations, training and a public helpline.

Adoption varies across the continent. South Africa leads with specialist teleconsultations and chronic disease management, supported by better infrastructure. Kenya integrates m-health solutions for maternal health and HIV care, favouring scalable, low-cost options. Nigeria, despite challenges, is developing remote diagnosis and teleconsultation innovations, often using SMS and apps for maternal health.

KII from Genesis Analytics (2025) noted that while some past telemedicine initiatives faced challenges with trust issues, lack of available doctors and scheduling, the trend continues towards improving back-office support and tools for healthcare professionals. Telemedicine improves access, cost savings, resource use and patient engagement, but is limited by connectivity, device access, digital literacy and regulatory needs.

2.3.3 Health information systems and electronic health records

Effective HIS and EHRs are essential for modern, efficient, high-quality healthcare, managing patient data, ensuring care continuity, supporting clinical decisions, enabling disease surveillance and providing data for health planning and monitoring.

However, the current state of HIS implementation across much of Africa presents a significant paradox. While their importance is acknowledged, systems that are widespread, functional and interoperable remain elusive in many countries. The landscape is often characterised by fragmentation, with numerous pilot projects that fail to scale, a proliferation of disease-specific vertical systems (particularly for HIV, TB and malaria) that do not communicate with each other, and a persistent reliance on paper-based records in many facilities. This lack of cohesive digital infrastructure severely limits the potential benefits of EHRs and hinders the development of data-dependent innovations such as AI.

Despite challenges, key systems such as DHIS2 are widely used across Africa for data reporting and management, improving health data timeliness and quality, accountability, and resource allocation. Open-source EHR platforms such as OpenMRS and Bahmni offer affordable solutions for resource-limited settings, improving data access and care continuity in places like Kenya.

Several countries have specific EHR systems, such as Zimbabwe's Impilo, which streamlines workflows and reduces wait times, Rwanda's type 1 diabetes EHR improves data completeness and outcomes, and Ghana's EHRs improve documentation and decision-making. Integrated solutions are also available, such as Helium Health in Nigeria.

However, operational challenges hinder adoption, including poor connectivity, unreliable power, high costs, data privacy concerns and user acceptance. Interoperability issues can create data silos, preventing a holistic view of patient health. Realising EHR/HIS potential requires overcoming infrastructure, funding, interoperability and human capacity barriers. Open-source solutions address cost issues but do not solve deeper implementation challenges.

2.3.4 AI and big data

AI and big data represent a promising frontier for enhancing diagnostics, optimising operations, improving public health surveillance and personalising treatment in healthcare. Though still in early adoption stages compared to m-health or telemedicine, AI applications are being developed across Africa, driven by local innovation and international support.

Diagnostics is a key application area. AI algorithms analyse medical images (e.g. X-rays, CT scans) to detect abnormalities and assist in diagnosing conditions such as TB, pneumonia and cancers. Companies including minoHealth AI Labs in Ghana and Neural Labs Africa in Kenya are developing such tools. In Nigeria, Ubenwa uses AI to analyse infant cries for early signs of birth asphyxia, and is suitable for resource-limited settings.

AI also improves healthcare operations. Predictive analytics forecast patient demand, optimise staffing and manage supply chains. Nigeria's LifeBank uses AI and drones for medical oxygen demand, AfyaRekod provides insights for providers and patients, and BroadReach's Vantage platform offers next-best-action recommendations for managing public health programmes like HIV treatment.

AI can enhance patient interaction through chatbots and virtual assistants for health information, triage and self-management, as seen with Sophie Bot in Kenya and mDoc's Kem chatbot in Nigeria. In public health, AI models analyse real-time data for disease outbreak prediction and response strategies, and initiatives such as Malawi's IntelSurv use AI to improve surveillance data collection. AI is also used in health insurance for claims processing and fraud detection, and in drug discovery via African medicinal plants.

However, AI deployment in Africa faces challenges. The lack of large, high-quality datasets for training risks inaccuracies and biases when applying Western-trained models in Africa, leading to misdiagnoses and health inequities. Data scarcity is compounded by underdeveloped EHR/HIS infrastructure. Limited computational resources, internet connectivity, a shortage of skilled AI professionals, high development costs and inadequate regulatory frameworks further constrain AI integration, with Africa currently ranking low on AI readiness indices.

While AI has transformative potential, integrating it into Africa's health systems requires investment in data infrastructure, capacity building, unbiased algorithms and ethical oversight. Addressing these dependencies is imperative to improving health equity and outcomes.

2.3.5 Wearable technology and remote monitoring

Wearable technology, including fitness trackers, smartwatches, continuous glucose monitors (CGMs), ECG patches and smart thermometers, is increasingly used for continuous remote patient monitoring in digital health. These devices collect physiological data (e.g. heart rate, activity levels, glucose levels) and transmit it, often via smartphones, to users and healthcare providers, enabling real-time feedback and proactive health management.

In Africa, wearables are emerging for chronic disease management, maternal health and wellness tracking. For chronic conditions like diabetes and cardiovascular disease, wearables improve self-management by continuously monitoring vital signs, aiding timely treatment adjustments. Global and preliminary Africa studies suggest positive impacts on outcomes such as glycaemic control. In Ghana, wearables improved life quality for dementia patients, while South Africa's hearX Group uses smartphone-connected devices for hearing tests, integrating mobile and peripheral technology.

In maternal health, wearables monitor foetal heart rates and maternal blood pressure, benefiting high-risk pregnancies or areas with limited clinical access. The Embrace Nest, for example, is a portable incubator with monitoring for premature infants. Wearables can aid vital research in m-health interventions for MCH in Africa.

Wearables in Africa also face challenges. Consumer-grade devices, though affordable, may lack accuracy compared to clinical-grade equipment, especially under varying conditions. Caution is needed for clinical decisions based solely on consumer data. Cost is a barrier that limits access, long-term user engagement can be difficult, and effective use requires digital literacy and infrastructure like smartphones. Data privacy and security are also critical as devices collect sensitive health information, and ethical concerns include monitoring devices reducing intrinsic health motivation.

Despite their challenges, wearables empower patients with real-time health insights, enhancing self-care engagement. They provide valuable data for healthcare providers, enabling personalised interventions. To realise their potential in Africa, issues of cost, accuracy validation, data governance, user training and access must be addressed.

2.3.6 Health supply chain management

Ensuring the consistent availability of medicines, vaccines and supplies is a persistent challenge in Africa, due to stockouts, inefficient logistics and lack of visibility. Digital innovations are addressing these gaps in the health supply chain.

Key applications include LMIS providing real-time stock data for proactive inventory management, with mobile tools enabling health workers to report stock levels quickly to improve visibility. Many African countries are integrating LMIS with platforms such as DHIS2, enhancing decision-making and reducing stockouts, as seen in Uganda.

Drones are another innovation for last-mile delivery to remote areas. Companies such as Zipline operate in Rwanda and Ghana, delivering blood, vaccines and medicines rapidly. Nigeria's LifeBank uses drones for blood and oxygen delivery, with similar initiatives in Malawi, significantly reducing delivery times and ensuring access to critical supplies.

Healthtech startups are digitising the pharmaceutical supply chain by connecting manufacturers, distributors, pharmacies, clinics and patients.

Companies including Remedial Health, mPharma and MYDAWA offer solutions for online ordering, inventory management, demand forecasting, quality assurance and financing, increasing efficiency, transparency and reliability in distribution. This sub-sector has attracted significant investment, indicating market need and opportunity.

These innovations improve medicine availability, reduce wastage, speed up delivery and enhance planning, strengthening health systems and supporting other interventions.

In conclusion, the diverse connectivity and data demands of digital health applications, from basic telehealth to AI-driven diagnostics and remote surgery, highlight the importance of advanced connectivity to support these needs. The industry is projected to move from a focus on illness to one centred on wellness and prevention (KII, Genesis Analytics, 2025). The shift towards sophisticated digital solutions requires a network infrastructure that can keep pace, making connectivity essential for digital health's future.

Case study:

Mobile coverage of health sites: South Africa

To accelerate from the baseline to the positive scenario, a critical factor is the advancement of existing network technologies to 5G across Africa. 2G networks cover 99.7% of health sites in South Africa, while 3G networks cover 96.6%. However, 4G coverage is significantly lower at 63.6%, highlighting a substantial gap in high-speed connectivity for advanced digital health solutions.

Table 4:

Connectivity coverage for health sites in South Africa

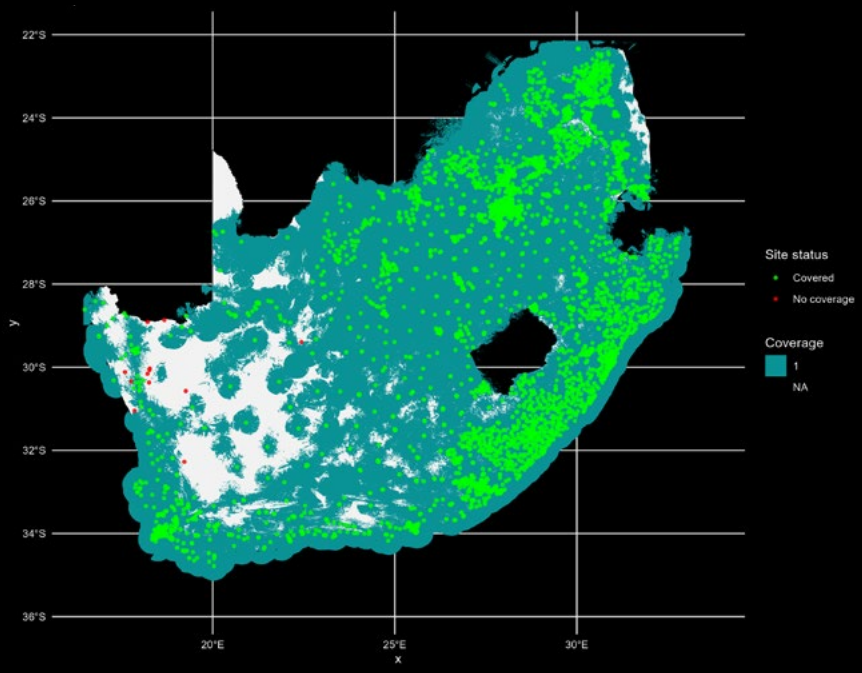
Status	2G		3G		4G	
Coverage	4,275 sites	99.7%	4,141 sites	96.6%	2,726 sites	63.6%
No coverage	12 sites	0.3%	146 sites	3.4%	1,561 sites	36.4%
Total	**4,287 sites**	**100%**	**4,287 sites**	**100%**	**4,287 sites**	**100%**

Source: Genesis Analytics health sites, GSMA Intelligence Mobile Coverage Explorer

Transitioning to 5G will require strategic investments and policy support to enhance network infrastructure, particularly in rural and underserved areas. While 2G supports basic voice and text services, 3G enables mobile internet access and 4G offers high-speed data suitable for video streaming and telemedicine. In contrast, 5G provides ultra-high-speed, low-latency connectivity necessary for real-time data transmission, telemedicine and remote monitoring. By improving connectivity, the continent can unlock the full potential of digital health technologies, enabling essential advancements in healthcare delivery and economic growth.

Figure 3

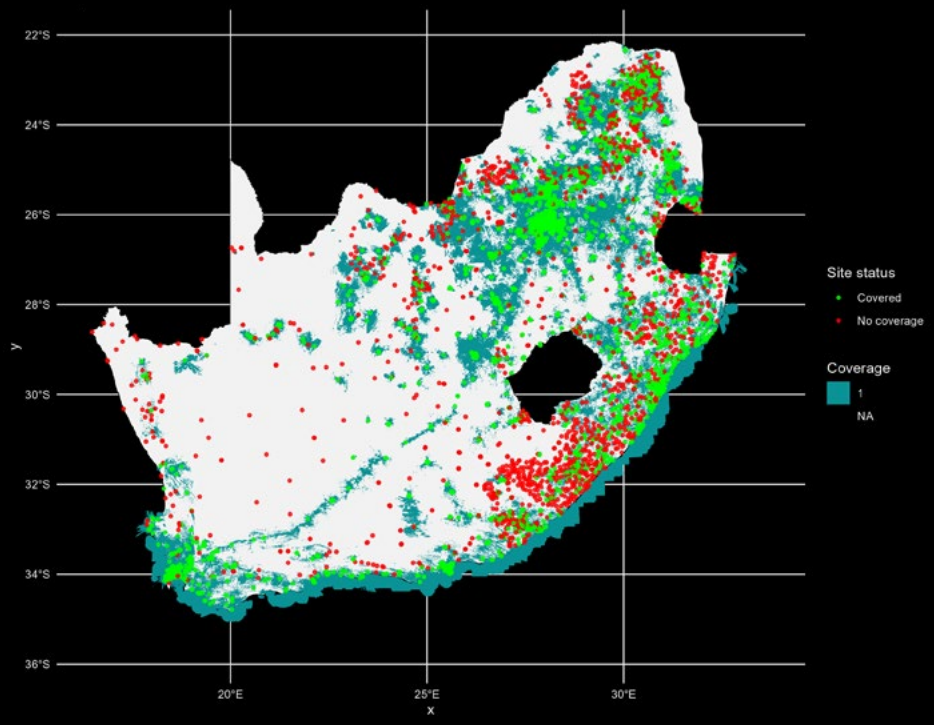
2G connectivity coverage across health sites in South Africa



Source: GSMA Intelligence Mobile Coverage Explorer

Figure 5

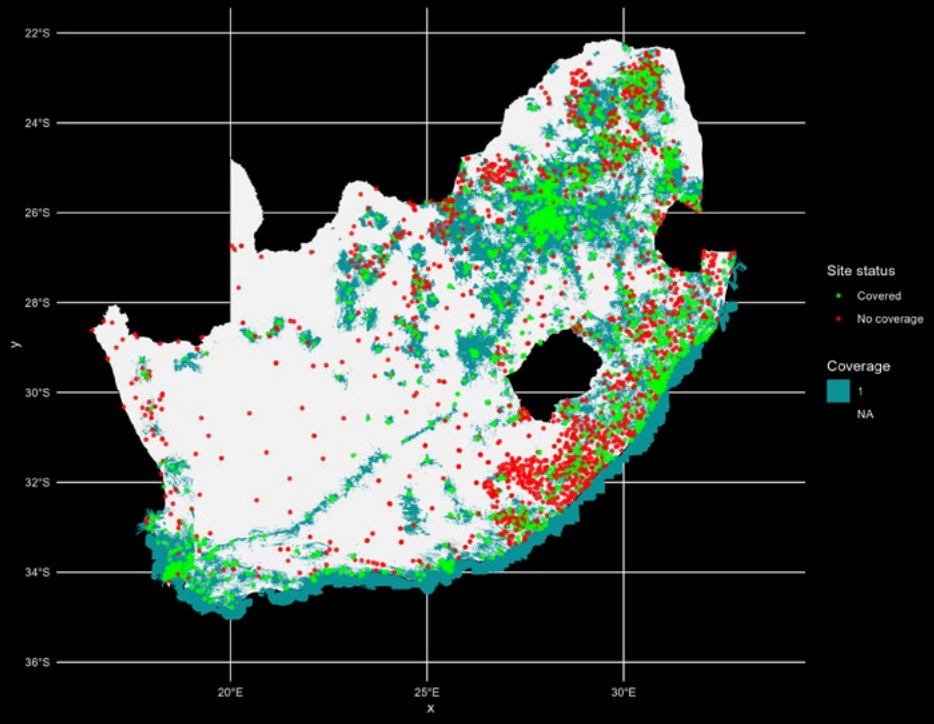
4G connectivity coverage across health sites in South Africa



Source: GSMA Intelligence Mobile Coverage Explorer

Figure 5

4G connectivity coverage across health sites in South Africa



Source: GSMA Intelligence Mobile Coverage Explorer

Digital health is now recognised as essential for strengthening health systems and advancing UHC, supported by WHO and other global bodies. Successful integration and scaling depend on a supportive environment comprising interconnected components.

The ITU/WHO National eHealth Strategy Toolkit describes seven components of an enabling environment, as illustrated in Figure 6.

Figure 6

Components of the enabling environment

Source: Genesis Analytics

> **"The future of health is digital, and supporting countries to harness the power of digital technologies for health is a priority for WHO."**
>
> **Dr Tedros Adhanom Ghebreyesus (8th WHO Director-General)**

2.4.1 Workforce capacity and development

A significant constraint is the shortage of skilled digital health professionals, including informatics specialists and data analysts. Low digital literacy among the health workforce and the general populace further hinders effective use. Studies in Ethiopia, Ghana and Zimbabwe highlight the lack of trained personnel for digital health interventions, with brain drain exacerbating these shortages. Initiatives like Amref Health Africa's Jibu platform offer online training, but a comprehensive approach is needed, covering skills development from education to continuous learning and retention. Empowering CHWs with digital tools is crucial; for example, in Kenya, the Doctors Explain initiative equipped CHWs with smartphones for remote doctor consultations.

2.4.2 Services and applications

Africa is a hub for digital health innovation, with varied applications:

- **m-health:** Utilising high mobile penetration for reminders and CHW support (e.g. mPedigree in Ghana, M-TIBA in Kenya).
- **Telemedicine:** Adoption accelerated for consultations and diagnostics, especially during Covid-19.
- **EHRs:** Increasing adoption, with OpenMRS widespread. Zimbabwe's Impilo EHR integrates HL7 FHIR standards.
- **HMIS:** DHIS2 is dominant, improving data quality and used in over 40 countries, including Ethiopia.
- **AI:** Emerging in diagnostics, chatbots and predictive analytics.
- **Digital supply chain management:** Tools for inventory and product tracking.
- **Drones:** Used for medical supply delivery (e.g. Zipline in Rwanda and Ghana).

Scaling initiatives beyond pilots is challenging due to funding, infrastructure deficits, lack of skilled personnel and insufficient integration with national systems. For example, Zimbabwe's Impilo EHR faced adoption challenges, and while Covid-19 accelerated digital tool adoption, it exposed existing weaknesses in the enabling environment.

2.4.3 Standards and interoperability

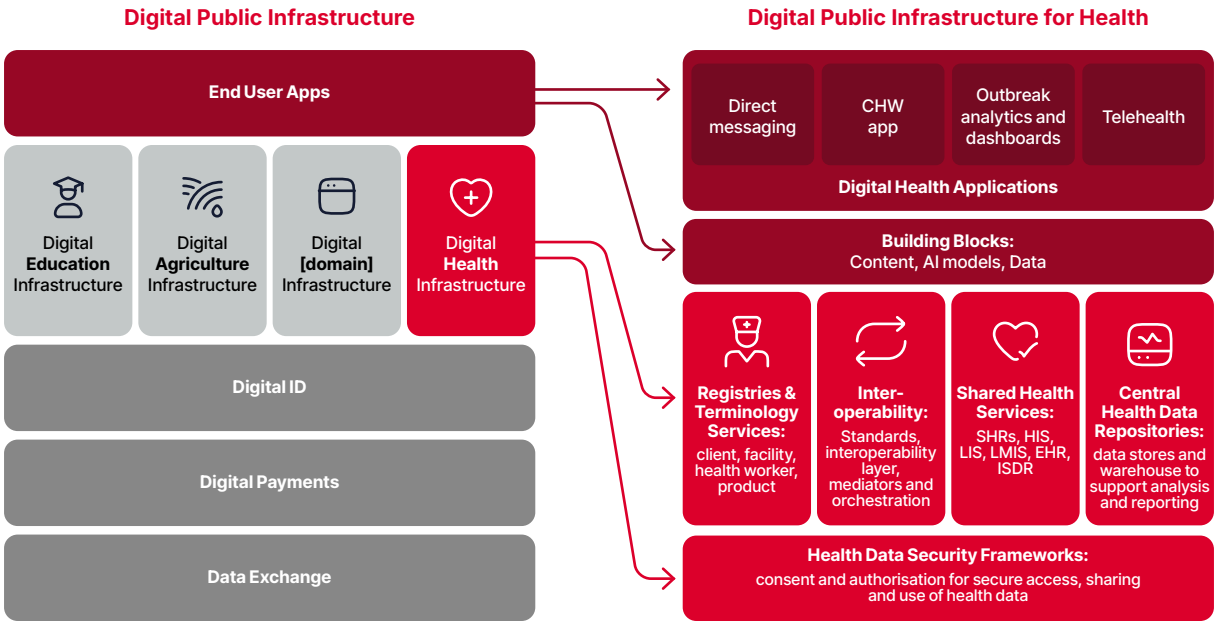
Achieving interoperability, or data exchange between systems, is essential but challenging. There is increasing recognition of the need to adopt international health data standards such as HL7 FHIR and ICD-10. However, implementing HL7 FHIR often falls behind policy. National and regional HIE frameworks are in development, with the Africa CDC's HIE Guidelines offering a continental blueprint. Challenges include technical issues (infrastructure, formats), semantic hurdles (consistent standards use), and organisational barriers (policies, funding, workforce capacity and data-sharing agreements). Open-source solutions such as DHIS2 and OpenMRS support interoperability at lower costs.

Digital public infrastructure for health

DPI-H operates as a specialised extension of digital public infrastructure, applying DPI's principles, such as secure identity, data exchange, interoperability and digital payments, to healthcare. By doing so, it ensures that healthcare systems are more integrated, efficient and accessible, while leveraging the existing public digital ecosystem to enhance service delivery. Figure 7 illustrates the relationship between digital health infrastructure in relation to DPI (adapted from Co-Develop's Report DPI for Health: Charting a Path to Implementation in LMIC Health Systems).

Figure 7

Digital Public Infrastructure (DPI) for Health



Source: Genesis Analytics
This image has been adapted from Co-Develop's Report DPI for Health: Charting a Path to Implementation in LMIC Health Systems to draw parallels to STL Partner's framework for digital health.

DPI is increasingly recognised as a necessary infrastructure enabler for sustainable, scalable digital solutions that span across multiple sectors.

2.4.4 Strategy and investment

National digital health strategies are common across Africa, aligning with WHO AFRO targets, indicating digital health's recognised importance. However, operationalising these strategies faces challenges including inadequate monitoring capacity, limited funding and inconsistent leadership, causing promising projects to stall, while rapid tech advancements risk strategies becoming outdated. With a projected decrease in ODA, there is a shift towards domestic resource mobilisation and innovative financing like solidarity levies and diaspora bonds. PPPs are key but require robust governance to manage risks like data commercialisation and align with public health goals. Initiatives such as the Global Fund engage the private sector, with support from international organisations and tech companies investing in infrastructure and skills.

Financial constraints affecting technology, devices, connectivity and digital health adoption

Adopting digital health in Africa carries substantial and multifaceted financial implications, including high capital expenditure for infrastructure and imported technology, significant operational costs for maintenance and training due to harsh environments and a lack of local expertise, rigorous compliance requirements for data security with evolving regulations, and economic and market uncertainties like low incomes and slow adoption rates. Technological integration with legacy systems poses further challenges, and funding availability in local financial markets is limited, often requiring external support. Despite these costs, the long-term economic and societal benefits of digital health are significant and necessitate a collaborative effort to overcome these challenges.

2.4.5 Legislation, policy and compliance

Supportive legal and policy frameworks are progressing, with many African nations enacting data protection laws, often influenced by GDPR, such as Kenya's Data Protection Act (2019) and South Africa's POPIA (2013). These regional frameworks acknowledge health data sensitivity and governance needs. Challenges include enactment delays, limitations in addressing foreign corporations and resource constraints for regulatory bodies. There are concerns that external models could hinder local innovation. Health-specific data governance is increasingly prioritised, with the Africa CDC working on a regional framework. Weak regulatory oversight, especially for commercial actors in digital health, is a significant issue. Rapid innovation often outpaces regulation, necessitating agile, risk-based approaches to balance innovation with patient safety and data protection.

Challenges posed by policy and regulation in Africa

Policy and regulation in Africa face challenges from fragmented and outdated regulatory frameworks, hindering digital health implementation due to inadequate capacity, overlapping responsibilities, and a lack of specific regulations for digital health, data and devices. Funding and investment are affected by high spectrum fees and taxes on mobile services and essential technology, increasing costs and limiting affordability. Data governance and security are concerns due to sensitive health data requiring strong protection and cybersecurity, while weak systems and laws exacerbate breach risks and hinder trust and data utilisation. Lack of interoperability and standardisation, particularly for HIE, prevents effective data sharing and the creation of integrated digital health ecosystems. Finally, limited institutional capacity and poor stakeholder collaboration impede policy implementation and coordination, hindering digital transformation in healthcare.

2.4.6 ICT infrastructure

Reliable infrastructure is essential. Mobile phone penetration is high and increasing, but a significant usage gap persists due to high data and device costs, low digital literacy and a digital gender divide; for example, in 2023, women in Africa were 37% less likely than men to use mobile internet. The cost of entry-level smartphones remains a major barrier,[23] and the shortage of reliable electricity for many health facilities undermines digital health systems, with around 100,000 facilities lacking consistent power. Initiatives such as HETA aim to electrify health facilities using renewable energy. Addressing infrastructure gaps requires public and private investment. Google's projects include the Equiano subsea cable.

Key infrastructure deficiencies impacting digital health enablement

Limited network coverage, particularly outside urban areas, requires significant investment and diverse technologies. Insufficient fibre backhaul infrastructure hinders data-intensive digital health solutions due to limited broadband access, and slow and complex construction permit processes delay network infrastructure deployment. Unreliable electricity supplies severely constrain digital health solutions and network operations, increasing costs for alternative power, while delays and high costs associated with spectrum allocation limit wireless connectivity for mobile health applications. Elevated costs for network building and operation, combined with limited funding, threaten essential infrastructure investment. A lack of coordinated long-term public and private sector investment hinders sustained network development for digital health.

2.4.7 Leadership and governance

Strong government leadership and political will are fundamental for digital health transformation. Effective leadership involves prioritising digital health, allocating resources, developing policies, and fostering collaboration. Governance typically involves Ministries of Health and ICT, with clear mandates and inter-ministerial collaboration being essential. Establishing dedicated digital health units could enhance coordination.

Digital health requires multi-stakeholder engagement, including development partners, the private sector, academia and civil society. Platforms exist to facilitate this, but challenges include securing genuine buy-in and managing diverse interests. Regional bodies such as the AU and Africa CDC play increasing roles in harmonisation, knowledge sharing and investment advocacy, while digital health maturity assessments guide strategic planning, but face implementation challenges. By addressing these challenges and leveraging opportunities, Africa can harness digital health to build stronger, more resilient and equitable health systems.

23 Digital Transformation Drives Development in Africa, World Bank, 2024

Effective digital health policies and supportive environments in other regions

Successful digital health relies on clear policy and strategy integration into general health policy, not as standalone projects, with countries such as Australia, Belgium, Estonia, England, Canada and Sweden exemplifying this integration.[24] In African countries with federal or decentralised governance, a coordinating entity aids national objectives while accommodating regional variations. Canada Health Infoway, a federal non-profit, coordinates and funds digital health within Canada's provincial systems, prioritising EHR use, telehealth and interoperability. Policies that articulate digital health benefits drive adoption, as demonstrated by the US HITECH Act, which incentivises EHR adoption. Africa could implement similar incentives, especially in areas with low technology uptake.

Estonia's digital health system, with integrated digital identities and a central platform (X-Road), offers a model for Africa. Mandatory EHRs and seamless data exchange, supported by robust digital identity frameworks, enhance patient data management and healthcare logistics. Africa can also learn from Australia's My Health Record (MHR), a national digital health record system with strong privacy controls and patient access options. MHR aims to provide a secure online summary of an individual's health information, accessible to both patients and authorised healthcare providers. Initially an opt-in system, it transitioned to an opt-out model to increase participation. Key policies are enshrined in the My Health Records Act 2012 and related rules and regulations, focusing on data privacy, security and access controls. The Australian Digital Health Agency oversees the system. A significant feature is the patient's ability to control who can access their record and what information is uploaded, including the option to restrict access to the entire record or specific documents.

Integrating health data with other sectors, such as social services, provides a holistic health view. Singapore's Smart Nation initiative exemplifies this with its HealthHub platform, promoting data analytics and AI in healthcare.23 Unified digital platforms enhance citizen engagement and health literacy.

Establishing and enforcing strong data privacy laws is essential for building trust in digital health systems. The European Union General Data Protection Regulation (GDPR) Model for Data Protection provides a robust framework for managing data privacy, which is a critical component in healthcare where sensitive patient data is extensively used.23 For Africa, adopting similar stringent data protection regulations could significantly enhance trust in digital health systems, encouraging wider adoption and compliance with international standards.

PPPs can help overcome financial and technological barriers by pooling resources and expertise from both sectors, enhancing the sustainability and reach of health services. India's Ayushman Bharat Digital Mission (ABDM) aims to bridge the gap between various healthcare stakeholders, focusing on developing digital building blocks and digital public goods based on open, interoperable standards, while ensuring the security and privacy of health-related personal information.

24 #SmartHealthSystems: International comparison of digital strategies, Bertelsmann Stiftung, 2018

3
The opportunity of digital health

The diverse challenges in Africa require scalable, resilient solutions. Digital health is vital for access, efficiency and continuity of care as countries strengthen primary healthcare and extend services to underserved populations. Effective solutions depend on adequate digital infrastructure, particularly mobile broadband. While 3G and 4G have supported foundational tools such as teleconsultations, 5G offers more advanced care models.

3.1 Bridging the healthcare workforce gap

A major challenge in Africa is the shortage and uneven distribution of skilled health workers. Doctor-to-patient ratios are below WHO recommendations, especially in rural areas where one clinician may serve thousands, without specialists or advanced tools. Digital health can address workforce gaps by enabling task-shifting, remote collaboration and enhanced training, extending the reach of limited resources.

3.1.1 Enabling task-shifting through AI and remote supervision

Task-shifting delegates clinical duties to less specialised workers. Digital health supports this by providing real-time assistance to frontline workers. For example, CHWs in rural clinics can connect to supervising doctors or use AI tools during consultations, and high-bandwidth networks enable live video streaming and data sharing, allowing off-site specialists to guide procedures and reduce referral delays. This distributed care model decentralises expertise, enabling lower-tier workers to manage complex tasks safely with remote support.

3.1.2 Tele-mentoring and continuous learning

Traditional training is often resource-intensive and centralised, isolating healthcare workers from development opportunities. Digital health offers low-cost, scalable training models. Real-time tele-mentoring allows junior staff to engage in procedures led by distant specialists, while virtual training tools, such as AR/VR simulations and case-based learning, support skill development in digital environments without requiring relocation. These platforms enhance retention, performance and care quality, especially in underserved areas.

3.1.3 Remote supervision of critical procedures

When specialists cannot be physically present, digital health technologies enable remote participation in medical procedures. A general practitioner in a rural clinic can receive live guidance during complex surgeries via high-resolution video links, and in equipped facilities, specialists can even remotely manipulate surgical tools with robotic interfaces. Though rare and costly in Africa, this model allows specialists to be virtually present across locations, improving access without relocation.

HopeXchange Medical Center

A pilot project initiated by Singapore's National University Hospital (NUHS) surgical team and HopeXchange Medical Center in Kumasi, Ghana addressed the need for specialist medical expertise in rural areas. Traditional outreach surgical programmes, while valuable, are impaired by discontinuity once visiting teams depart, leading to consequent regression in local skill development. This initiative sought to address this gap by adopting the application of mixed reality (MR) technology for remote surgical assistance, continuing medical education and extending support beyond physical team visits.

Coordinated efforts established a temporary dedicated 4G network (40 Mbps) in HopeXchange's operating theatre. This enabled eight hours of uninterrupted live surgical streaming for four remotely supervised procedures, proving effective even at lower speeds. Surgeons quickly integrated the user-friendly MR devices. The project underscored the need for robust, dedicated network infrastructure due to unreliable hospital Wi-Fi. Strategic partnerships were formed with local network providers Comsys, GSMA Africa and the Ghana Chamber of Telecoms. The first year's deployment, including a new antenna, cost less than $10,000 due to discounted rates.

A key demonstration of MR's immediate impact occurred during the fourth surgery, where the senior on-site surgeon from Singapore was required to handle an emergency. This left a Ghanaian surgeon, who had previously observed the procedure but never performed it, to proceed under remote real-time guidance. Dr Gao, who is based in Singapore, provided guidance by detailing lines on the local surgeon's screen, guiding him where to make an incision, where to look and positioning the instrument.

This initiative effectively demonstrated the use of MR to provide continuous, real-time operating room assistance in underserved areas, increasing local competence and patient safety significantly. Dr Gao emphasises the need for continuous training and capacity building, as skilled healthcare workers will always be more valuable than advanced technology. However, scaling up successfully will require the determination of the right use cases in consultation with local practitioners, resource planning, financing from varied sources (public, private or PPP), and establishing effective remote support networks regarding timezones and medical-legal factors. The future success and widespread rollout of such technologies in Africa depend greatly on ongoing improvement and innovation in mobile and digital infrastructure.

3.1.4 Augmented primary care delivery

Digital platforms can enhance primary care with AI-enabled tools, supporting real-time data processing and feedback. CHWs, using diagnostic devices, can collect patient data and receive instant guidance on triage or referrals, and AI chatbots and virtual assistants can improve efficiency and standardisation, particularly in high-volume, low-resource settings.

3.1.5 Supporting emergency medical coordination

Digital health improves emergency coordination. In low-resource areas, ambulances often arrive without prior notice or patient data, but digital tools allow field medics to send vitals, images and real-time video to hospitals while en route, enabling the receiving team to prepare and allocate resources efficiently. These time savings can significantly enhance health outcomes in strained health systems.

3.2 Enabling the opportunity: infrastructure, technology and ecosystem

3.2.1 Necessary connectivity infrastructure

Robust connectivity infrastructure is necessary for digital health adoption, requiring diverse technology deployment for varying geographies. Urban areas need high-capacity networks using fibre optics and advanced radio technologies to handle data traffic, with regulatory bodies needed for strategic spectrum allocation and to create a supportive infrastructure environment. Innovative solutions such as FWA and satellite communication, meanwhile, are essential to bridge the digital divide in underserved rural areas. Achieving comprehensive connectivity demands investment and collaboration among network operators, governments and regulatory bodies, including securing spectrum, creating supportive policies and leveraging existing infrastructure.

3.2.2 Required devices for accessing digital health solutions

Digital health solutions need affordable and accessible devices across all socioeconomic levels. Smartphones are necessary for virtual consultations, health apps and information, while wearables and connected devices, like smartwatches, are key for monitoring health data. Specialised medical devices with connectivity are vital for diagnostics and remote procedures. Ensuring affordability and accessibility is critical, especially where cost is a barrier. Collaborations among network operators, manufacturers and healthcare providers can reduce costs and improve tool availability.

3.2.3 Ensuring interoperability in the digital health landscape

System fragmentation and data silos impede patient information exchange. Interoperability is key to achieve the full potential of healthcare technology. Establishing robust data exchange platforms enables secure and efficient communication between systems, facilitated by standardised data formats and protocols. Digital health initiatives should promote interoperability through standards-based exchanges and architectures, using open-source tools and global standards for a cohesive digital health ecosystem.

3.2.4 Strategic digital infrastructure deployment for health across Africa

Digital infrastructure deployment varies by telecommunications maturity, urbanisation and health system readiness. Strategic deployment should align with local needs and diverse health ecosystems. As African countries vary in telecommunications and health capabilities, market segmentation is required to prioritise digital health infrastructure investments.

Table 5:

Market segmentation for digital health infrastructure prioritisation

Country group	Infrastructure status	Health system profile	Digital health readiness
Early adopters	Active or planned deployment of advanced mobile network technologies and extensive fibre backhaul, particularly in urban areas. Growing FWA presence.	Presence of large, well-equipped hospitals and specialised health centres. Existing digital health pilots and innovation hubs. Government support for digital health initiatives.	High potential for implementing and scaling advanced digital health use cases requiring high bandwidth and low latency (e.g. AI diagnostics, remote surgery support, widespread electronic health records).
Mid-tier markets	Expanding 4G coverage with initial testing or spectrum planning for advanced mobile technologies. Developing fibre networks in key areas. Mix of connectivity options.	Mix of public and private healthcare providers. Increasing number of health facilities adopting basic digital tools. Growing momentum for digital health initiatives.	Viable for hybrid digital health approaches, leveraging existing 4G and FWA for telemedicine and data collection, with targeted deployment of more advanced connectivity in urban health centres.
Nascent markets	Predominantly reliant on 2G and 3G networks with limited data coverage, especially in rural areas. Nascent fibre deployment. Connectivity is a significant challenge.	Health infrastructure may be weaker with limited resources. Low overall digital penetration within the health system. Basic digital tools may be in early stages of adoption.	Focus on foundational digital health tools that work well on lower bandwidth (e.g. SMS-based health information, basic mobile data collection). Advanced digital health use cases and widespread need for advanced mobile technologies are long-term prospects.

Source: Genesis Analytics

Segmentation identifies feasible digital health use cases and infrastructure investment priorities. While advanced technologies are not universally viable across Africa, targeted deployment in high-demand areas, such as urban health zones and economic hubs, is compelling. These clusters of enterprises, healthcare facilities and innovation centres warrant investment in advanced connectivity solutions, such as dedicated rollouts.

Urban hospitals and tertiary centres are ideal for advanced digital health services that require high speed and reliability, such as real-time imaging, AI-assisted analysis and remote consultations. Medical universities benefit from robust connectivity for virtual reality training, while large hospitals using AI radiology, robotic surgery or digital pathology need networks offering speed, security and reliability beyond standard Wi-Fi. Dedicated networks using advanced technologies suit these environments, ensuring quality service for remote surgery or data-intensive analytics.

Beyond clinical care, industrial zones and smart cities can use reliable connectivity for health monitoring and emergency response, while pharmaceutical warehouses benefit from low latency and high reliability for real-time tracking. Infrastructure investment should focus on areas with clear returns, such as major cities and economic corridors, aligning with Africa's digital economy goals to attract private investment and develop smart infrastructure.

A one-size-fits-all approach is ineffective in Africa. Strategies should align technology with specific health use cases and geographical contexts.

Table 6:

Infrastructure deployment considerations

Context	Suitable health use cases	Network approach
Urban centres with advanced facilities	AI diagnostics, tele-surgery support, real-time specialist consultations, large-scale EHR access.	High-capacity fibre, advanced mobile networks (including 4G and targeted 5G deployments), private networks (leveraging fibre, advanced wireless, or a mix).
Secondary towns with district hospitals	Teleconsultation services, digital patient record systems, remote diagnostics (e.g. teleradiology), digital health information systems.	Enhanced 4G coverage, FWA, expanding fibre reach, consideration for future advanced mobile network capabilities.
Rural and peri-urban clinics	Community health worker support tools (data collection, communication), remote mentorship, basic telemedicine consultations, mobile health awareness campaigns.	Extended 4G/3G coverage, satellite connectivity, FWA, opportunistic use of existing mobile networks, long-term planning for infrastructure upgrades.
Health innovation corridors/hubs	Data integration platforms, multi-sector pilot projects (e.g. smart health logistics, environmental health monitoring), digital health research and development.	Mixed network approaches combining high-speed fibre, advanced mobile networks (including targeted 5G and private networks), and edge computing capabilities to support diverse, data-intensive activities.

This approach ensures that infrastructure investments are purpose-built to meet the distinct needs and capabilities of different health settings across the continent.

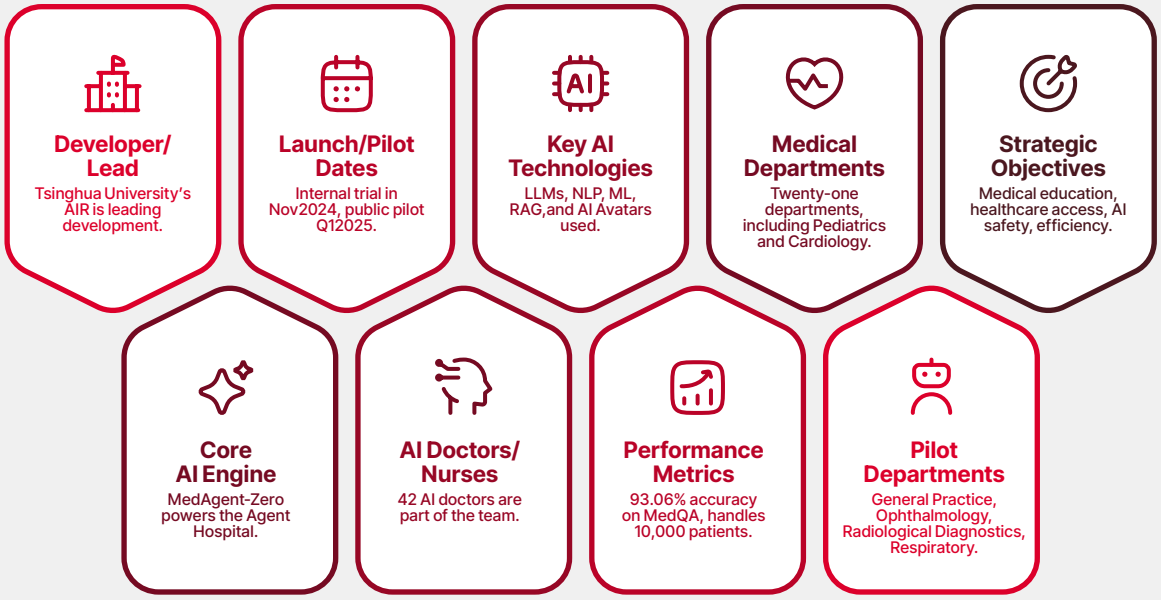
3.3 The future of healthcare

3.3.1 AI in healthcare delivery

AI is rapidly transforming healthcare by enhancing efficiency, diagnostic accuracy and service accessibility. A major advancement is China's Agent Hospital, showcasing AI's integration into comprehensive healthcare services. China's progress is driven by strong government support for AI, comprehensive data infrastructure and widespread EHR adoption.[25]

Figure 8

The components of the Agent Hospital



Source: Genesis Analytics

Developed by Tsinghua University and launched in May 2025, the virtual hospital uses AI doctors and nurses to revolutionise medical training and patient care. Operating in a simulated environment, AI agents diagnose and treat virtual patients,[26] addressing key issues:

- Medical education and training: Providing a risk-free, realistic setting for students to experience diagnosing and treating various conditions, addressing current training limitations and costs.[27]
- Reducing clinician workload: AI doctors efficiently handle routine inquiries and tasks, allowing human doctors to focus on complex cases.
- AI safety and research: Uses a simulation-first approach to ensure AI safety, setting a standard for AI in critical industries.
- Healthcare access and affordability: Aims to deliver scalable and affordable care, improving accessibility in developing and remote regions through telemedicine.
- Efficiency and speed: Enhances diagnostic accuracy and operational efficiency, improving patient experiences and potentially reducing costs.[28]

25 The Future of Healthcare: How China's medical industry is adopting AI, CKGSB Knowledge, 2025
26 China Launches "Agent Hospital": The World's First Fully AI-Powered Medical System, Rysysth Technology, 2025
27 "'World's first' AI hospital with virtual doctors opens in China," Robotics and Automation, May 2024
28 Maleki Varnosfaderani, S. and Forouzanfar, M., (2024). The Role of AI in Hospitals and Clinics: Transforming Healthcare in the 21st Century. Bioengineering, 11

Technological architecture

The Agent Hospital uses an innovative AI framework, MedAgent-Zero, developed by Tsinghua's AIR. This self-evolving AI engine learns clinical decisions through simulation, addressing data privacy and cold start issues. It utilises a base LLM, a medical case base, an experience base of validated rules and RAG for informed decisions. Its expertise improves through tuning-free rule accumulation. A team of AI doctor agents across 21 departments can manage thousands of patients rapidly with high accuracy (e.g. 93.06% on MedQA for respiratory diseases). Key technologies include LLMs (currently ChatGPT), natural language processors and machine learning. The hospital reportedly features AI avatars for consultations, similar to Ping An's health system.22

The enabling ecosystem in China

China's rapid AI healthcare advancement, exemplified by the Agent Hospital, is supported by a unique ecosystem:

1. **Policy and regulatory framework:** National policies such as Healthy China 2030 and Made in China 2025 promote AI in healthcare, backed by significant investment in AI and genomics to establish China as a leader in medical AI.
2. **Accessibility and inclusion:** China uses extensive EHRs in 70% of hospitals and genomic initiatives to generate health data. Combining global public datasets with domestic data control enhances AI model effectiveness for local healthcare.
3. **Infrastructure development:** Advanced digital infrastructure, telemedicine, 5G and cloud computing support AI systems like the Agent Hospital. This digital maturity is key for real-time data processing and smart hospital applications, potentially widening global healthcare disparities.
4. **Investment and innovation:** A quad-helix ecosystem combines governmental vision, academic institutions such as Tsinghua University, tech and telemedicine companies, and public engagement, fostering ambitious AI projects like the Agent Hospital.

Implementing AI hospitals in Africa

China's AI-driven healthcare models prompt examination of their adaptability in Africa, which faces unique healthcare challenges. Africa's complex environment demands innovative solutions for improved outcomes and stronger systems. Integrating AI requires a pragmatic, needs-driven approach, tailoring solutions to local health challenges for tangible improvements.

Optimal AI strategies should enhance, not replace, human healthcare workers, boosting their efficiency and diagnostic capabilities in high-impact areas. AI can support maternal and child health, infectious disease management (malaria, TB, HIV), primary care diagnostics, patient triage and radiological analysis, strengthening health systems and extending care in resource-limited settings.[29]

Key areas for implementing AI in Africa include the following:

- **Infrastructure development:** National strategies should focus on expanding internet connectivity, especially in rural areas, through community Wi-Fi and subsidised data plans. Sustainable electricity solutions such as solar power are vital. Affordable devices (smartphones, tablets) are essential for healthcare workers.
- **Policy and regulatory frameworks:** Governments should align AI policies with health goals, including funding mechanisms and ethical guidelines.[30] They should establish review boards for algorithmic bias and develop policies to reduce health disparities.
- **Data governance:** Strengthen data privacy rules and digitise records to generate local data for AI training. Enhance digital literacy for the public and healthcare workers to ensure effective AI use.
- **Upskilling and training:** Comprehensive training for healthcare workers, covering digital device use, telehealth platforms, EHR management and data security.
- **Collaboration:** Partnerships among governments, tech companies and international organisations are key. Support African AI research and startups to develop locally relevant solutions. Share experiences with other developing countries.
- **Cultural fit:** Consider cultural preferences for human doctors and involve communities in creating culturally appropriate tools, such as AI interfaces in African languages.

29 Agbeyangi, A.O. and Lukose, J.M., (2025). Telemedicine Adoption and Prospects in Sub-Sahara Africa: A Systematic Review with a Focus on South Africa, Kenya, and Nigeria. Healthcare, 13(7)

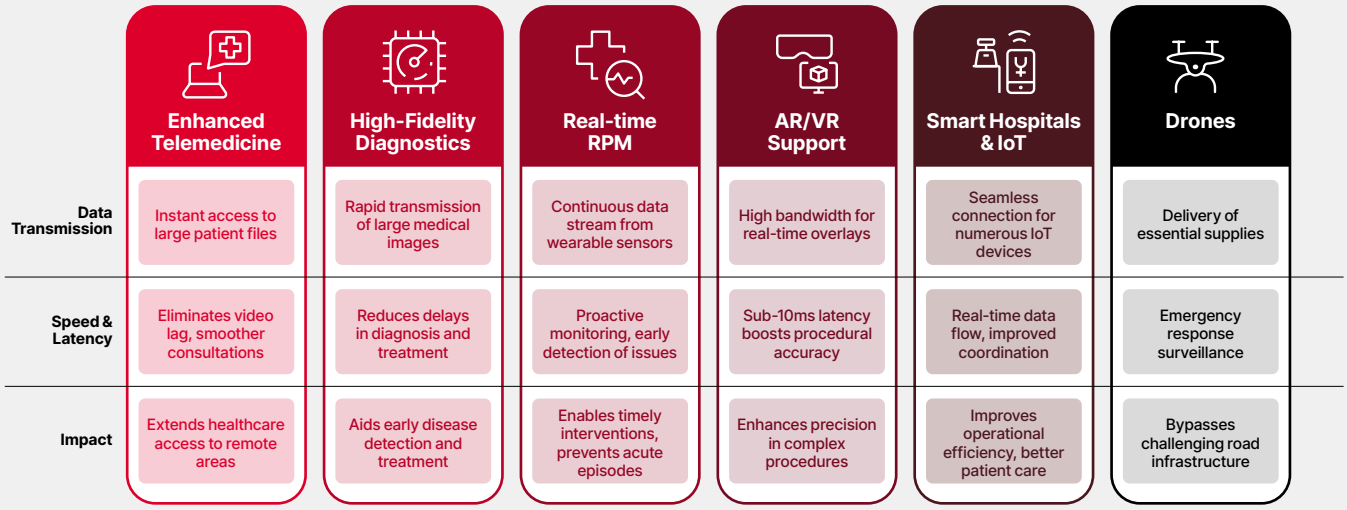
30 Alaran, M.A., et al. (2025). Challenges and opportunities of artificial intelligence in African health space. Digital Health, 11

3.3.2 Frontier digital health solutions

Digital health solutions within Africa are a broad spectrum of technologies and use cases. While current 3G and 4G networks support many of these applications, advancements in connectivity infrastructure are facilitating even more impactful innovations. These next-generation networks unlock the potential for real-time, interoperable and data-intensive digital health interventions that were previously limited by infrastructure capabilities.

Figure 9

5G Applications in Healthcare



Source: Genesis Analytics

Telemedicine creates virtual consultations that more closely mimic in-person visits, expanding healthcare access to remote and underserved populations facing geographical barriers. The increased reliance on telehealth highlighted by the Covid-19 pandemic underscored the vital role of robust network infrastructure in sustaining and advancing these services. Furthermore, faster and more reliable connectivity allows healthcare professionals immediate access to large patient files, such as electronic medical records (EMRs), during consultations, leading to quicker and better-informed clinical decisions.

Diagnostic systems, which generate large files such as MRI and CT scans, can leverage enhanced connectivity to substantially reduce file transfer times. This rapid transfer significantly accelerates both diagnosis and treatment planning. In rural healthcare settings, devices leveraging improved connectivity could substantially decrease patient wait times by immediately sending high-resolution data to specialists in urban centres. Moreover, this infrastructure facilitates the implementation of AI-driven image analysis, which can be hosted closer to the point of care. This allows for swift and precise analysis of scans, supporting early disease detection and potentially alleviating shortages of specialist medical professionals like radiologists.

Real-time patient monitoring via wearable sensors and implantable devices tracking vital signs such as heart rate, blood pressure, glucose levels and oxygen saturation can transmit data continuously and in real-time to healthcare providers. This enables proactive monitoring, early detection of adverse events or deterioration in patients with chronic conditions, and timely interventions, potentially preventing acute episodes. The ability for advanced biosensors to instantly transmit high-resolution data allows specialists to detect anomalies faster than with older network protocols. Remote patient monitoring is emerging as a significant application area for advanced connectivity in healthcare globally, with studies suggesting that these technologies can significantly improve real-time monitoring accuracy and potentially reduce hospital readmission rates by enabling early intervention.

Augmented and virtual reality can overlay critical patient information or medical images during surgery onto the surgeon's view in real-time, enhancing precision, particularly in complex, minimally invasive procedures. Studies suggest AR can boost procedural accuracy in intricate operations, while VR offers highly realistic, immersive environments for surgical training and simulation, allowing medical professionals to practise procedures and develop skills in a risk-free setting. Furthermore, the stability of advanced networks reduces the risk of data packet loss compared to previous generations, improving the safety of remote operations. The ultra-low latency also makes remote robotic surgery, where a specialist guides a robotic arm from a distance, a safer and more reliable possibility, potentially overcoming geographical barriers to expert surgical care.

Smart hospitals and IoT leverage advanced technologies and interconnected systems to enhance patient care, streamline operations, improve efficiency, and create a more intelligent and adaptive healthcare environment. IoT integrates digital and physical assets within a unified framework to connect various clinical and business workflows, with healthcare teams gaining comprehensive insights, facilitating proactive and personalised care, automation of routine tasks, and improved coordination. The integration of IoT also leads to reduced operational costs through optimised resource utilisation, decreased errors and streamlined workflows, ultimately promising enhanced patient outcomes and a more sustainable healthcare model.

Drones can be used for the rapid delivery of essential medical supplies, such as blood products, vaccines and medications, to remote clinics or disaster-stricken areas, bypassing challenging road infrastructure. Beyond logistics, drones equipped with high-resolution cameras and thermal imaging can aid in search and rescue operations, quickly locating individuals in need of medical assistance. Furthermore, specialised drones could potentially facilitate the transport of diagnostic samples or even provide remote monitoring capabilities in underserved communities, extending the reach and efficiency of healthcare services.

Principles of digital development

Developing digital health interventions comes with a unique set of considerations due to the sensitive nature of health data, the diverse user base (patients, clinicians, caregivers), and the potential for significant impact on well-being. The Principles for Digital Development are a set of nine living guidelines that aim to integrate best practices into technology-enabled programmes, including digital health interventions. While not specific only to health, they provide a strong framework for designing effective and ethical digital health solutions.

Understand the existing ecosystem: For digital health, this means thoroughly understanding the local health system, cultural norms, existing technology infrastructure, the digital literacy levels of both health providers and patients, and any relevant legal and regulatory policies. Ignoring these factors can lead to low adoption, a lack of trust and even unintended negative consequences.

Share, reuse and improve: Digital health initiatives should leverage and build upon existing tools, platforms and frameworks. This promotes interoperability, reduces duplicated effort and fosters collaboration across the health sector.

Design with people: Solutions must be user-centred, involving all target user groups (patients, healthcare workers and administrators) in the planning, development and assessment phases. This ensures the solutions are appropriate, useful and sensitive to the needs of even the most marginalised populations, including women, children and people with disabilities.

Design for inclusion: Digital health interventions should actively work to bridge digital divides and ensure equitable access. This means considering factors like connectivity, affordability, digital literacy, and the unique needs of underserved and unserved communities. It also implies designing solutions that are adaptable to different contexts and languages.

Build for sustainability: Digital health solutions require a long-term plan, including financial viability, local ownership and integration into national health strategies. This involves investing in local communities and developers and engaging with governments to ensure sustained support and integration.

Establish people-first data practices: This principle emphasises the ethical and responsible handling of health data. It means prioritising data privacy and security, ensuring informed consent, and being transparent about how data is collected, used, stored and shared. Data should not be collected solely for organisational value; instead, it should directly benefit the individuals from whom it is derived.

Create open and transparent practices: This involves using open standards, open-source software and open data, where appropriate. This promotes collaboration, allows for wider adoption and improvement of solutions, and fosters trust by making the development process and underlying technologies transparent.

Anticipate and mitigate harms: Digital health interventions can have unintended negative consequences. Designers must proactively assess and mitigate risks to the security of users and their data, address potential biases in algorithms, and ensure the equitable and fair application of technology.

Use evidence to improve outcomes: Digital health initiatives should be data-driven, with clear metrics for measuring impact. This involves designing projects that allow for measurement at discrete milestones, focusing on outcomes rather than just outputs, and using real-time information to monitor and inform ongoing improvements.

3.3.3 The role of complimentary connectivity technologies

Digital health transformation marks a shift towards an interconnected ecosystem of tools and services, relying entirely on robust connectivity. Without data transmission, communication facilitation and real-time insights, digital health's core principles would be unattainable. Table 7 illustrates the connectivity technologies enabling digital health.

Table 7:

Complementary connectivity technologies

Technology	Typical range	Data rate	Power consumption	Key digital health applications	Strengths	Limitations
Wi-Fi (IEEE 802.11)	~30-100 metres (indoors)	Mbps - Gbps	Medium - high	EHR access, medical imaging (DICOM), IoMT in hospitals, in-home RPM, telehealth video consultations.	High bandwidth, widespread adoption, mature technology.	Limited range, can be power-intensive for battery devices, infrastructure-dependent.
Bluetooth Classic & BLE	BLE: ~10-100 metres	BLE: ~1-2 Mbps	Very low (BLE)	Wearable health trackers, personal medical devices (CGMs, pulse oximeters), device pairing, data sync to smartphones.	Low power (BLE), cost-effective, ubiquitous in smartphones.	Shorter range, typically requires a gateway (e.g. smartphone) for WAN access.
NFC (near-field communication)	< 10 centimetres	~100-400 kbps	Very low/ passive	Patient ID, medication management, secure device pairing, EHR access at workstations, contactless payments.	Secure tap-and-go, low power, simple.	Very short range, low data rate.
Cellular (4G LTE, 5G, RedCap)	Kilometres	4G: Mbps; 5G: Gbps	Medium - high	Mobile health apps, remote patient monitoring, telehealth, connected ambulances, IoMT backhaul.	Wide area coverage, high mobility, high bandwidth (5G), network slicing (5G).	Higher power consumption, data plan costs, infrastructure deployment.
LPWAN (e.g. LoRaWAN)	Kilometres (up to 15+)	0.3 - 50 kbps	Very low	Remote asset tracking, environmental monitoring, simple sensor data for RPM (e.g. temperature, location).	Long range, very low power, cost-effective for massive deployments.	Low data rate, not suitable for rich data or real-time video.
Satellite	Global/regional	Mbps - Gbps (LEO)	High (terminal)	Telehealth in remote/ rural areas, disaster recovery, connectivity for mobile clinics in off-grid locations.	Global coverage, reaches underserved areas.	Higher latency (GEO), cost of terminals/ service, potential weather interference.
Mesh networks (e.g. Wi-Fi Mesh, Zigbee)	Variable/scalable	Variable	Variable	Resilient hospital networks, medical surveillance, asset tracking, smart building controls in healthcare.	High reliability, self-healing, scalable coverage, can overcome obstructions.	Can be complex to design/ manage, potential for increased latency with many hops.

Source: GSMA Intelligence

The true strength of digital health connectivity lies in the synergistic interplay of technologies, not their individual capabilities. Technologies are often combined to create comprehensive solutions, leveraging each component's strengths to overcome limitations and deliver effective digital health services. Table 8 shows examples of how technologies combine to address various digital health use cases.

Table 8:

Technology combinations to address digital health use cases

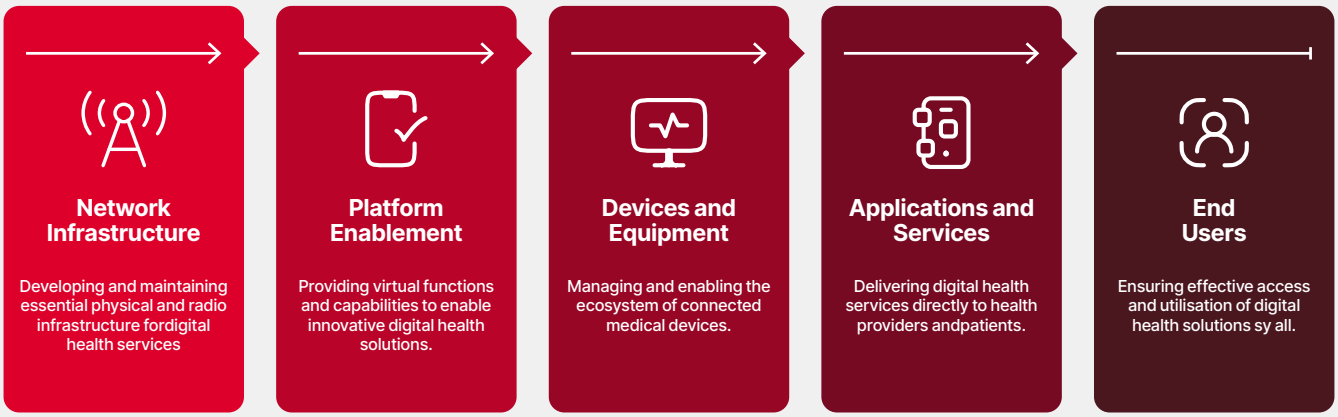
Digital health use case	Primary on-device/ local connectivity	Complementary gateway/ backhaul technology	Complementary technology	Key benefits of synergy
Continuous glucose monitoring (CGM)	BLE	Smartphone (cellular or Wi-Fi) - data relay to cloud, m-health app interface.	Cloud platform - data storage, analytics, provider access.	Enables continuous, minimally invasive monitoring, real-time alerts, data sharing with clinicians for proactive diabetes management, patient empowerment.
Rural emergency tele-consultation	Wi-Fi (local hotspot at clinic/ ambulance)	Satellite (e.g. Starlink) - primary backhaul for internet access.	Video conferencing platform - enables audio-visual communication.	Extends specialist medical expertise to remote/emergency situations, facilitates rapid diagnosis and treatment decisions, overcomes geographical barriers.
Smart hospital IoMT and asset tracking	BLE (for sensors, tags)	Wi-Fi or mesh network - local area data aggregation and device communication.	Ethernet/fibre (hospital backbone)/cellular (backup) - WAN connectivity.	Real-time patient monitoring, efficient tracking of medical equipment and staff, optimised workflows, improved patient safety, resilient network.
M-health app for cardiac rehab	BLE (wearable ECG/activity tracker to smartphone)	Smartphone (cellular or Wi-Fi) - app operation, data sync, communication.	Telehealth platform/ EHR - data sharing with care team, progress tracking.	Supports remote rehabilitation, encourages patient adherence to exercise programmes, enables provider monitoring and feedback, personalised care.
Secure medication dispensing in clinic	NFC (pharmacist authentication, medication verification)	Wi-Fi/ethernet (clinic network) - accessing EHR for prescription details.	EHR system - record of dispensing, inventory update.	Reduces medication errors, ensures correct patient and dosage, provides auditable trail, enhances patient safety and pharmacy workflow efficiency.

3.4 The strategic role of MNOs across the value chain

MNOs have been fundamental to communication networks, primarily offering connectivity, and their role is expanding, positioning them as key players in digital transformation across Africa. MNOs now engage in infrastructure investment, service enablement and cross-sector innovation.

Figure 10

The role of MNOs across the digital health value chain



Source:

The evolving digital landscape offers MNOs opportunities to redefine their models, enhance market influence and unlock new value streams, especially in the B2B sector. By deepening their engagement in the health sector, MNOs can unlock value across the digital health value chain, from core network capabilities to end user applications. Understanding MNOs' multiple entry points in the digital health ecosystem is essential.

The strategic role of MNOs in digital health can be understood across distinct layers of the value chain.

Layer 1: Network infrastructure

MNOs are key to developing and maintaining infrastructure for digital services. Their key roles include the following:

- Deploying and expanding network coverage: Investing in infrastructure in areas with health institutions to enable connectivity for health services, including remote diagnostics and HIS, and extending coverage to underserved rural zones.
- Enhancing backhaul and last-mile connectivity: Extending fibre backhaul and improving last-mile connections to health facilities for reliable high-capacity connections is essential for large medical images, telemedicine and digital logistics.
- Implementing dedicated network solutions: Deploying private networks for healthcare campuses requiring enhanced security, guaranteed quality of service (QoS) and traffic prioritisation for critical applications.
- Investing in hybrid connectivity solutions: Using a mix of technologies, including 4G, FWA and satellite, to provide bandwidth for telemedicine, remote consultations and digital health logistics in diverse settings.

By driving infrastructure in health-critical areas, MNOs bridge the coverage-to-capacity gap, ensuring health providers have necessary network access and performance for demanding applications.

Layer 2: Platform enablement

This layer provides virtual functions atop network infrastructure to enable digital health solutions. MNOs play key roles including the following:

- Offering edge computing: Providing infrastructure closer to care points for hosting applications such as AI diagnostics, minimising latency and enhancing responsiveness for mobile units or remote monitoring.
- Providing network segmentation and prioritisation: Allowing health sectors to use virtual network segments tailored to specific use cases, prioritising critical traffic such as remote surgery and ensuring reliable performance.
- Enabling API access: Offering APIs for authentication, geolocation and device management, facilitating health application integration with core network capabilities for seamless service delivery.
- Supporting cloud deployments: Hosting digital health platforms in the cloud, reducing the need for complex on-premises infrastructure management by ministries or NGOs.

These capabilities transform MNOs into service orchestrators, offering tailored technical environments for diverse health use cases.

Layer 3: Devices and equipment

Healthcare digitisation relies on the IoMT. MNOs enable this ecosystem through the following:

- Certifying devices: Ensuring connected medical devices meet standards for network compatibility, security and efficiency.
- Managing provisioning and connectivity: Handling SIM and eSIM provisioning across dispersed health facilities and for mobile health workers, ensuring reliable connectivity.
- Offering device lifecycle management: Providing bundled services for device procurement, activation, maintenance and replacement, simplifying logistics for health organisations.
- Providing telemetry and tracking support: Enabling real-time monitoring of health assets such as vaccine logistics and medical equipment.

These activities help MNOs support continuous and remote care models, enhancing both facility-based and community-based health service delivery.

Layer 4: Applications and services

MNOs play a visible role in delivering digital health services to providers and patients through the following:

- Partnering on health applications: Collaborating with agencies, NGOs and tech companies to develop and host m-health platforms for chronic disease, maternal health, mental health and immunisation tracking.
- Developing B2B solutions: Offering tailored solutions for hospitals and clinics, including secure communication, mobile billing integration and automated patient notifications.
- Providing access to health content: Offering zero-rated access to national health portals and telemedicine apps, eliminating data costs as a barrier.
- Supporting health-tech innovation: Hosting platforms to distribute and promote vetted digital health applications, leveraging customer reach.

MNOs make health tools accessible and scalable, driving digital health adoption when integrated into national strategies.

Layer 5: End users

This layer ensures individuals and institutions effectively access digital health solutions. MNOs expand access and enable use through the following:

- Developing connectivity solutions: Creating affordable data packages for health workers and patients, and ensuring reliable connectivity, especially in rural areas.
- Facilitating digital identity: Supporting mobile-based digital identity for patient registration and service eligibility, aiding efficient healthcare access.
- Supporting digital literacy: Collaborating to provide digital skills training for healthcare professionals and the public.
- Engaging communities: Using communication channels to disseminate health information and raise awareness of digital services.

MNOs ensure digital health systems are functional, equitable and centred on patient and worker needs. Their comprehensive involvement in the digital health value chain is key for transforming healthcare systems across Africa, ensuring investment in infrastructure, enabling connected health devices and promoting digital inclusion. Their role extends to co-creating service models, aligning with health priorities, and expanding access to underserved populations.

Case study:

The opportunity for MNO service diversification in healthcare delivery

MNOs are actively diversifying their revenue streams beyond traditional voice and SMS services, with a significant focus on digital services, including the burgeoning digital health sector. This strategic pivot will promote sustained growth and profitability in the dynamic African telecommunications landscape. Plausible alternative revenue models for MNOs, particularly within the digital health sector, include:

1. **IoT-enabled health solutions:** MNOs are uniquely positioned to leverage their extensive network infrastructure to offer IoT solutions for healthcare. This involves providing connectivity and platforms for remote patient monitoring, asset tracking within healthcare facilities, and managing large-scale health programmes.
   - Remote patient monitoring: MNOs can offer connectivity and managed platforms for devices that monitor vital signs, track medication adherence or manage chronic conditions from a distance. This is particularly valuable in rural areas with limited access to physical healthcare facilities.
   - Supply chain management: Solutions such as Vodacom's Stock Visibility Solution (SVS) digitise laboratory value chains and supply chain management for critical services, ensuring efficient planning and delivery of medical supplies and lab results. This can reduce bottlenecks and improve patient care.
   - Vaccination and public health programmes: MNOs can support large-scale public health initiatives, such as vaccination programmes, by providing mobile technology for registering caregivers and vaccinations, tracking vaccine stock levels and sending health notifications and reminders via SMS (e.g. Vodacom's mVacciNation).
   - Smart healthcare infrastructure: Implementing IoT for smart hospitals or clinics, including smart utility meters, asset management and security, can be offered as enterprise solutions.
2. **Digital health platforms and value-added services (VAS):** MNOs can develop or host digital platforms and offer specialised VAS tailored to health needs.
   - Telehealth and teleconsultation: Providing reliable, low-latency connectivity for virtual consultations, remote diagnostics and tele-education for health professionals, especially in underserved areas, can be a significant revenue stream.
   - Health education and promotion: MNOs can monetise content platforms that deliver health education to the public, monitor chronic conditions and provide on-demand health information. This can include health-oriented VAS tools, such as maternal care SMS alerts.
   - Digital pharmacy and/or medicine delivery: Partnering with pharmacies to enable online ordering and delivery of medicines, facilitated by mobile payments and logistics tracking.
3. **Mobile money and fintech integration in health:** Mobile money platforms, already a major revenue driver for MNOs, can be expanded to facilitate health-related financial services.
   - Health insurance products: Offering micro-health insurance products directly through mobile money platforms, making coverage accessible to a wider population, including those traditionally unbanked.
   - Payment for health services: Facilitating seamless mobile payments for medical consultations, prescriptions and hospital bills, especially in regions where cash transactions are prevalent.
   - Health-related disbursements: Partnering with governments and NGOs to disburse health subsidies, emergency aid or social welfare payments directly to mobile money accounts, ensuring transparency and efficiency.

4. **Data analytics and insights for public health:** MNOs collect vast amounts of anonymised and aggregated data on population movement, communication patterns and service usage. This data, when analysed responsibly, can provide valuable insights for public health planning, disease surveillance and targeted health interventions. This could be offered as a service to government health ministries or research institutions.

5. **NaaS for health providers:** MNOs can offer their robust network infrastructure and capabilities as a service to third-party digital health startups and established healthcare providers. This could involve providing dedicated bandwidth, secure data transmission or edge computing resources for health applications.

6. **Strategic partnerships:** Collaborating with healthcare providers, technology companies, pharmaceutical firms and government health bodies can enable MNOs to co-create and deliver integrated digital health solutions, leveraging their connectivity and mobile money ecosystems with specialised healthcare expertise. For instance, Airtel Africa partnered with SpaceX to bring Starlink's satellite internet to remote communities, which will support telemedicine.

By diversifying into these digital health-focused areas, MNOs across Africa can leverage significant market opportunities while simultaneously contributing to improved health outcomes and building sustainable, long-term revenue streams beyond traditional connectivity services.

3.5 Market opportunities and economic potential

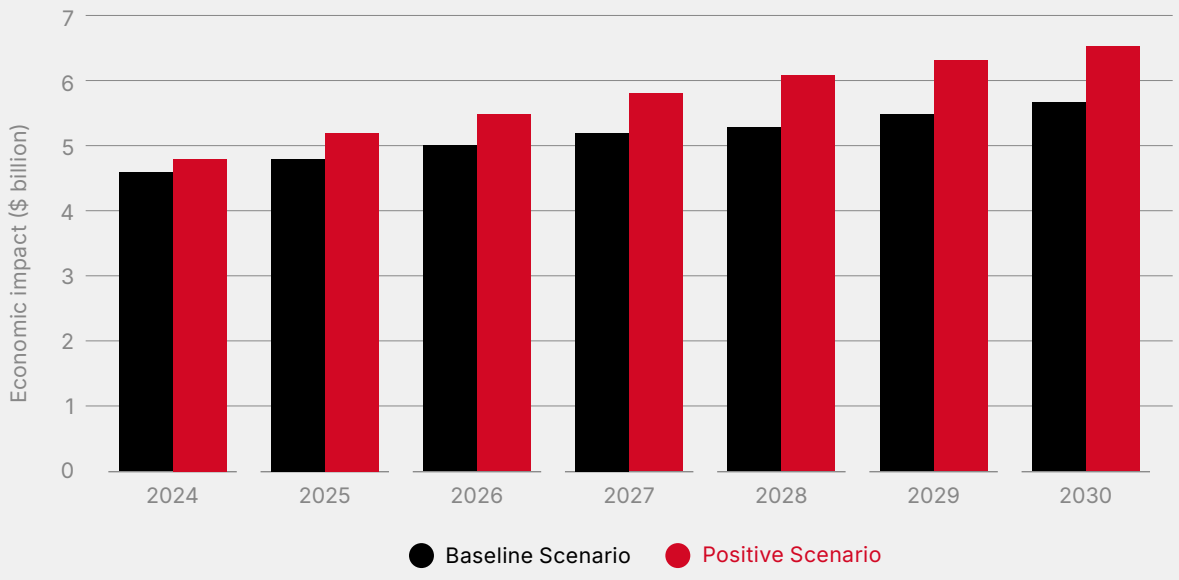
The digital health landscape in Africa is rapidly evolving, offering significant market opportunities and economic potential. As the continent embraces technological advancements, particularly in connectivity and digital health solutions, there is a growing recognition of the transformative impact these innovations can have on healthcare systems and economic development. This section explores the current economic impact of digital health, its future potential, and the enabling environment required to maximise these opportunities.

3.5.1 Economic impact of digital health in Africa

The health sector in Africa currently plays a vital role in the continent's economy, yet it faces significant challenges that limit its full potential. Digital health offers transformative possibilities by enhancing healthcare delivery, improving patient outcomes and extending access to services, particularly in underserved areas. As of 2024, the economic impact of digital health technologies was estimated at $4.6 billion (Figure 11). By 2030, under the baseline scenario, this impact could grow to approximately $5.7 billion. In a positive scenario, with accelerated adoption and supportive policy environments, the potential impact could be even greater, contributing $6.5 billion to the economy continentally. Transitioning from the baseline to the positive scenario requires an enabling environment characterised by robust infrastructure development, regulatory support, investment in technology and strong partnerships between public and private sectors.

Figure 11

Economic impact of digital health continentally, per scenario



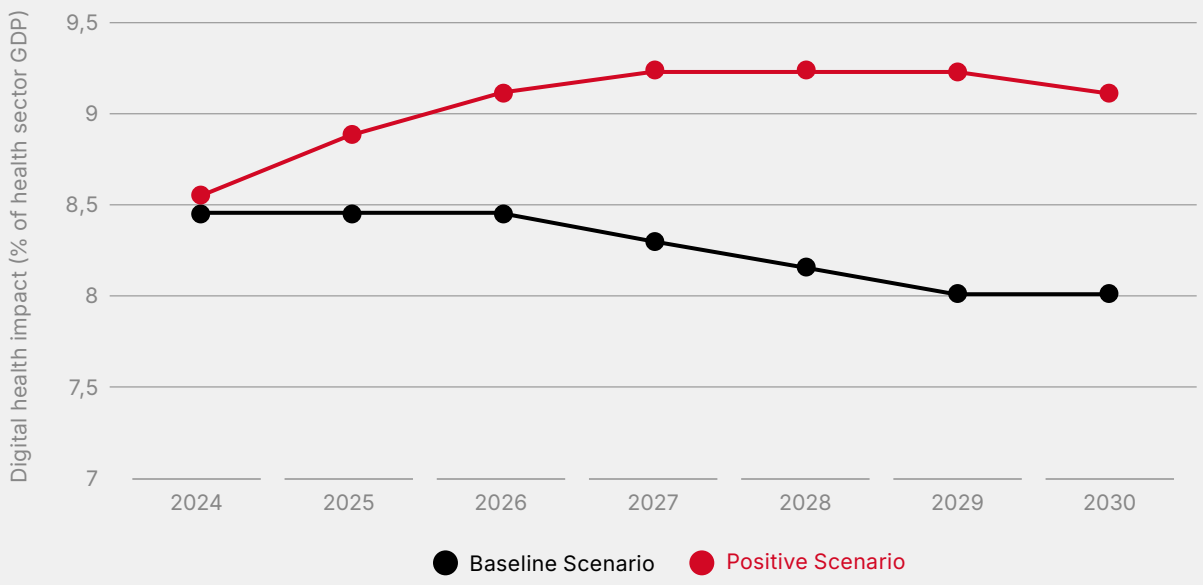
Source: GSMA Intelligence Mobile Coverage Explorer

3.5.2 Contribution of digital health to GDP in Africa

Continentally, the health sector contributes significantly to GDP in Africa, although the full potential remains untapped due to systemic challenges. Digital health contributed 8.3% to the health sector's GDP in 2024 and is expected to fall to 8% under the baseline scenario. In the positive scenario, this share is expected to increase to 9.1% by 2030 (Figure 12), highlighting the substantial economic benefits of digital health integration. Mobile technologies play a pivotal role in this transformation, enhancing connectivity and enabling innovative health solutions. Their contribution extends beyond the health sector, positively impacting the broader continental economy by driving technological adoption and fostering economic growth. These advancements underscore the importance of continued investment in mobile technologies to realise the full potential of digital health across Africa.

Figure 12

Digital health contribution to the health sector's GDP continentally, per scenario



Source: Genesis Analytics health sites, GSMA Intelligence Mobile Coverage Explorer

The digital health market in Africa is poised for substantial growth, expanding from $2.049 billion in 2023 to $3.237 billion by 2030, with a CAGR of 6.7%. This expansion covers the 10 focus countries, as depicted in Table 9, and the broader continent, presenting significant opportunities for investment and strategic development. South Africa leads with the largest market share, representing 32% of the focus countries' market in 2023 at $649 million and projected to reach $949 million by 2030 with a 5.7% CAGR, reflecting its mature healthcare infrastructure. Secondary markets including Kenya, Ethiopia and Tanzania also offer considerable growth prospects.

An inverse relationship between market size and growth rate is observed, with Uganda showing the highest growth at 11.1% CAGR despite a smaller market size, indicating untapped potential. Other high-growth markets include Malawi (6.7%), Côte d'Ivoire (6.5%), and Gabon (5.5%). The 10 focus countries are set to grow from $1.215 billion in 2023 to $1.779 billion by 2030 at a 5.6% CAGR. However, the rest of Africa segment is expanding faster at 8.2% CAGR, from $833 million to $1.457 billion, driven by mobile technology penetration and innovative service models adapted to resource-constrained environments.

Strategically, three approaches emerge. Established markets like South Africa require differentiated value propositions to compete effectively, high-growth markets like Uganda offer opportunities for rapid market share acquisition but necessitate different operational models, and the broader region beyond the focus countries represents the highest growth potential, suggesting opportunities for scalable, pan-African digital health platforms.

Table 9:

Digital health market opportunities in Africa (Source: Genesis Analytics health sites, GSMA Intelligence Mobile Coverage Explorer)

Country	Digital health market size ($ million)		CAGR 2024-30
	2024	2030	
Côte d'Ivoire	72	104	6.5%
Democratic Republic of the Congo	63	85	5.1%
Ethiopia	107	142	4.7%
Gabon	12	17	5.5%
Kenya	134	168	3.8%
Malawi	25	37	6.7%
Senegal	38	49	4.5%
Tanzania	88	108	3.3%
Uganda	65	122	11.1%
South Africa	681	949	5.7%
Sub-total focus countries	1,285	1,779	5.6%
Rest of Africa	906	1,457	8.2%
Total	**2,191**	**3,237**	**6.7%**

Source: Genesis Analytics health sites, GSMA Intelligence Mobile Coverage Explorer

3.6 About the country case studies

The country case studies in Annex 2 offer a comprehensive view of the digital health landscape in Africa, providing insights for stakeholders on common regional barriers and country-specific strengths. For governments and policymakers, these profiles allow benchmarking against regional peers, identifying policy gaps and prioritising investments. Digital health providers can use these insights to gauge market readiness and key innovations that may influence solution designs. For MNOs, the profiles highlight connectivity needs, from basic mobile connectivity for m-health in emerging markets such as Gabon to advanced network capabilities in mature markets such as South Africa and Kenya.

This analysis covers 10 countries representing a cross-section of the region, including anglophone, francophone, and lusophone nations, selected for digital health maturity diversity, DHI data availability, and larger populations. Annex 1 details the Digital Health Maturity Index compilation.

Each profile follows a standardised structure for comparison while highlighting national characteristics, offering a snapshot of connectivity and health indicators, an in-depth discussion of digital health maturity and profiles of leading local innovators. The maturity discussion is based on the ITU/WHO National eHealth Strategy Toolkit's seven critical components, assessed on a five-point scale from 1 (Emerging) to 5 (Mature), with scores from the Global Digital Health Monitor. Table 10 shows the overall scores for the 10 focus countries.

The assessment reveals maturity disparities, with phases ranging from 2 (Emerging) to 4 (Advanced). Tanzania leads with a phase 4 rating, excelling in leadership and governance. Gabon is at phase 2, the earliest development stage. Kenya, Malawi, Tanzania and Ethiopia have phase 4 status, indicating strong digital health ecosystems, while Uganda and DRC are at phase 3, showing moderate development. Table 10 highlights strengths and weaknesses across components, with significant variation in standards

and interoperability, from phase 1 in Senegal and Côte d'Ivoire to phase 5 in Kenya, Malawi and Tanzania. Annex 3 presents the Digital Health Maturity scores for all 53 African countries. It is important to acknowledge that some countries experienced limited data availability, as indicated by greyed-out cells signifying an absence of data for specific metrics. Consequently, this data limitation may result in an inaccurately inflated final score.

Table 10:

Overview of digital health maturity in case study countries (Source: Digital Health Monitor)

	Workforce and Capacity Development	Services and Applications	Standards and Inter-operability	Strategy and Investment	Legislation, Policy and Compliance	ICT Infrastructure	Leadership and Governance	**Overall Digital Health Phase**
South Africa	2	3	3	2	3	4	4	**3**
Kenya	2	4	5	3	4	4	4	**4**
Malawi	4	3	5	4	3	3	4	**4**
Tanzania	3	4	5	4	4	4	5	**4**
Ethiopia	5	3	3	3	3	4	4	**4**
Senegal	2	3	1	3	3	3	4	**3**
Uganda	3	3	3	3	3	3	3	**3**
Côte d'Ivoire	2	2	1	3	4	3	3	**3**
Gabon	1	1	1	2	3	2	3	**2**
DRC	2	2	2	3	2	3	3	**3**
Phase of development				1	2	3	4	5

4 Measures to realise the digital health opportunity in Africa

4.1 Collaborative measures to transform digital health in Africa

Digital health is not solely an ICT issue or a health issue, but a synergistic challenge requiring integrated strategies and strong partnerships across all sectors to unlock its full transformative potential in Africa.

This highlights the need for cross-cutting measures to realise the potential for digital technologies to help improve health outcomes and address key bottlenecks in Africa's health sector.

4.1.1 Implement actionable, costed national digital health blueprints

Audit and strengthen existing blueprints or develop new ones where they do not exist. These blueprints should be comprehensive, nationally owned and include a clear, costed implementation roadmap. They should align with national health goals like UHC and broader digital transformation strategies, moving beyond simple strategy documents to actionable plans with defined roles and responsibilities for all stakeholders.

A lean, iterative action plan with short-term, measurable goals (e.g. one-year sprints) and clear accountability frameworks is prioritised, with progress directly linked to performance incentives or funding disbursements for ministries.

Policymakers and regulators	MNOs	Digital health providers
Lead the development, ensuring multi-ministerial buy-in (health, ICT, finance, education) and clear regulatory frameworks.	Advise on connectivity capabilities, infrastructure deployment plans and potential for bundled services to support the roadmap's goals.	Provide technical input on feasible applications, interoperability needs and user requirements based on their on-the-ground experience.

Key recommendations

- Given funding dynamics, a multi-ministerial budgeting approach for digital health can be implemented, ensuring contributions from health, ICT, finance and education ministries, recognising digital health as a cross-cutting national priority. This shifts the financial burden from a single, chronically underfunded sector.
- Signal specific digital health needs an ecosystem of stakeholders to encourage targeted solutions and foster consortia that can mobilise diverse resources. Explore innovative financing models such as blended finance, social impact bonds or PPPs with clear risk-sharing and benefit-sharing frameworks, ensuring sustainability beyond donor funding.
- Establish a high-level, inter-ministerial digital health steering committee with executive authority, co-chaired by Ministers of Health and ICT, and with a clear mandate to resolve inter-departmental conflicts and allocate shared resources.
- Implement joint performance indicators and shared accountability across relevant ministries for digital health outcomes. Fund joint training programmes for ministerial staff from different departments to foster cross-understanding and collaboration, as well as embedding dedicated digital health units within the Ministry of Health.

4.1.2 Bridge the digital divide with affordable and accessible solutions

Implement multi-pronged initiatives to address the usage gap caused by high data and device costs, limited digital literacy, and unreliable electricity, especially in rural areas. This includes making both connectivity and devices more accessible and affordable.

Policymakers and regulators	MNOs	Digital health providers
Develop policies for affordable data packages, potentially through tax incentives for MNOs offering health-specific bundles, and incentivise local device manufacturing or subsidisation programmes.	Offer targeted impact packages for health data, allow zero-rated health solutions, and explore large-scale procurement of affordable smartphones. Co-invest in solar solutions for health facilities to ensure reliable power.	Design applications that are low-bandwidth and offline-first, compatible with entry-level smartphones, and integrate with SMS/USSD for broader reach. Develop user-friendly interfaces that consider varying levels of digital literacy.

Key recommendations

- Implement a tiered incentive system for MNOs by offering tax breaks for providing zero-rated access to verified, essential health services, such as national health portals and emergency telehealth. Additionally, offer differentiated tax incentives for supplying deeply subsidised health-centric data bundles to underserved populations and CHWs.
- Encourage bulk procurement agreements facilitated by the government or development partners to drastically reduce the cost of entry-level smartphones and robust feature phones capable of running m-health apps. Consider assembling devices locally to further reduce costs and create jobs.
- Shift reliance from the national grid to aggressive, decentralised deployment of off-grid renewable energy solutions, such as solar mini-grids or individual solar kits, for health facilities. Prioritise rural and peri-urban clinics for these energy solutions.
- Create clear policy frameworks and incentives, such as feed-in tariffs and tax breaks, to encourage private sector energy companies and MNOs to invest in and manage these energy solutions at health facilities. Consider integrating these energy solutions with network infrastructure deployment.
- Adopt a hybrid-first approach rather than strictly offline-first. Design core functionalities to work offline while strategically leveraging higher bandwidth for specific value-add features, such as high-resolution image upload when connectivity is available.
- Prioritise investment in targeted 4G/5G rollout and fibre backhaul to key health facilities and innovation hubs. Ensure that where advanced capabilities are most impactful, such as tertiary hospitals and specialist clinics, the necessary infrastructure is proactively developed. This approach ensures that offline-first is a pragmatic interim solution rather than a permanent limitation.

4.1.3 Foster interoperability and data governance

Prioritise the establishment and enforcement of national HIE frameworks and standardised data formats (e.g. HL7 FHIR, ICD-10) to enable seamless and secure data exchange across fragmented health systems, particularly for holistic patient views and AI development.

Policymakers and regulators	MNOs	Digital health providers
Mandate interoperability standards and develop robust data privacy and security laws (informed by models such as GDPR) with clear enforcement mechanisms and dedicated health data governance frameworks.	Provide the underlying secure network infrastructure for data transmission and potentially offer secure health data vault services, ensuring robust cybersecurity measures for sensitive health information.	Actively design solutions to be interoperable and compliant with national standards, building connectors and APIs to facilitate data exchange. Advocate for and participate in the development of these standards.

Key recommendations

- Implement a phased approach to interoperability, beginning with the mandatory adoption of core data standards, such as HL7 FHIR for data exchange and ICD-10 for coding, for all new digital health system procurements and renewals. Develop a national digital health architecture with clear API standards to which existing systems must connect.
- Establish a digital health certification body that vets and certifies digital health solutions for adherence to national interoperability standards and data privacy requirements before they are adopted within the public health system. Encourage open-source development and the sharing of interoperability connectors and tools to reduce cost and complexity.
- Develop a comprehensive health data governance law specific to healthcare data, building on general data protection laws but providing clear and pragmatic guidelines for sensitive health data. This should include guidance on anonymisation, pseudonymisation and secure cross-border data exchange where necessary for public health or research, while strongly encouraging localisation.
- Invest in building the capacity of regulatory bodies and judicial systems to understand digital health technologies and data governance nuances, possibly through dedicated digital health legal training programmes. Establish regulatory sandboxes where novel digital health solutions can be tested under controlled conditions, allowing regulators to learn and adapt policies proactively, rather than responding retrospectively.
- Ensure any MNO-provided health data vaults are subject to stringent government oversight and independent third-party audits for security and privacy compliance. Implement blockchain or similar distributed ledger technologies for auditable patient consent and data access logs to enhance transparency and trust.
- Conduct public awareness campaigns to educate citizens on their data rights and the security measures in place. This includes explaining the benefits of digital health data sharing for improved care, alongside robust redress mechanisms for data breaches or misuse.

4.1.4 Strengthen digital health workforce capacity

Implement comprehensive, multi-level programmes to enhance the digital literacy and specialised skills of the healthcare workforce, from basic device usage to advanced health informatics and AI. This needs to be integrated into both pre-service and in-service training.

Policymakers and regulators	MNOs	Digital health providers
Integrate digital health into national health and education curricula, establish dedicated digital health career pathways, and potentially offer incentives for training and retention.	Support digital literacy training efforts, potentially leveraging community outreach programmes.	Develop Train the Trainer models, provide user-friendly training modules for their solutions, and involve communities in the design process to ensure tools are easy to adopt.

Key recommendations

- Integrate foundational digital literacy skills, such as basic device usage, internet navigation and cybersecurity hygiene, into all levels of health professional training, including pre-service, in-service, and continuous professional development. This integration should be mandated and assessed to ensure competency.
- Develop gamified health education applications that make learning about digital tools and health interventions engaging and intuitive, leveraging the ubiquity of mobile phones. Partner with local community organisations to run digital literacy programmes tailored to the needs of CHWs and rural populations, potentially using mobile learning platforms that operate on basic feature phones.
- Create attractive digital health career pathways within the public sector that include competitive compensation, clear progression opportunities and continuous professional development. This initiative should be supported by sustained government funding and potentially blended finance models to ensure its viability.
- Foster local digital health innovation ecosystems and startups, such as through MNO accelerator programmes, to create alternative, attractive employment opportunities within Africa, thereby reducing the incentive to migrate. Explore partnerships with diaspora health professionals for remote mentoring and knowledge transfer programmes to enhance local expertise.
- Establish a national digital health skills council, comprising multiple ministries, responsible for identifying critical skills gaps within the Ministry of Health and across the broader health workforce.
- Implement targeted training programmes for Ministry of Health officials, potentially through partnerships with academic institutions and private tech companies, focusing on areas like digital health strategy, project management, data analytics and cybersecurity. Create a dedicated budget line for this capacity building and link retention to performance and professional development opportunities.

4.1.5 Cultivate a collaborative innovation ecosystem

Create structured platforms and mechanisms for ongoing dialogue, resource pooling and co-creation among governments, MNOs, digital health providers, academia and civil society, moving beyond isolated pilot projects to scalable, sustainable solutions.

Policymakers and regulators	MNOs	Digital health providers
Establish multi-stakeholder steering committees, develop regulatory sandboxes for innovation, and signal specific digital health needs to encourage targeted solutions.	Launch digital health accelerator programmes, offer network and cloud resources to startups, and engage in strategic partnerships with digital health providers.	Actively seek partnerships with MNOs and government bodies, participate in policy discussions, and ensure their innovations address real-world local health challenges and cultural contexts.

Key recommendations

- Establish a dedicated digital health innovation fund to provide follow-on funding and technical support for successful pilot projects to scale nationally. This fund should include clear criteria for scalability, sustainability and adherence to interoperability standards.
- Create a centralised digital health solution repository, managed by the Ministry of Health, where all vetted and certified digital health solutions, including successful pilots, are catalogued. This repository should include clear guidelines for procurement and adoption by health facilities, reducing fragmentation and helping to avoid reinventing the wheel.
- Combine top-down needs signalling with bottom-up innovation challenges and hackathons that explicitly invite tech companies and startups to propose solutions for identified health priorities. This approach fosters demand-driven innovation while allowing for novel approaches.
- Establish regulatory sandboxes that provide a safe space for innovators to test new digital health technologies without immediate full regulatory burden, allowing regulators to learn and adapt policies proactively. This approach balances oversight while encouraging rapid iteration.
- Implement strong, transparent PPP governance frameworks that explicitly define roles, responsibilities, data ownership, intellectual property rights and benefit-sharing mechanisms to ensure that public good remains paramount.
- Build the public sector's capacity for negotiating and managing complex PPP contracts, including legal and technical expertise, to ensure fair terms. Require independent third-party evaluations of PPP outcomes, with public disclosure, to ensure accountability and track whether public health objectives are truly being met.

4.2 Recommendations for policymakers and regulatory bodies

4.2.1 Establish permanent regulatory sandboxes for digital health

To address regulatory lag and the pace of innovation, governments should establish permanent regulatory sandboxes or innovation labs focused specifically on digital health. These environments allow for iterative policy development and rapid learning alongside technological advancements. Empowering a multi-ministerial national digital health skills council, which includes regulatory bodies, is crucial to continuously update policy and address emerging technologies such as AI. Additionally, developing a 5G regulatory roadmap specific to healthcare will proactively guide deployment and adoption, ensuring that the sector is prepared for future demands. Prioritising the development of specific laws and guidance on AI in health, including ethical guidelines and secure cross-border data exchange, will further enhance the regulatory framework.

4.2.2 Adopt a risk-based regulatory approach

To balance control and growth, governments should adopt a risk-based regulatory approach that differentiates oversight intensity based on the digital health solution's potential for harm or impact on sensitive data. Implementing a national framework for digital health interventions that defines clear requirements for government endorsement based on safety, efficacy and interoperability is essential. Promoting equitable access policies ensures that regulations do not disproportionately burden small local innovators or exclude vulnerable groups. Actively involving diverse stakeholders, including patient groups and digital health innovators, in regulatory discussions will ensure pragmatic and balanced outcomes, fostering an environment where innovation can thrive without compromising safety or equity.

4.2.3 Enhance enforcement capacity for regulatory authorities

To strengthen enforcement capacity, governments should invest significantly in building the technical and legal capacity of regulatory authorities through specialised training programmes and recruitment of digital health experts. Collaborating with international partners and regional bodies, such as the Africa CDC, to share best practices and build expertise in digital health regulation and enforcement will enhance capabilities. Establishing clear reporting mechanisms for non-compliance and publicising enforcement actions will deter violations and ensure accountability. Robust data privacy and protection policies, with clear enforcement mechanisms and dedicated health data governance frameworks, are essential to safeguarding sensitive health information and maintaining public trust in digital health systems.

4.3 Recommendations for MNOs

4.3.1 Implement a tiered incentive system for connectivity expansion

MNOs should address the challenge of providing affordable and accessible connectivity by implementing a tiered incentive system that combines tax benefits with regulatory fast-tracking for achieving specific, measurable targets. These targets should focus on extending high-speed (4G/5G) network coverage and offering genuinely affordable data packages in underserved rural health zones. Establishing a rural connectivity fund, supported by universal service obligations (USOs) contributions from all MNOs and potentially co-funded by government and donors, can subsidise infrastructure deployment in areas deemed commercially unviable but critical for public health. Additionally, mandating that a portion of spectrum allocation, especially lower-band frequencies suitable for wide coverage, be tied to achieving rural health connectivity targets will ensure that MNOs prioritise these areas. Encouraging MNOs to diversify revenue beyond just data by offering Connectivity-as-a-Service packages to rural health facilities can further enhance access. These packages should bundle reliable internet, solar power solutions and basic device provision, thereby addressing inconsistent electricity and connectivity challenges.

4.3.2 Establish a national HIE for secure data management

To ensure trust and prevent conflicts of interest in health data management, MNOs should participate in establishing a national, public-private HIE as the central secure data vault. In this model, MNOs would act as secure data carriers and technical enablers for the public HIE, rather than primary data owners. Developing clear data ownership policies that explicitly state patient and Ministry of Health ownership of health data is essential. Implementing stringent, independently audited cybersecurity frameworks for all data transmission and storage, aligned with international standards like GDPR, will further enhance security. A multi-stakeholder governance model for the HIE, including government, MNOs, digital health providers and civil society, should be fostered to ensure transparency and accountability. MNOs can contribute by providing secure cloud hosting and data centre management for the national HIE.

4.3.3 Create a digital health accelerator programme for innovation and investment

To drive innovation and investment in digital health, MNOs should collaborate with government and development partners to create a digital health accelerator programme. This programme should specifically target solutions for public health challenges that offer both social impact and potential long-term commercial viability. Offering MNOs incentives, such as matching grants and preferential procurement, to invest in and scale digital health solutions addressing high-impact areas that include maternal and child health, infectious disease management and primary care diagnostics can foster development. Facilitating network-as-a-service models, where MNOs offer their infrastructure, APIs and technical expertise to vetted digital health startups at preferential rates, can lower barriers to entry and encourage innovation. Additionally, exploring impact investment models where MNOs can achieve a blend of financial return and social return on investment will promote sustainable growth in the digital health sector.

4.3.4 Diversify revenue through digital health solutions

MNOs should strategically pivot beyond traditional voice and SMS services to capitalise on the burgeoning digital health sector in Africa. This diversification will unlock new revenue streams and enhance market influence.

MNOs can leverage their network infrastructure to provide connectivity and platforms for IoT-enabled health solutions such as:

- Remote patient monitoring: Offer managed platforms for devices tracking vital signs, medication adherence or chronic conditions, especially in rural areas.
- Supply chain management: Implement solutions to digitise laboratory value chains and critical service supply chains, ensuring efficient delivery of medical supplies and lab results.
- Vaccination and public health programmes: Support large-scale initiatives by providing mobile technology to register caregivers and vaccinations, track stock levels and send health notifications via SMS.
- Smart healthcare infrastructure: Offer enterprise solutions for smart hospitals or clinics, including smart utility meters, asset management and security.

MNOs can develop or host digital health platforms and offer specialised value-added services for health needs:

- Telehealth and teleconsultation: Provide reliable, low-latency connectivity for virtual consultations, remote diagnostics, and tele-education, particularly in underserved areas.
- Health education and promotion: Monetise content platforms delivering health education, monitoring chronic conditions and providing on-demand health information, including maternal care SMS alerts.
- Digital pharmacy and/or medicine delivery: Partner with pharmacies for online ordering and delivery of medicines, integrated with mobile payments and logistics tracking.

MNOs can expand existing mobile money platforms to facilitate health-related financial services:

- Health insurance products: Offer micro-health insurance directly through mobile money platforms to a wider, including unbanked, population.
- Payment for health services: Enable seamless mobile payments for consultations, prescriptions and hospital bills, especially where cash transactions are common.

- Health-related disbursements: Partner with governments and NGOs to disburse health subsidies, emergency aid or social welfare payments to mobile money accounts, ensuring transparency and efficiency.

MNOs could also consider the following:

- Data analytics and insights for public health: Responsibly analyse anonymised and aggregated MNO data to provide valuable insights for public health planning, disease surveillance and targeted interventions. This can be offered as a service to government health ministries or research institutions.
- NaaS for health providers: Offer robust network infrastructure and capabilities as a service to third-party digital health startups and established healthcare providers, including dedicated bandwidth, secure data transmission or edge computing resources.
- Strategic partnerships: Collaborate with healthcare providers, technology companies, pharmaceutical firms and government health bodies to co-create and deliver integrated digital health solutions.

To ensure compliance with national data privacy regulations and support data sovereignty, MNOs should invest in and offer robust local data infrastructure:

- In-country data warehousing and data centres: Establish and operate secure, high-capacity data centres within the respective countries where they operate. This ensures that sensitive health data remains physically within national borders, addressing concerns about data sovereignty and compliance with local data protection laws.
- Edge computing for low latency and local processing: Deploy edge computing capabilities closer to the data source. This minimises data transfer latency, improves real-time processing for critical health applications and further supports data residency requirements by processing data locally before aggregation.
- Secure data management and governance services: Offer services to health providers for secure data storage, backup and disaster recovery within their local data centres. This includes implementing robust encryption, access controls and auditing capabilities to ensure data integrity and confidentiality, which are paramount for health data.
- Interoperable data platforms: Develop or support platforms that enable secure and standardised data exchange between different health systems while maintaining data sovereignty. This ensures that data can be shared for public health benefits without compromising national control or individual privacy.

By diversifying into these digital health-focused areas and building and offering robust local data infrastructure, MNOs can leverage significant market opportunities, contribute to improved health outcomes, and build sustainable, long-term revenue streams beyond traditional connectivity services, all while respecting and supporting country-specific data sovereignty requirements.

4.4 Recommendations for digital health providers

4.4.1 Design solutions for national scalability and interoperability

Digital health providers should address scalability beyond pilot projects by actively designing solutions with national scalability and interoperability as core requirements from the outset. This involves proactively building connectors and APIs that facilitate seamless data exchange with national HIE frameworks and adhere to international standards.

Focusing on developing open-source data and leveraging existing platforms in local languages to train language models can make solutions more contextually relevant and scalable. Early engagement with Ministries of Health will align solutions with national health priorities and ensure their long-term integration into public health systems.

4.4.2 Innovate financing models for commercial viability

To achieve commercial viability in public health, digital health providers should innovate new financing models that blend public and private funding, allowing for shared costs and benefits. This is particularly important for solutions serving low-income or remote populations. Exploring micro-subscription models or pay-per-outcome models integrated with mobile money platforms can make services affordable and accessible. Actively pursuing PPPs for service delivery, where the public sector provides part of the funding or infrastructure and the private sector brings technology and operational efficiency, can enhance sustainability. Leveraging partnerships with MNOs to digitise CLM data demonstrates clear public health value, attracting further public or donor funding.

4.4.3 Engage in quality control and clinical governance

Digital health providers should proactively engage with regulatory bodies to achieve certification and endorsement for their solutions, demonstrating adherence to national quality and safety standards. Investing in clinical validation of tools, especially for diagnostic or treatment-oriented solutions, and publishing transparent efficacy data is key.

Developing Train the Trainer (CHW) models and user-friendly training modules ensures healthcare workers are competent and confident in using these tools. Establishing clear channels for user feedback and rapid iteration of products based on real-world clinical use will further enhance quality and effectiveness.

4.4.4 Make interoperability a core design principle

To overcome data silos and integration challenges, digital health providers should make interoperability a core design principle and business strategy. Actively building connectors and APIs to facilitate data exchange with national HIS is essential. Providers should actively participate in national HIE development initiatives and advocate for common data standards. Developing business models that derive value from insights gained from integrated data, with strict anonymisation and privacy controls, rather than from proprietary data lock-in, can drive innovation. Collaborating with MNOs to leverage their secure data infrastructure for integrated solutions ensures data portability and access for public health purposes.

4.5 Conclusion

The landscape of healthcare in Africa is undergoing a profound transformation, driven by the synergistic convergence of digital health solutions and advanced connectivity. This report underscores that digital health represents a systematic integration of information and communication technologies, computer science, and data into health systems to foster more efficient, personalised and accessible care.

A pivotal insight is the interdependence of connectivity and digital health. The increasing sophistication and adoption of digital health solutions, from m-health and telemedicine to AI-powered diagnostics and remote patient monitoring, generate significant demand for robust and reliable network infrastructure. Conversely, the expansion and enhancement of connectivity, particularly 4G and emerging 5G networks, unlock the full potential of these advanced healthcare applications, facilitating real-time data transmission, remote consultations and efficient logistical operations, especially in underserved areas. MNOs play a fundamental and strategic multi-layered role across the entire digital health value chain, from network infrastructure deployment to platform enablement, device support and the delivery of end user services.

Digital health presents substantial economic potential for Africa, with the market projected to grow significantly from an estimated $2.049 billion in 2023 to $3.237 billion by 2030, and its economic impact reaching approximately $5.7 billion under a baseline scenario and $6.5 billion under a positive scenario by 2030. This growth not only enhances health outcomes and expands UHC but also contributes significantly to the health sector's GDP regionally, underscoring the critical importance of sustained investment and strategic development.

However, the realisation of this transformative potential is contingent on addressing persistent systemic challenges. These include chronic underfunding of healthcare, severe shortages and maldistribution of skilled health workers, inadequate and fragmented data infrastructure, low digital literacy, significant rural-urban disparities in connectivity and device access, and unreliable electricity supply at health facilities.

Therefore, unlocking the full benefits of digital health in Africa demands a holistic and collaborative approach. This necessitates the following:

- Strong leadership and political will, embedded within comprehensive, actionable and costed national digital health blueprints, ensuring multi-ministerial buy-in and clear regulatory frameworks.
- Targeted investments in foundational infrastructure, including expanding 4G/5G coverage, enhancing backhaul and last-mile connectivity, and deploying sustainable energy solutions for health facilities, often through innovative PPPs.
- The establishment and rigorous enforcement of interoperability standards and robust health data governance frameworks to enable seamless and secure data exchange, ensuring holistic patient views and supporting the development of advanced AI applications.
- Comprehensive workforce capacity building initiatives that integrate digital literacy and specialised digital health skills into both pre-service and in-service training for healthcare professionals and end users, addressing the usage gap and fostering local talent.
- The cultivation of a collaborative innovation ecosystem that moves beyond isolated pilot projects to scalable, sustainable solutions, actively involving governments, MNOs, digital health providers, academia and civil society. This includes establishing regulatory sandboxes and incentivising demand-driven innovation.

The journey towards a digitally-enabled health future in Africa is complex but filled with immense promise. By strategically investing in connectivity, fostering a supportive enabling environment, and forging strong partnerships across all sectors, Africa can harness digital health to overcome its persistent healthcare challenges, improve population health outcomes, and build more resilient, equitable and efficient health systems for generations to come.

Annex 1
Digital Health Maturity Index

Purpose and composition

The Digital Health Maturity Index (DHMI) is a comprehensive analytical tool developed to assess and compare the digital health landscapes of 10 African countries. It provides a framework for understanding the diverse contexts, infrastructure capabilities and potential impact avenues for digital health solutions across the continent. The DHMI combines quantitative indicators across digital infrastructure, health system performance and ecosystem maturity, while ensuring geographic and linguistic diversity in country selection.

The index integrates seven indicators, each weighted by their relative influence on digital health potential. Each country's score was computed as a weighted sum across all seven indicators, and normalised where applicable. Table 11 provides an overview of the assessment criteria.

Table 11:

Digital Health Maturity Index assessment indictors and associated weightings

Indicator category	Indicator	Weight (%), total 100%
Digital health maturity (40%)	Digital health maturity	40
Health system indicators (30%)	Health expenditure as % of GDP	10
	Cause of death by NCDs as % of total deaths	10
	Under-five mortality rate per 1,000 live births	10
Digital infrastructure (30%)	3G/4G/5G coverage	10
	Smartphone penetration	10
	Internet quality as average download speed	10

Digital health maturity

1. **Digital health maturity:** The digital health maturity indicator is a composite assessment derived from the Global Digital Health Monitor. It scores national digital health capabilities across seven key components of an enabling digital health environment, as outlined in the ITU/WHO National eHealth Strategy Toolkit. These components include leadership and governance, strategy and investment, legislation and policy, workforce capacity, services and applications, infrastructure, and standards and interoperability. Each component is evaluated on a five-point scale, from 1 (Emerging) to 5 (Mature), providing a detailed view of a country's digital health landscape.

Health system indicators

1. **Health expenditure (% of GDP):** This indicator reflects the proportion of national economic output dedicated to healthcare. A higher percentage suggests a stronger political and financial commitment to health services, though it does not capture allocation efficiency. It provides insights into the prioritisation of health within a country's budget, highlighting potential areas for digital health investment.

2. **Cause of death, by NCDs (% of total):** This metric indicates the prevalence of NCDs as a cause of death, often linked to factors such as ageing populations, urbanisation and lifestyle changes. A higher percentage suggests an increasing demand for long-term care systems and digital health solutions, such as chronic disease management tools and telehealth services.

3. **Mortality rate, under-five (per 1,000 live births):** Serving as a proxy for the effectiveness of maternal, newborn and child health services, this indicator also reflects broader health determinants such as nutrition, sanitation and access to basic healthcare. It provides insights into overall health system performance and progress towards the SDGs.

Digital infrastructure indicators

1. **3G/4G/5G coverage (% of population):** This measures the percentage of the population within the geographical reach of a mobile network signal capable of supporting higher-bandwidth applications. It is a key marker for assessing the potential reach of mobile-based digital health solutions, such as m-health applications and remote monitoring services.

2. **Smartphone penetration rate (% of population):** This indicator shows the extent of smartphone usage within a country. Smartphones are essential for delivering advanced digital health services due to their computing capabilities, larger screens and access to a wide range of applications.

3. **Internet (network) quality as the average download speed:** This indicator reflects the efficiency and reliability of internet services essential for running data-intensive digital health applications such as telemedicine and large medical file transfers. High download speeds ensure smooth operation and accessibility of digital health services, impacting user experience for both healthcare providers and patients. This metric underscores the capacity of a country's network to support advanced digital health solutions and highlights areas for infrastructure improvement to meet growing digital health demands.

Data collection and analysis

We applied a two-step scoring method:

1. **Normalisation:** To bring all indicators to a common scale.
2. **Aggregation:** To combine weighted indicator scores into a total index score.

Table 12 details the rationale behind the scoring of each country in more detail.

Table 12:

Scoring rationale

Indicator category	Indicator	Weight (%), total 100%	Rationale	Method summary	Normalisation formula
Digital health maturity (40%)	Digital health maturity	40	Composite score derived from qualitative/ quantitative factors. Not normalised originally but mapped to a 1-5 scale.	Median break normalisation. Countries at or above the median are scored proportionally between median and max (20-40 points); below median are scored between min and median (0-20 points).	=IF(Value ≥ Median, ((Value - Median) / (Max - Median)) × HalfWeight + HalfWeight, ((Value - Min) / (Median - Min)) × HalfWeight)
Health system indicators (30%)	Health expenditure as % of GDP	10	Right-skewed data with large variance.	Two-step scaling. Split at median, then scaled 0–5 within either the lower (min–median) or upper (median–max) half.	=IF(Value ≥ Median, ((Value - Median) / (Max - Median)) × HalfWeight + HalfWeight, ((Value - Min) / (Median - Min)) × HalfWeight)
	Cause of death by NCDs as % of total deaths	10	Interpreted as a proxy for epidemiological transition and health system maturity.		
	Under-five mortality rate per 1,000 live births	10	Inverse indicator (lower is better).	Reversed median-split scaling. Countries below the median are scored between median and min (5–10), while above-median countries are scored between max and median (0–5).	
Digital infrastructure (30%)	3G/4G/5G coverage	10	Represents population coverage. A directly proportional readiness metric.	Min-max normalised to a 0-1 scale, then multiplied by 10%.	= ((Value - Min) / (Max - Min)) × Weight
	Smartphone penetration	10	Directly proportional to user access to digital health services.	Min-max normalised, scaled to percentage.	
	Internet quality as average download speed	10	Reflects digital infrastructure quality.	Min-max normalised to reflect range of average national mobile internet speeds.	

Data for the DHMI was collected from a variety of reliable sources, including national health departments, global health organisations and telecommunications reports. The selection of indicators was informed by their relevance to digital health and their ability to provide a comprehensive overview of each country's health system and connectivity infrastructure. The analysis involved compiling and normalising data to ensure comparability across countries. Table 13 provides an overview of how the countries were scored, including the top 10 countries.

Table 13:

Digital Health Maturity Index country scores

Country	Language group	% DHI data available	Digital health maturity (40)	Health expenditure (% of GDP) (10)	Cause of death by NCDs (% of total) (10)	Mortality rate under-five (per 1,000 live births) (10)	3G/4G/5G coverage (10)	Smartphone penetration (10)	Internet (network) quality (avg. download speed) (10)	Total
Mauritius	Anglophone	22.58%	30	6.02	10.00	9.90	10.00	10.00	4.69	**80.60**
South Africa	Anglophone	100.00%	20	8.28	6.34	7.78	8.78	6.34	10.00	**67.52**
Kenya	Anglophone	100.00%	30	4.46	5.32	7.19	7.38	3.94	2.77	**61.07**
Cabo Verde	Lusophone	96.77%	20	5.00	8.20	10.00	5.99	7.61	2.75	**59.54**
Malawi	Anglophone	100.00%	30	6.95	5.25	6.47	6.16	0.99	1.73	**57.56**
Botswana	Anglophone	22.58%	20	5.86	5.79	7.38	7.71	3.80	6.31	**56.86**
Tanzania	Anglophone	96.77%	30	3.04	3.46	5.92	6.91	2.68	1.93	**53.94**
Namibia	Anglophone	100.00%	20	7.81	5.52	6.90	6.21	3.94	2.74	**53.14**
Ethiopia	Anglophone (de facto, with Amharic official)	100.00%	30	1.96	5.55	5.86	3.36	1.83	3.93	**52.50**
Lesotho	Anglophone	100.00%	20	10.00	5.73	3.40	7.01	2.25	3.72	**52.11**
Senegal	Francophone	96.77%	20	3.57	5.71	6.91	7.31	4.93	3.30	**51.73**
Rwanda	Francophone/ Anglophone	100.00%	20	6.17	6.25	6.88	7.07	1.69	2.30	**50.36**
Ghana	Anglophone	100.00%	20	2.32	5.76	6.29	7.33	3.80	2.33	**47.84**
Zimbabwe	Anglophone	100.00%	20	7.19	5.16	5.66	3.94	1.83	3.46	**47.23**
Guinea	Francophone	96.77%	30	3.39	2.94	1.11	5.72	2.54	0.98	**46.69**
Liberia	Anglophone	90.32%	20	7.81	2.20	3.11	5.73	4.23	3.56	**46.64**
Uganda	Anglophone	100.00%	20	3.04	4.02	6.47	6.83	2.68	2.70	**45.73**
Zambia	Anglophone	100.00%	20	5.31	3.64	4.64	7.06	2.11	2.42	**45.19**
Mozambique	Lusophone	96.77%	20	7.27	4.30	3.71	6.56	1.13	1.82	**44.78**
Gambia (the)	Anglophone	19.35%	20	3.04	4.72	5.79	5.22	3.66	1.58	**44.01**
Togo	Francophone	87.10%	10	5.63	5.34	4.30	7.28	2.39	8.66	**43.60**
Madagascar	Francophone	100.00%	20	2.86	5.72	4.34	6.37	0.99	3.18	**43.46**
Côte d'Ivoire	Francophone	100.00%	20	2.14	4.07	3.18	6.78	4.65	2.59	**43.41**
Cameroon	Francophone/ Anglophone	96.77%	20	2.68	5.00	3.58	6.80	2.96	1.96	**42.97**
Sao Tome and Principe	Lusophone	96.77%	10	5.47	6.96	9.76	6.49	2.96	0.38	**42.02**
Benin	Francophone	96.77%	20	0.54	5.13	2.42	7.05	3.10	2.94	**41.17**
Burkina Faso	Francophone	19.35%	20	5.47	3.64	2.46	4.44	2.11	2.59	**40.71**
Burundi	Francophone	93.55%	20	7.42	4.58	5.20	2.14	0.85	0.00	**40.18**
Angola	Lusophone	22.58%	20	0.71	2.20	3.58	5.15	4.93	2.45	**39.03**
Mali	Francophone	96.77%	20	3.21	1.54	1.19	6.59	2.68	3.63	**38.84**
Gabon	Francophone	93.55%	10	1.25	5.72	6.75	6.81	4.65	2.01	**37.19**
Sudan (the)	Anglophone/ Arabic	6.45%	20	4.46	6.60	5.00				**36.06**

Country	Language group	% DHI data available	Digital health maturity (40)	Health expenditure (% of GDP) (10)	Cause of death by NCDs (% of total) (10)	Mortality rate under-five (per 1,000 live births) (10)	3G/4G/5G coverage (10)	Smartphone penetration (10)	Internet (network) quality (avg. download speed) (10)	Total
Democratic Republic of the Congo (the)	Francophone	100.00%	20	2.50	3.32	2.78	3.70	1.13	1.71	**35.14**
Niger (the)	Francophone	93.55%	20	5.63	1.59	0.00	3.26	1.41	0.76	**32.64**
Guinea-Bissau	Lusophone	100.00%	10	7.66	2.90	3.20	4.67	2.82	1.18	**32.42**
Congo (the)	Francophone	6.45%	10	0.00	5.09	5.69	5.23	2.39	2.35	**30.76**
Sierra Leone	Anglophone	96.77%	10	7.97	3.32	0.38	5.77	1.27	1.61	**30.31**
Comoros (the)	Francophone	96.77%	10	5.23	5.69	5.61				**26.54**
Nigeria	Anglophone	100.00%	10	1.61	0.05	0.02	6.40	3.66	3.21	**24.94**
Mauritania	Francophone/ Arabic	77.42%	10	2.14	4.72	6.75				**23.61**
South Sudan	Anglophone	6.45%	10	5.86	0.42	1.56	4.26	1.13	0.20	**23.43**
Seychelles	Francophone/ Anglophone		No digital health indicators available				8.01	8.73	5.49	**22.23**
Central African Republic (the)	Francophone	96.77%	10	7.27	2.29	0.95	0.00	0.99	0.05	**21.53**
Chad	Francophone	93.55%	10	4.11	0.00	0.23	3.04	0.85	1.37	**19.59**
Eswatini	Anglophone		No digital health indicators available				6.80	5.07	1.54	**13.41**
Equatorial Guinea	Hispanophone/ Francophone		No digital health indicators available				0.90	1.97	1.23	**4.10**
Eritrea	Francophone/ Arabic		No digital health indicators available				0.66	0.00		**0.66**
Djibouti	Francophone		No digital health indicators available							**0.00**
Somalia	Anglophone (de facto, with Somali official)		No digital health indicators available							**0.00**

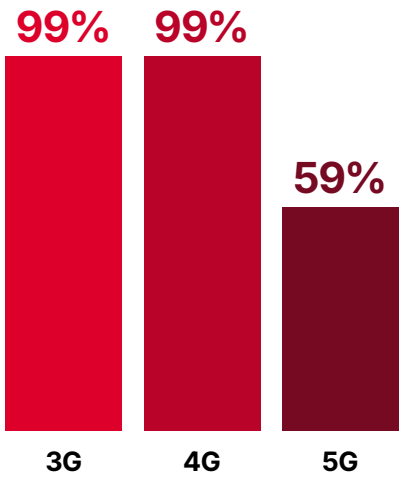
In refining the selection of the 10 countries, alignment was sought with markets covered in the GSMA's The Mobile Economy report. Mauritius, despite achieving the highest score, was excluded due to its low DHI data availability at 23%. Similarly, Cabo Verde, despite its high total score and DHI data availability, was excluded due to its relatively small population of 522,000 as of 2023. To ensure a comprehensive representation, Côte d'Ivoire, Gabon, Uganda and the Democratic Republic of the Congo were included in the selection.

The DHMI serves multiple stakeholders by offering benchmarking opportunities for governments and policymakers to assess their digital health maturity against regional peers, identify policy gaps and prioritise investment areas. For digital health providers, the index highlights market readiness and key innovations in each country's ecosystem. For MNOs, it reveals connectivity requirements emerging from each country's digital health trajectory.

Annex 2- Case Studies

South Africa

Connectivity
3G/4G/5G Coverage rates



Smartphone penetration
46%

Internet (network) quality (avg. download speed)
63.86 Mbps

No. of health apps
333

Connectivity

South Africa's digital health maturity

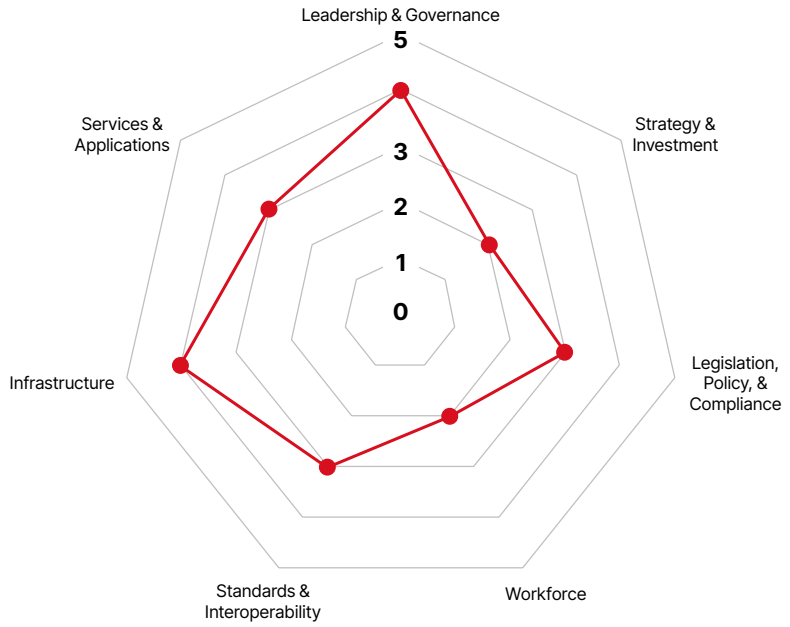
South Africa stands out as a digital health frontrunner in Africa, demonstrating relatively strong digital health maturity. The country benefits from advanced ICT infrastructure, including the highest 5G coverage in the region (47%) and high smartphone penetration, as well as high-level government commitment and mature governance mechanisms supporting its national digital health strategy. These strengths have enabled the successful national scale-up of m-health platforms such as MomConnect. Digital health providers such as LXE hearing, Vula Health, NTT Data and Audere are innovating in diagnostic tools, network services, AI and telehealth.

South Africa is further along the epidemiological transition than many of its regional peers, with NCDs accounting for over half (51%) of the disease burden. This has been driving demand for digital solutions that support chronic disease management, remote patient monitoring and real-time care coordination.

However, persistent challenges in workforce and capacity developments and interoperability remain. There are digital skills gaps among health professionals and limited access to specialised digital health training. Interoperability issues and fragmented system implementation continue to hinder seamless service delivery, particularly in the public sector. The Health Patient Registration System (HPRS) is under development and will help to standardise fragmented EHRs.

South Africa needs sustained investments in workforce development and system integration. With this, it can lead the continent in telemedicine, AI-enabled care and digitally supported NCD management. Its strong policy foundation and infrastructure provide a solid platform to scale population health interventions and realise the full potential of digital health innovation.

Digital health maturity



Health system

Health expenditure (% of GDP)

9.1%

Cause of death, by NCDs (% of total)

51.3%

Mortality rate, under-5 (per 1,000 live births)

34.3

Digital health maturity

South Africa's digital health maturity unpacked

1. Workforce and capacity development (2): South Africa's digital health workforce faces a significant digital skills gap among healthcare professionals. Pre-service and during-service training for health and health-related professionals currently lacks a digital health component. Structured education pathways are emerging, with universities and private institutions offering online short courses and postgraduate diplomas in public health that often incorporate digital health components. However, the country lacks digital health specific degrees, which negatively affects workforce readiness and the development of specialised digital health skills. Despite these weaknesses, the National Digital Health Strategy 2019-2024 recognises this need to develop robust technical capacity and a skilled workforce for the effective implementation and scaling of digital health initiatives.[31] The National Digital and Future Skills Strategy 2020 also highlights the broader need to equip South Africans with the digital skills needed to participate in a rapidly evolving digital economy.[32]

2. Services and applications (3): South Africa's under-five mortality rate of 34.3 per 1,000 live births is lower than the average for many Africa countries, where rates often exceed 50 per 1,000 live births. This indicates better healthcare services and interventions, particularly in child health outcomes. Various digital health services and applications are used, particularly in m-health and telemedicine, and several of these have been scaled to the national level. Applications such as MomConnect,[33] a mobile phone-based service for maternal and child health, and the SVS,[34] a mobile system for medicine stock monitoring, are key examples. NCDs account for 51% of total deaths in the country, reflecting a more advanced epidemiological transition, where lifestyle-related illnesses such as cardiovascular diseases, diabetes and cancer are more prevalent. This increases the need for digital health solutions in remote patient monitoring and chronic disease management. This trend is already evident in the private sector through initiatives that utilise digital technology to encourage healthier lifestyles and track health metrics. Electronic health record systems remain fragmented across the private and public sectors, but the rollout of HPRS, which aims to standardise patient information across public healthcare facilities, is laying the groundwork for a unified national EHR platform.[35] DHIS2 is widely used for data collection and reporting.

31 National Digital Health Strategy for South Africa 2019 - 2024, Department of Health, Republic of South Africa, 2020
32 National Digital and Future Skills Strategy 2020, Department of Communications & Digital Technologies, Republic of South Africa, 2020
33 What is MomConnect?, Department of Health, Republic of South Africa, 2020 (n.d.)
34 Stock Visibility System, Department of Health, Republic of South Africa, 2023
35 Official guide to South Africa 2021/22, Department of Health, Republic of South Africa, (n.d.)

3. Standards and interoperability (3): Interoperability between disparate HIS is a key challenge, and currently, there is no active national HIE in South Africa. This leads to incomplete medical histories being available to doctors, which can hinder effective diagnosis and treatment and result in costly re-tests and redundant procedures. The National Health Normative Standards Framework (HNSF) for Interoperability in Digital Health 2021 has been published to facilitate and coordinate the establishment, implementation and maintenance of interoperable health information systems.[36] This includes the development and implementation of HPRS and the master patient index (MPI) to facilitate movement across healthcare providers and enhance the interoperability of HIS.

4. Strategy and investment (2): South Africa has a clearly articulated National Digital Health Strategy 2019-2024, which builds on previous e-health strategies. Better health for all South Africans enabled by digital health is explicitly aligned with the National Health Insurance (NHI) transformation and the broader goal of UHC.[37] The Digital Transformation Infrastructure Roadmap 2025–2027 is also working to strengthen e-government services, expand digital infrastructure and develop digital skills.[38] South Africa's health spending is among the higher levels in the region at 9.1% of GDP. While details on direct investments in digital health initiatives are lacking, there are commitments to enhancing digital infrastructure in the latest national budget.[39] Donor organisations and the private sector are also involved in financing digital health solutions in the country.

5. Legislation, policy and compliance (3): The regulatory environment for digital health in South Africa is evolving. The National Health Act 2003 provides the foundational legal framework for health services in South Africa, including provisions related to health information management. The Protection of Personal Information Act (POPIA) sets conditions for the lawful processing of personal data, including health information. As in most countries in Africa, policies on connected medical devices, digital health services and the use of AI in healthcare are lacking and require further development.[40]

6. ICT infrastructure (4): South Africa has relatively well-developed ICT infrastructure compared to many other African countries. The country has good mobile network coverage, with 3G and 4G boasting a coverage rate of 99%. The country is the leader in 5G deployment in Africa, with coverage currently at 47%. As in the broader Africa region, there are disparities in internet quality and ICT infrastructure between urban and rural areas. Reliable electricity supply for ICT infrastructure and healthcare facilities is a concern given frequent load shedding and persistent power supply challenges in South Africa. Improving digital public infrastructure has been prioritised in South Africa's Digital Transformation Infrastructure Roadmap.[41]

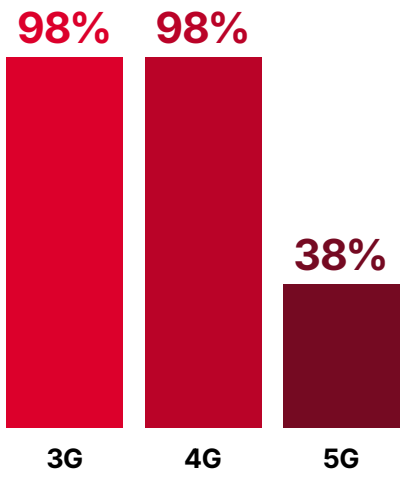
7. Leadership and governance (4): South Africa demonstrates strong government leadership and a clear political commitment to digital transformation and digital health at the national level. The National Department of Health has a designated Ministerial Advisory Committee on eHealth, which is responsible for the country's National Digital Health Strategy.[42] Additionally, an Inter-departmental Working Group (IDWP) and the Government Information Technology Officers Council (GITOC) play key roles in driving digital transformation across the government. Strengthening governance structures and ensuring coordinated efforts among various stakeholders are ongoing priorities to avoid fragmentation and ensure alignment with national health priorities.

36 National Health Act: National 2021 Normative Standards Framework for Interoperability in Digital Health, Republic of South Africa, 2022
37 National Digital Health Strategy for South Africa 2019 - 2024, Department of Health, Republic of South Africa, 2020
38 South Africa's Roadmap for the Digital Transformation of Government, Republic of South Africa, 2025
39 National Treasury Budget, Department of National Treasury, Republic of South Africa, 2025
40 See: https://monitor.digitalhealthmonitor.org/country_profile/ZAF
41 "South Africa's Digital Transformation Infrastructure Roadmap", Department of Communications & Digital Technologies, Republic of South Africa, October 2024
42 National Digital Health Strategy for South Africa 2019 - 2024, Department of Health, Republic of South Africa, 2020

Kenya

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

29%

Internet (network) quality (avg. download speed)

21.45 Mbps

No. of health apps

60

Connectivity

Kenya's digital health maturity

Kenya shows high digital health momentum, underpinned by strong governance, infrastructure and interoperability leadership. The 2023 Digital Health Act established a dedicated digital health agency and laid the foundation for coordinated digital health governance. Kenya has a well-established HIE and benefits from ubiquitous 4G coverage. 5G coverage is still limited (13%), restricting the development of high-bandwidth digital health applications.

Kenya has a wide array of national and private digital health services and applications. Digital health providers such as AfyaRekod, Ilara Health, Baobab Circle and Field Intelligence are innovating in the fields of health record management, diagnostics, chronic disease management, telehealth and pharma supply chain management.

Kenya's regulatory and innovation strengths are counterbalanced by workforce capacity and access challenges. Gaps in digital literacy among healthcare workers and the lack of formalised digital health career pathways hinder effective digital health implementation. Access to healthcare remains uneven, with rural areas facing a shortage of health workers and limited infrastructure, which digital tools alone cannot fully address.

Kenya can rapidly scale its digital health ecosystem with targeted investments in workforce training and full deployment of its national HIE. With its solid policy environment, active private sector involvement and momentum in innovation, Kenya is well positioned to become East Africa's leading hub for digital health. Prioritising rural access and human capacity development will be key to unlocking the full potential of its digital health ecosystem.

Digital health maturity

Health system

Health expenditure (% of GDP)
4.6%

Cause of death, by NCDs (% of total)
40.9%

Mortality rate, under-5 (per 1,000 live births)
39.4

Digital health maturity

Kenya's digital health maturity unpacked

1. Workforce and capacity development (2): Kenya faces shortages in the availability, skills and capacity of the healthcare workforce to effectively utilise and manage digital health solutions. The Kenya National E-Health Policy 2016-2030 identified low ICT literacy among users and inadequate technical expertise, digital literacy, training and distribution of skilled personnel as key challenges.[43] Dedicated digital health career pathways are lacking, and digital health is not yet fully integrated into the curriculum for health and health-related support professionals. To address this, the Ministry of Health (MoH) is in the process of developing health skills training curricula and programmes for the workforce. There are currently 16 digital health-related courses on the MoH Virtual Academy.[44]

2. Services and applications (4): Kenya has made substantial progress improving overall health services, as proxied by their under-five mortality rate of 39.4, but there is still room for improvement. The country is experiencing a shift in the disease burden from primarily infectious diseases to a significant presence of lifestyle-related illnesses. NCDs cause 40.9% of all deaths in Kenya, reflecting changes in lifestyle, urbanisation and ageing populations, necessitating a focus on prevention, early detection and management of NCDs. Kenya has a growing range of digital health services and applications for various features of the country's health and health systems. Examples include the Kenya electronic Community Health Information System (eCHIS), which digitises community health services, DHIS2, for collecting routine health data, and various m-health and telemedicine initiatives such as M-TIBA and Ohospital. M-TIBA is a digital healthcare platform in Kenya that allows users to save, send and receive funds for healthcare services using their mobile phones. It connects patients, healthcare providers and healthcare payers (governments, insurers, donors and solidarity payers) to streamline the management of health schemes and improve access to healthcare.[45] Ohospital is a digital platform that offers telehealth services, including selling health products and providing a data wallet for patients.[46]

43 Kenya National eHealth Policy 2016-2030, Ministry of Health, Republic of Kenya, 2017
44 See: https://monitor.digitalhealthmonitor.org/country_profile/KEN
45 Case Brief: M-TIBA Digital Health Platform, ILO, 2020
46 See: https://ohospital.health/company

3. Standards and interoperability (5): The Kenya Health Information Systems Interoperability Framework (KHISIF) serves as a guiding document for achieving interoperability among various health information systems within the country.[47]

The Digital Health Act 2023 mandates the development and maintenance of a comprehensive integrated health information system (CIHIS), which includes a national HIE to facilitate the secure and seamless flow of electronic health information across the healthcare system.

4. Strategy and investment (3): Kenya has an established National eHealth Strategy 2016 - 2030 and is developing a costed Kenya Digital Health Strategy 2025-2028. Additionally, it has enacted the Digital Health Act 2023, which mandates the establishment of a comprehensive integrated health management information system (CIHMIS).[48] This strategic direction is closely aligned with the country's overarching goals for UHC, with digital health identified as a key enabler for achieving enhanced healthcare access and quality. Investment in digital health comes from the government, development partners and, increasingly, the private sector. Kenya allocates 4.6% of GDP to healthcare. While typical for the Africa region, this is modest compared to global averages, highlighting a need for increased investment. In 2024, a Safaricom consortium committed to investing $800 million in the country's healthcare information technology management system.[49]

5. Legislation, policy and compliance (4): The Digital Health Act 2023 provides a key legal framework for digital health in Kenya, addressing aspects of data standards and security protocols. The Data Protection Act 2019 further enhances data protection and security within the digital health landscape.[50] This recent legislation has strengthened Kenya's regulatory environment for digital health.

6. ICT infrastructure (4): Kenya benefits from a relatively robust ICT infrastructure, showing strengths in nearly 100% 3G and 4G mobile network coverage and reasonable internet quality (an average download speed of 21.45 Mbps). Challenges remain in smartphone penetration (currently at 29%) and advancing to 5G coverage (currently at 13%). Kenya's Digital Superhighway project, a cornerstone of its Vision 2030, is also expanding the country's ICT and physical infrastructure through laying an additional 100,000 km of national fibre optic cable, establishing 25,000 public Wi-Fi hotspots in urban and rural areas, and setting up 1,450 Digital Village Smart Hubs.[51] Additionally, an integrated healthcare information technology system is being developed through a public-private partnership with Safaricom and two other companies. The initiative is aimed at transforming the country's healthcare infrastructure by integrating advanced technology and digital solutions over 10 years, starting in February 2025.[52] The project includes setting up a standardised HIE, which will significantly boost the country's digital public infrastructure.

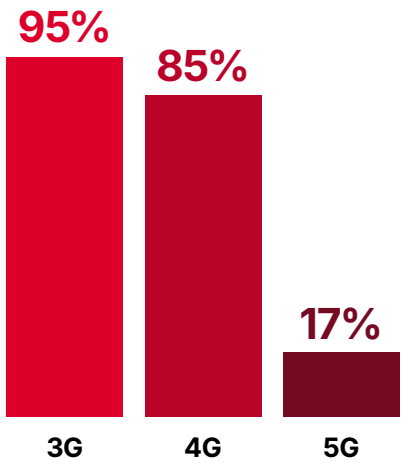
7. Leadership and governance (4): Kenya demonstrates a notable level of national prioritisation for digital health. A significant step in strengthening governance was the enactment of the Digital Health Act 2023, which led to the creation of the dedicated digital health agency (DHA). The DHA aims to enhance the provision of digital health services, ensure data security and privacy, and promote the integration of technology in healthcare delivery across Kenya.

47 Kenya Health Information Systems Interoperability Framework, Ministry of Health, Republic of Kenya, 2020
48 Kenya Digital Health Act 2023, Republic of Kenya, 2023
49 "Safaricom and two others invest over $800 million in Kenya's health digitisation," Techpoint Africa, September 2024
50 The Data Protection Act 2019, Republic of Kenya, 2019
51 Kenya Country Commercial Guide, International Trade Association, 2024
52 "Health ministry rolls out new IT system for affordable care," GAA, February 2024

Malawi

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

8%

Internet (network) quality (avg. download speed)

15.35 Mbps

No. of health apps

2

Connectivity

Malawi's digital health maturity

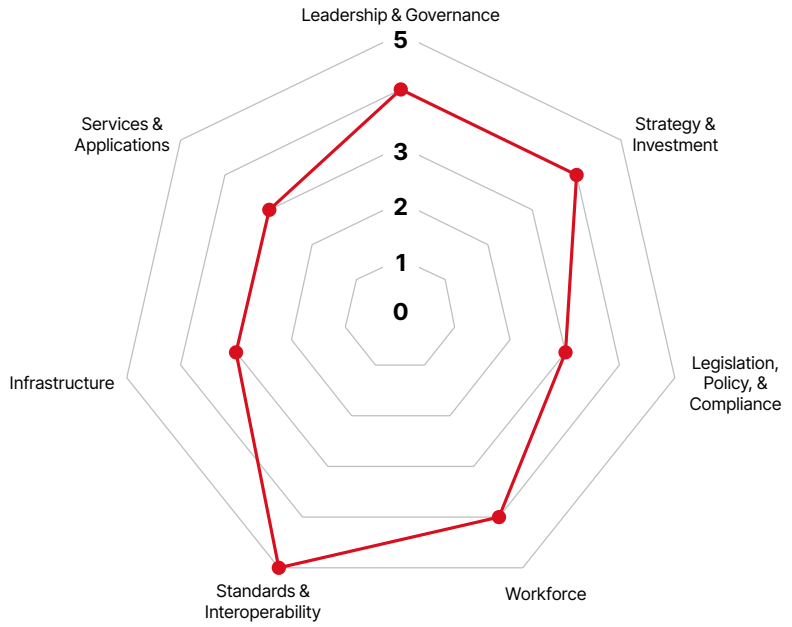
Malawi demonstrates strong government leadership and coordination in digital health, despite facing major infrastructure and access barriers. The country has a unified national digital health strategy, a dedicated Digital Health Division within the Ministry of Health and Population (MoHP), and robust donor engagement, supporting system development and training integration. Initiatives like Chipatala Cha Pa Foni and DREAM telemedicine reflect growing digital health solutions.

Malawi has relatively strong digital health workforce capacity compared to regional peers and, like Kenya and Tanzania, is a regional leader in interoperability and standards. Academic programmes cover IT, medical engineering and health informatics, and digital health training is increasingly integrated into pre-service and in-service education. The MoHP has adopted a clear set of standards to be used in HIS in Malawi, informed by international standards.

Infrastructure and access challenges remain a significant barrier. Smartphone penetration is only 8%, and internet quality is often poor, particularly in rural areas with limited electricity and broadband. While 3G and 4G coverage is expanding, current infrastructure limits the use of data-intensive applications such as telemedicine.

Targeted investments in physical infrastructure, connectivity and affordable devices could turn Malawi into a replicable model for coordinated, government-led digital health expansion. Its strong institutional leadership, integrated workforce training and commitment to interoperability provide a solid foundation for inclusive and scalable digital health growth.

Digital health maturity



Health system

Health expenditure (% of GDP)
7.4%

Cause of death, by NCDs (% of total)
40.2%

Mortality rate, under-5 (per 1,000 live births)
45.6

Digital health maturity

South Africa's digital health maturity unpacked

1. Workforce and capacity development (4): While gaps exist, Malawi's healthcare workforce has a reasonable level of digital health capacity. One of the aims of Malawi's previous eHealth strategy (2011-2016) was to enhance the digital competencies of healthcare professionals. At present, digital health professional academic training is available for medical engineering, computer sciences, information technology and health informatics. While this pool of trained personnel is available, the MoHP reports that it continues to struggle to hire and retain adequate numbers of staff to strengthen the delivery of its services. Digital health training is being integrated into pre-service and during-service training, with an estimated 50-70% of health professionals accessing training modules on digital health concepts such as interoperability and cybersecurity.[53]

2. Services and applications (3): Malawi's health landscape reflects the dual burden of disease common in Africa, with a significant portion of deaths attributed to NCDs and an under-five mortality rate that highlights ongoing challenges in healthcare quality and access. To this end, various m-health projects focus on maternal and child health, HIV/AIDS management, and other health areas, using mobile technology to disseminate health information and reminders. The Chipatala Cha Pa Foni programme is one example.[54] Malawi also utilises EMRs and DHIS2 for routine health information. Telemedicine is increasingly utilised through efforts such as the DREAM initiative which provides telemedicine services that facilitate remote consultation and treatment, improving access to specialised care for patients in remote areas.[55]

3. Standards and interoperability (5): Malawi has demonstrated a clear understanding of the importance of data exchange and interoperability in digital health. The MoHP has adopted a set of standards, informed by international standards such as HL7, FHIR and SOAP, to be used in health information systems in Malawi.[56] The ministry has also developed a set of standard operating procedures and guidelines specifically for the interoperability of systems. PATH has provided technical assistance to MoHP on the development of these digital standards and other interoperability components.[57] While these standards and guides are now well developed, their implementation and effective functioning are still a work in progress.

53 See: https://monitor.digitalhealthmonitor.org/country_profile/MWI
54 Chipatala Cha Pa Foni: Health Centre by Phone, Social Innovation In Health Initiative, 2025
55 See: https://www.dream-health.org/health-innovation-and-technologies/?lang=en
56 Malawi National Digital Health Strategy 2020-2025, Government of the Republic of Malawi, 2020
57 "Lessons from Malawi's collaborate approach to digital health," PATH, May 2024

4. Strategy and investment (4): Malawi has a comprehensive Digital Health Strategy 2020-2025 that covers various facets of the digital health landscape, including policy, human resources, interoperability and infrastructure. The development of a National Digital Health Information System (NDHIS) is one of the most important pillars of Malawi's National Health Strategy.[58] Investments in Malawi's digital health sector involve both government allocations and support from international donors and partners. Although information on digital health specific spending is not available, Malawi spends 7.4% of its GDP on health. This is relatively high compared to many other countries in Africa and indicates a commitment to improving healthcare services and infrastructure.

5. Legislation, policy and compliance (3): Malawi is working to strengthen its data protection, privacy and security frameworks within the health sector. The National Data Protection Act 2024[59] and the National Digitalisation Policy 2023-2028[60] provide a foundation, but a digital health-specific law is lacking. However, ongoing discussions around a model health data governance law indicate proactive efforts to develop a more specific legal framework for health data management.[61]

6. ICT infrastructure (3): While connectivity is increasing and 3G and 4G coverage is widespread, challenges remain regarding low smartphone ownership and poor internet quality. Smartphone penetration stands at 8%, suggesting that a large portion of the population lacks access to the devices necessary for mobile health applications. The average internet download speed is 15.35 Mbps, which is reasonable for basic internet functions, but may not be sufficient for more data-intensive applications, such as telemedicine or high-quality video consultations. Limited electricity access and gaps in broadband infrastructure, particularly in rural areas, remains a barrier to digital health technology adoption. The Digital Malawi project aims to improve ICT infrastructure to support e-services and improve public delivery.[62]

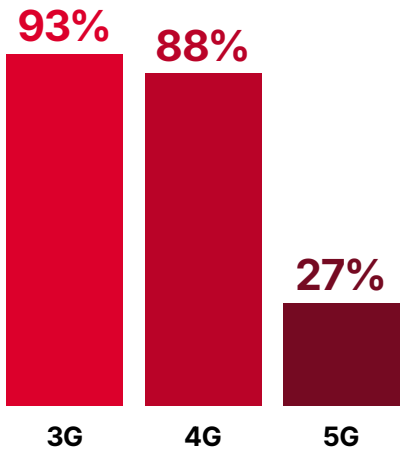
7. Leadership and governance (4): Malawi has demonstrated significant progress in establishing formal structures for digital health governance. A major achievement was the establishment of a specific Digital Health Division (DHD) within the Ministry of Health and Population in 2020.[63] The DHD's objective is to coordinate and manage the development and implementation of sustainable, secure and interoperable digital health solutions. The DHD operates under the Quality Management Directorate (QMD) - a pivotal entity within Malawi's Ministry of Health, established in 2016 to lead and coordinate quality improvement initiatives across the nation's health sector.

58 Zao, J.K., et al. (2024). Design of a Trustworthy Cloud-Native National Digital Health Information Infrastructure for Secure Data Management and Use. Oxford Open Digital Health, Vol 2.
59 Malawi Data Protection Act 2024, Republic of Malawi, 2024
60 Malawi National Digitalization Policy 2023-2028, Republic of Malawi, 2024
61 "Health Data Governance in Malawi - Building a Framework for the Future," Helina Africa, October 2024
62 The Digital Malawi Project, Ministry of Information and Digitalization, Republic of Malawi, (n.d.)
63 "Lessons from Malawi's collaborative approach to digital health," PATH, May 2024

Tanzania

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

20%

Internet (network) quality (avg. download speed)

16.52 Mbps

No. of health apps

31

Connectivity

Tanzania's digital health maturity

Tanzania has established strong digital health foundations, with advanced interoperability and national-level strategic leadership. The country has a comprehensive health enterprise architecture and operational HIE, currently enabling integration across 15 different systems. These advances are supported by strong government commitment and active partnerships with mobile operators and donors.

Tanzania's digital health ecosystem is broad and expanding, with increasing adoption of HIS, EHR and m-health platforms to address a relatively high under-five mortality rate and a growing burden of NCDs. The Healthy Pregnancy, Healthy Baby (HPHB) SMS service and the CommCare platform are notable examples of mobile-enabled tools improving maternal and community health delivery to help address these critical issues. Infrastructure investments such as the National ICT Broadband Backbone and Vodacom's $10 million contribution are important steps towards boosting the country's connectivity.

Despite this progress, workforce readiness remains a key barrier. There is a lack of standardised digital health training and digital health career pathways, which results in a shortage of digitally empowered healthcare workers and digital health specialists. This limits the scalability of digital health solutions.

With strong technical systems and policy alignment, Tanzania is well-positioned to become a regional digital health leader. Realising this potential will require targeted investments in workforce capacity.

Digital health maturity

Health system

Health expenditure (% of GDP)
3.8%

Cause of death, by NCDs (% of total)
34.4%

Mortality rate, under-5 (per 1,000 live births)
50.4

Digital health maturity

Tanzania's digital health maturity unpacked

1. Workforce and capacity development (2): Tanzania has demonstrated a commitment to strengthening its digital health workforce, as outlined in the National Digital Health Strategy 2019–2024. However, the country currently lacks a standardised digital health curriculum within pre-service training for health professionals, and career pathways in digital health within the public sector remain underdeveloped.[64] While a national e-learning platform for healthcare workers was launched in 2019, it does not specifically address digital health competencies. The recently introduced National Digital Education Strategy 2024/25–2029/30 aims to integrate ICT across all levels of education, but targeted digital health training programmes are needed to bridge existing skill gaps and empower practitioners.[65]

2. Services and applications (4): Tanzania's health services need to cater to significant challenges. The under-five mortality rate of 50.4 per 1,000 live births highlights ongoing issues in child health services, often due to preventable or treatable conditions such as malnutrition, pneumonia, diarrhoea and malaria. Concurrently, 34.4% of deaths are attributed to NCDs. This reflects a shift towards lifestyle-related diseases similar to trends observed in other African countries. In response to these challenges, Tanzania's digital health landscape is leveraging a diverse array of services and applications to improve health outcomes. These include HIS, EHRs, m-health and telemedicine platforms, while Tanzania's HMIS is powered by DHIS2. CommCare is a widely-used m-health app designed to support community health workers, particularly in resource-limited settings. It provides digital tools for real-time patient data collection, case management and health education.[66] The HPHB service in Tanzania is an m-health initiative designed to provide essential maternal and early childcare health information to expectant and new mothers via SMS. HPHB provides crucial maternal and early childcare health information via free SMS.[67] Thanks to the successful partnership between donors, government and leading mobile operators, this life-saving information is freely available to all families across Tanzania. The GSMA provided content, strategy and monitoring and evaluation support to the HPHB programme.[68]

64 See: https://monitor.digitalhealthmonitor.org/country_profile/TZA
65 National Digital Education Strategy 2024/25 -2029/30, Ministry of Education, Science and Technology, The United Republic of Tanzania, 2025
66 See: https://exchange.dial.global/projects/tanzania-commcare
67 Healthy Pregnancy, Healthy Baby – An mHealth service achieving scale and impact, GSMA, 2020
68 Ibid.

3. Standards and interoperability (5): Tanzania is a regional leader in standards and interoperability. The Tanzania Health Enterprise Architecture (TZHEA) is a strategic framework developed by the Government of Tanzania to streamline and enhance the country's HIS.[69] The Tanzania Health Information Exchange (Tz-HIE) is a national digital infrastructure initiative designed to enhance interoperability among the country's diverse health information systems and has successfully enabled data exchange among 15 separate information systems.[70] Sustained efforts are needed to address the remaining technical and organisational hurdles to achieve seamless data exchange across all levels of the health system.[71]

4. Strategy and investment (4): Tanzania's National Digital Health Strategy for 2019-2024 serves as a comprehensive framework guiding the digital transformation of the country's health system. The overarching goal of the strategy is to accelerate increased access to and improved quality of effective and efficient healthcare for all Tanzanians through digitally enabled transformation.[72] The digital health strategy forms part of the government's broader digital transformation agenda outlined in its National Digital Economy Strategic Framework 2024–2034.[73] Despite this strong strategic commitment, financial challenges persist. Funding draws on the government, international donors, and growing private sector involvement. Tanzania's health expenditure of 3.8% of its GDP indicates challenges in adequately funding healthcare needs.

5. Legislation, policy and compliance (4): Tanzania has taken steps to establish a legal and regulatory framework for the digital space, which is increasingly relevant to the health sector. The Personal Data Protection Act 2022 and its accompanying regulations provide for matters relating to the protection of personal data. At present, health-specific regulations are lacking, particularly in cybersecurity and data governance.

6. ICT infrastructure (4): Tanzania has made significant progress in ICT infrastructure, boasting high mobile coverage with a network reach of 91% 3G and 88% 4G, and growing internet access. However, challenges persist, particularly in rural areas, including unreliable internet connectivity and limited access to devices, as evidenced by a smartphone penetration rate of only 20%. The average internet download speed of 16.52 Mbps supports basic online activities but may fall short for more data-intensive applications. Inconsistent electricity supply further complicates connectivity efforts. The National ICT Broadband Backbone (NICTBB) is a notable project enhancing Tanzania's telecommunications capacity and internet access through a robust fibre optic network connecting rural and urban areas and neighbouring countries. In 2021, Vodacom Tanzania invested $10 million into the NICTBB.[74]

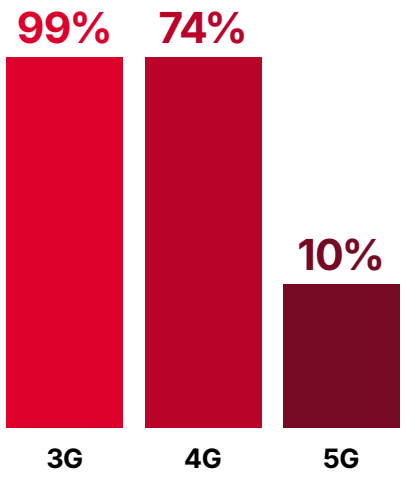
7. Leadership and governance (5): Digital health is prioritised at the national level with clear governance structures and strategies. The Ministry of Health, Community Development, Gender, Elderly and Children drives the agenda while the National Digital Health Steering Committee (NDHSC) provides overall leadership and strategic oversight and the National Digital Health Secretariat is responsible for the day-to-day operations of the strategy. Additionally, Tanzania outperforms many African countries in integrating diversity, equity and human rights considerations into its national digital health strategies.[75]

69 Tanzania Health Enterprise Architecture, Ministry of Health, Community Development, Gender, Elderly and Children, United Republic of Tanzania, 2020
70 Vikas Dwivedi, A.N., et al. (2021). One country's journey to interoperability: Tanzania's experience developing and implementing a national health information exchange. BMC Medical Informatics and Decision Making, 21, 139
71 East African Community Digital Health and Interoperability Assessments – Results at a Glance: Tanzania, MEASURE Evaluation, 2020
72 National Digital Health Strategy for 2019-2024, Ministry of Health, Community Development, Gender, Elderly and Children, United Republic of Tanzania, 2019
73 Tanzania Digital Economy Strategic Framework 2024-2034, Ministry of Information, Communication and Information Technology, The United Republic of Tanzania, 2024
74 "Vodacom Tanzania expands mobile connectivity to remote areas," Vodafone, May 2022
75 See: https://monitor.digitalhealthmonitor.org/country_profile/TZA

Ethiopia

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

14%

Internet (network) quality (avg. download speed)

28.26 Mbps

No. of health apps

6

Connectivity

Ethiopia's digital health maturity

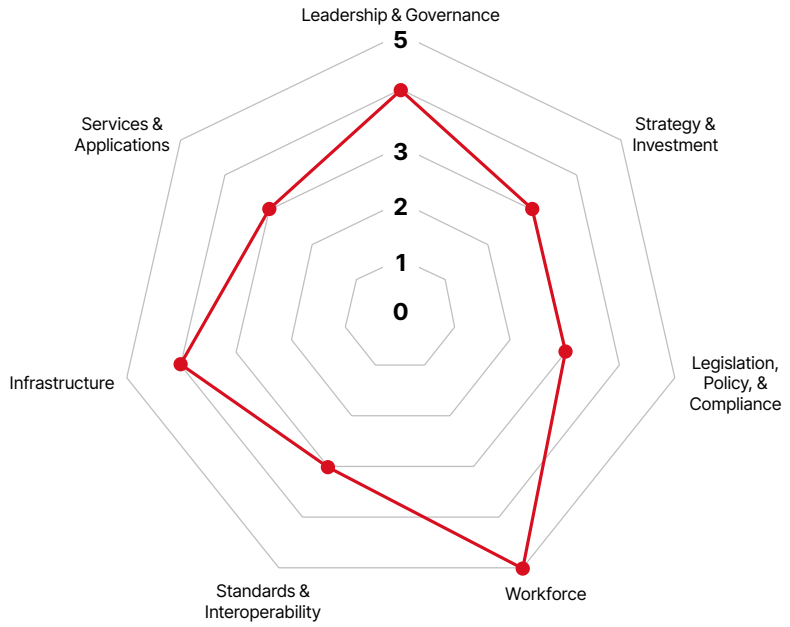
Ethiopia is making steady progress in digital health, anchored by strong workforce development and a clear national strategy. The country's Digital Health Blueprint provides a strategic foundation, guiding investment and innovation across digital health domains. Digital health training is well-integrated across multiple cadres, contributing to a strong digital health workforce compared to regional peers.

Ethiopia's digital tools aim to address persistent health challenges, including a high under-five mortality rate and increasing pressure from NCDs. The government and its partners have deployed EHRs, telemedicine platforms and mobile health applications to extend services to underserved communities. These tools support frontline delivery, but system fragmentation and weak enforcement of data privacy laws limit their full potential. Government-led initiatives such as the Digital Health Payment Initiative are driving financial inclusion and digitisation within the health sector.

Ethiopia faces uneven infrastructure and access challenges. Smartphone penetration remains low at just 14%, 5G coverage is limited at only 5% coverage, and electricity and internet connectivity are inconsistent in rural areas. The lack of private sector participation and insufficient funding further constrain innovation and the scale-up of digital health solutions.

Ethiopia's coordinated digital health strategy and strong workforce base position it for scaled impact. Unlocking this potential will require stronger investment in rural connectivity, greater interoperability enforcement, more inclusive private sector engagement and sustainable funding models.

Digital health maturity



Health system

Health expenditure (% of GDP)
3.2%

Cause of death, by NCDs (% of total)
43.3%

Mortality rate, under-5 (per 1,000 live births)
50.9

Digital health maturity

Ethiopia's digital health maturity unpacked

1. Workforce and capacity development (5): Ethiopia's digital health workforce is well-established compared to other African countries.[76] The nation has undertaken promising workforce competency initiatives, including DHIS2 academy-level training, collaborations with institutions and customised training programmes, and there is a general readiness among health professionals for digital tools.[77] TVET colleges offer a diploma in health information technology and larger universities offer BSc and MSc programmes in health informatics. Training is needed on digital data security to improve the quality and completeness of secure registries and/or indexes.

2. Services and applications (3): Ethiopia's digital health services are largely anchored by one of the world's largest DHIS2 implementations, though the adoption of more advanced patient-level applications such as EMR and telemedicine faces significant hurdles due to high costs, limited technology and inadequate infrastructure. Secure HIS, including master death and birth registries and master patient indexes are lacking and fragmented. m-health initiatives are showing significant promise, particularly in maternal and child health where the country still struggles with an under-five mortality rate of 50.9 per 1,000 live births.[78] Ethiopia faces a dual burden of disease, with significant challenges from both infectious diseases and a rising tide of NCDs, and comprehensive digital health services and applications are needed to enhance healthcare delivery and improve health outcomes. A notable development is the nationwide Digital Health Payment Initiative (DHPI), launched in 2024 by the Ministry of Health in collaboration with Safaricom M-Pesa. The DHPI aims to transform health payments by digitising salary disbursements for over 40,000 health extension workers and enabling digital payments at health facilities.[79]

76 See: https://monitor.digitalhealthmonitor.org/country_profile/ETH
77 Yilma, T.M., et al. (2024). Maturity Assessment of District Health Information System Version 2 Implementation in Ethiopia: Current Status and Improvement Pathways. JMIR Med Inform. 12.
78 Atnafu, A. et al. (2017). The role of mHealth intervention on maternal and child health service delivery: findings from a randomized controlled field trial in rural Ethiopia. mHealth, Vol 3.
79 "Safaricom M-PESA Partners with FDRE Ministry of Health to Digitalize Healthcare Payments," Safaricom, March 2025

3. Standards and interoperability (3): While progress has been made in implementing various digital health systems, challenges related to interoperability and fragmented systems persist. Ethiopia established the national eHealth Architecture (eHA) Framework 2019 with an interoperability layer. This helped successfully automate data exchange in specific cases such as the Covid-19 response.[80] Within DHIS2, indicators are regularly harmonised with international standards. However, automated patient data exchange between the DHIS2 and other systems (beyond specific pilots) is not fully implemented.[81] This lack of integration between disparate systems has led to data duplication and inaccuracies.[82]

4. Strategy and investment (3): Ethiopia has a Digital Health Blueprint 2021-2030 that serves as the governing strategy for digital health endeavours.[83] The strategy aims to unify fragmented initiatives, provide leadership guidance, prevent duplication, enhance coordination and mobilise investments. It also aligns with the country's broader digital transformation strategy, Digital Ethiopia 2025, and its Health Sector Transformation Plan II.[84] While investments are being made, with total health expenditure comprising just 3.2% of its GDP, current spending on digital health (and health in general) is noted as being less than estimated resource needs.

5. Legislation, policy and compliance (3): Ethiopia recently enacted its first comprehensive Personal Data Protection Proclamation (No. 1321/2024), which includes provisions for sensitive data, like health information, and mandates data localisation.[85] The Ministry of Health has its own privacy policy outlining how it collects, uses, discloses and safeguards information. However, a critical gap is the absence of a dedicated national data protection authority or mechanism for effective enforcement and oversight.

6. ICT infrastructure (4): Ethiopia has demonstrated a commitment to developing its ICT infrastructure. This includes massive electrification efforts, particularly in rural areas, and mobilising resources for photovoltaic (PV) solar installations at health centres.[86] Still, pervasive challenges to digital health adoption remain, including an unstable electricity supply, insufficient and outdated hardware, and limited and unreliable network and internet connectivity. Smartphone penetration is low at only 14% as of 2021, and while 3G network coverage is ubiquitous, access to faster and more stable 4G coverage is limited. 5G coverage (at just 5%) is at the very early stages of development. This severely restricts the reach and real-time capabilities of digital health services. Significant rural-urban disparities in access to basic ICT resources persist.

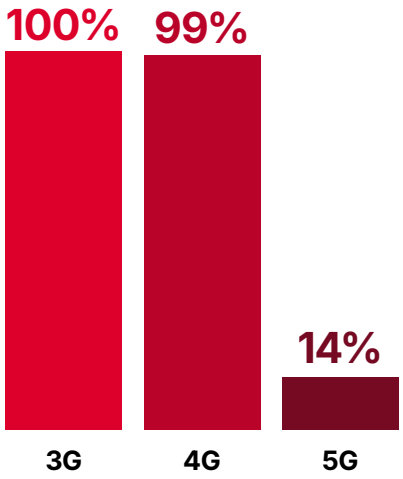
7. Leadership and governance (4): Ethiopia has built strong digital health governance foundations. The Ministry of Health leads key initiatives and is guided by the Digital Health Blueprint and the Health Sector Transformation Plan. Despite this established coordination structure and guiding strategy, challenges remain in executing policies, ensuring cross-ministry coordination and sustaining operational digital health mechanisms.

80 Digital Health Blueprint, Ministry of Health, Ethiopia, 2021
81 Yilma, T.M., et al. (2024). Maturity Assessment of District Health Information System Version 2 Implementation in Ethiopia: Current Status and Improvement Pathways. JMIR Med Inform. 12
82 "Enhancing Healthcare Performance in Ethiopia Using DHIS2," DHIS2, February 2025
83 Digital Health Blueprint, Ministry of Health, Ethiopia, 2021
84 Health Sector Transformation Plan II (HSTP II) 2020/21 – 2024/25, Ministry of Health, Ethiopia, 2021
85 DPA Digital Digest: Ethiopia, Digital Policy Alert, 2025
86 "Ethiopia harnesses solar power to improve healthcare access in rural areas," Further Africa, October 2024

Senegal

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

36%

Internet (network) quality (avg. download speed)

24.51 Mbps

No. of health apps

5

Connectivity

Senegal's digital health maturity

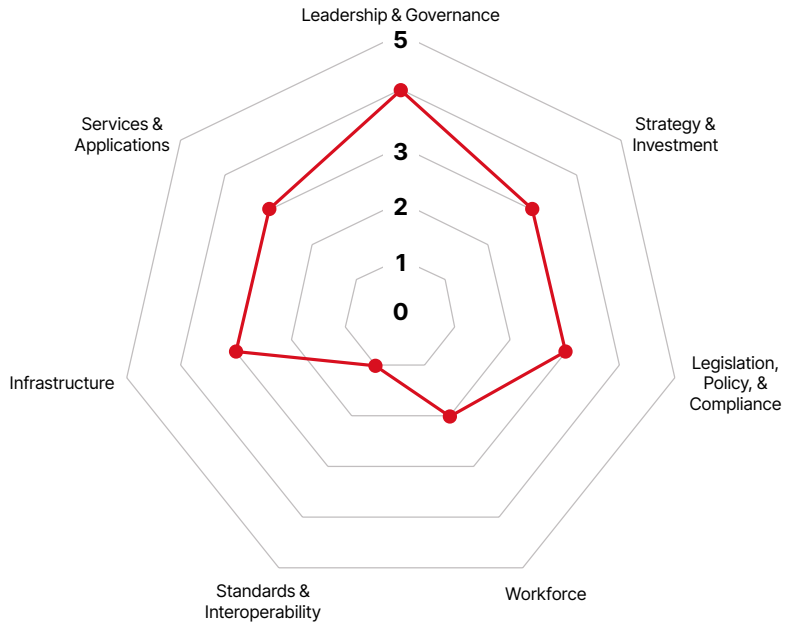
Senegal has demonstrated strong political commitment and innovation in digital health, backed by donor investment and national policy direction. The Digital Health Policy 2025–2030 reflects clear government alignment and strategic vision. These efforts are supported by strong legal frameworks and consistent donor engagement, including significant investments from the World Bank.

Senegal uses digital tools to address pressing public health needs, particularly in communicable disease management and patient engagement. Programmes like mRamadan and the AI-powered 3S One Health disease surveillance platform are standout examples of how mobile and AI technologies are being integrated into public health delivery, while JokkoSanté is innovating in the digital health payments space. Significant urban-rural disparities in connectivity persist however, limiting equitable access to these innovations.

Gaps in workforce development and systems interoperability are key bottlenecks. Senegal lacks a national HIE, and the adoption of interoperability standards remains limited. Digital health training is not yet systematically integrated into health professional education, and specialist digital health career paths are not available. This prevents scaling and sustaining digital tools across the system.

Senegal can become a digital health frontrunner in francophone West Africa. Prioritising national interoperability standards, workforce training and rural infrastructure will be critical to translating high-level policy ambition into tangible improvements in population health and service equity.

Digital health maturity



Health system

Health expenditure (% of GDP)
4.1%

Cause of death, by NCDs (% of total)
44.9%

Mortality rate, under-5 (per 1,000 live births)
41.8

Digital health maturity

Senegal's digital health maturity unpacked

1. Workforce and capacity development (2): Senegal's digital health workforce faces considerable challenges, including the absence of formal digital health curricula in both pre-service and in-service training programmes. This gap contributes to limited workforce preparedness and hampers effective digital health implementation.[87] Moreover, the absence of defined career paths hinders the retention and development of a sustainable workforce, slowing digital health integration. These challenges are further compounded by low digital literacy and disparities in internet access, with only 15.9% of rural populations connected, compared to 56.9% in urban Dakar, highlighting a stark digital divide.[88]

2. Services and applications (3): Senegal has made notable strides in deploying digital health services and applications. The country is actively expanding its EPR system with support from the World Bank-funded Digital Economy Acceleration Project (PAEN) and the National Program for Digitalising the Health System (PDSS).[89] DHIS2 is used for routine health data management. Innovations in m-health and telemedicine, such as mRamadan, highlight the growing role of digital tools in service delivery. mRamadan is an m-health initiative launched in Senegal in 2014 as part of the Be He@lthy, Be Mobile programme. It was the first of its kind in a francophone country and was designed to support people with diabetes during the holy month of Ramadan.[90] Senegal is also pioneering digital health surveillance in West Africa with the use of AI.[91] The 3S One Health platform is an AI-powered tool for real-time surveillance of zoonotic diseases. It was developed through a partnership between Senegal's Ministry of Health and Social Action and the Global South Artificial Intelligence for Pandemic and Epidemic Preparedness and Response Network (AI4PEP). These digital solutions are especially critical as Senegal navigates a dual burden of disease. While infectious diseases remain a persistent threat, NCDs now account for 44.9% of all deaths.

3. Standards and interoperability (1): While Senegal acknowledges the importance of standards and interoperability in its digital health strategy, it continues to lag behind many of its African counterparts in both policy development and implementation. The country's digital health landscape is fragmented, with a proliferation of standalone systems and limited interoperability between platforms. Critically, Senegal lacks a national

87 See: https://monitor.digitalhealthmonitor.org/country_profile/SEN
88 "Le Sénégal en passe de réussir sa transformation digitale?" UNDP, August 2022
89 "Senegal adopts Digital Health Policy, Drafts Law," We Are Tech Africa, April 2025
90 "Treating diabetes takes more than insulin: Senegal mobile phone project promoting public health," WHO, November 2017
91 "Empowering Communities Through AI: How Senegal Is Pioneering Digital Health Surveillance in West Africa, York University, May 2025

e-health architectural framework or HIE, and has yet to establish standards for health data exchange, security and privacy.

4. Strategy and investment (3): Senegal has an active national Digital Health Policy 2025–2030, which builds on a prior Digital Health Strategic Plan 2018-2023.[92] This is aligned with the country's broader digital transformation strategy, the New Deal Technologique 2025–2034.[93] Both launched in 2025, marking a strategic shift towards embedding digital health within national development priorities. International donors and partners have made significant investments into digitising health infrastructure, including $50 million from the World Bank.[94] While the government contributes 4.1% of GDP to health expenditure, this remains insufficient to meet national digital health needs. Mobilising and coordinating fragmented funding sources remains a persistent challenge.

5. Legislation, policy and compliance (3): Senegal is advancing its legal and policy framework for digital health through a forthcoming digital health law regulating data use, privacy and security.[95] Currently, the main legal framework for personal data protection is the Protection of Personal Data Law 2008. An independent regulatory body, the Commission de Protection des Données Personnelles, is responsible for overseeing compliance, handling complaints and enforcing the law. As in many other Sub-Saharan African countries, Senegal lacks specific laws and guidance on the use of AI in health, as well as on secure cross-border data exchange and storage.

6. ICT infrastructure (3): Senegal has made strong strides in ICT infrastructure to support digital health, with universal 3G and 4G coverage and emerging 5G availability (8%). Smartphone penetration stands at 36%, and average internet speeds are relatively strong at 24.5 Mbps. The national New Deal Technologique strategy aims to enhance high-speed, climate-resilient connectivity and achieve 95% internet coverage by 2034.[96] To address electrification challenges, the World Bank's Senegal Energy Access Scale-Up Project is investing $150 million to build and rehabilitate nearly 4,000 km of powerlines that will electrify over 600 health clinics.[97] These initiatives are helping to close infrastructure gaps, but connectivity disparities between urban and rural areas remain key barriers to equitable digital health adoption.

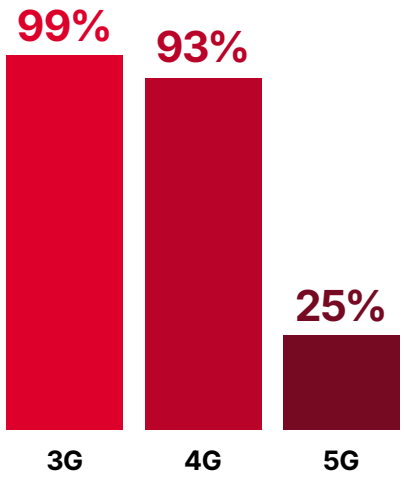
7. Leadership and governance (4): Senegal has established a governance framework to advance its digital health agenda. The Ministry of Health and Social Action (MSAS) leads national digital health initiatives, guided by the Digital Health Strategic Plan (PSSD) 2018–2023 and the recently updated national Digital Health Policy. The Digital Health and Health Observatory Unit (CSSDOS) serves as the operational arm, overseeing the development, monitoring and evaluation of digital health projects. The Transform Health coalition also advocates for enabling policies, data governance and coordinated investments, reinforcing political and sector-wide buy-in.[98] Nonetheless, improving coordination among stakeholders and fostering inclusive governance that actively engages marginalised groups remain key areas for further development.

92 Senegal eHealth Strategy 2018-2023, Republic of Senegal, 2018
93 "Launch of Senegal's new digital strategy "Newdeal Technologique,"" Presidency of Senegal, February 2024
94 "Senegal gets $50 million from World Bank to digitize its healthcare system," Empower Africa, June 2023
95 "Senegal Adopts Digital Health Policy, Drafts Data Law," We Are Tech Africa, April 2025
96 "New deal Technoloqique: A National Ambition to make Senegal a Leader in the Digital Economy in Africa," Presidency of Senegal, February 2024
97 "Senegal closing in on universal electricity access," World Bank, January 2025
98 See: https://transformhealthcoalition.org/senegal/Transform Health

Uganda

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

20%

Internet (network) quality (avg. download speed)

21.02 Mbps

No. of health apps

37

Connectivity

Uganda's digital health maturity

Uganda has laid strong digital health foundations through national policies and early frameworks. The country shows commitment to advancing digital health governance through a national policy on digital health and general data governance laws, but a health-specific data law is lacking. Coordination mechanisms such as technical working groups are in place, but their execution has been uneven.

Uganda's digital health ecosystem features a few nationally scaled digital health solutions, but shows limited private provider innovation and lacks interoperability. The eCHIS and FamilyConnect form an important part of Uganda's efforts to improve primary health outcomes through digital means. While the country has an HIE, broad adoption and enforcement of specific technical standards across all HIS remain limited.

There has been progress on connectivity but structural and access-related gaps persist. Smartphone ownership remains low at just 20%, limiting the impact of app-based services. While 3G coverage is at 95% and expanding fibre infrastructure provides a technical foundation, electricity access and device affordability continue to hinder equitable connectivity, particularly in rural areas.

Uganda has all the right ingredients for digital health success, but each element must be strengthened to deliver impact at scale. Future progress will depend on integrating digital health into health workforce training, introducing strong standards and frameworks on security and interoperability, expanding access to smartphones and reliable electricity, and clarifying governance structures to ensure coordinated implementation.

Digital health maturity

Health system

Health expenditure (% of GDP)
3.8%

Cause of death, by NCDs (% of total)
35.6%

Mortality rate, under-5 (per 1,000 live births)
45.6

Digital health maturity

Uganda's digital health maturity unpacked

1. Workforce and capacity development (3): Uganda faces a persistent shortage of healthcare professionals and limited digital literacy.[99] National strategies have acknowledged this capacity constraint and digital health curricula have been proposed and are still under review.[100] External partners, such as Last Mile Health and Amref Health Africa, have significantly contributed to training frontline health workers on digital tools such as eCHIS.[101],[102] Although digital health is not yet integrated into health workforce training, specific career pathways in digital health informatics do exist, primarily at the postgraduate level, with some emerging at the undergraduate level.[103]

2. Services and applications (3): Uganda's digital health landscape features diverse applications, including EMRs deployed in 15 hospitals as of October 2023, and eCHIS for village health teams.[104] National m-health initiatives such as mTRAC and FamilyConnect are improving rural healthcare access and quality. mTRAC is used by health facility workers to submit routine, weekly health surveillance data by SMS using their own basic mobile phones and is part of the national eHMIS system.[105] FamilyConnect, modelled after South Africa's MomConnect, offers targeted SMS and USSD services to support pregnant women and families with newborns.[106] Uganda's under-five mortality rate is relatively high compared to other Africa countries and reflects ongoing challenges in child health. Private telehealth initiatives such as MediConnect Health Solutions are increasingly providing Ugandans with healthcare solutions through telemedicine.[107] Despite these innovations, fragmentation and lack of interoperability among systems remain a key challenge, hindering a unified national digital health environment.

99 Bagyendera, M., et al. (2023). Critical factors influencing data use and utilization in health systems: a focus on data and interoperability standards for health information exchange (HIE) in Uganda's health care system. Oxford Open Digital Health, Vol 1
100 Uganda National eHealth Strategic Plan 2012/2013-2014/2015, 2013
101 See: https://lastmilehealth.org/where-we-work/uganda/
102 "Strengthening Uganda's Community Health Workforce: Impact from the West Nile, AMREF Health Africa, April 2025
103 See: https://monitor.digitalhealthmonitor.org/country_profile/UGA
104 Health Sector Digitization Report October 2023, Ministry of Health, Uganda, 2023
105 mTrac Using innovations to improve healthcare, UNICEF, (n.d.)
106 FamilyConnect Connecting women and children to health care services, UNICEF, (n.d.)
107 MediConnect Health Solutions, MediConnect, (n.d.)

3. Standards and interoperability (3): There is a strategic commitment to interoperability through the Uganda Health Information and Digital Health Strategic Plan 2020/21-2024/25 and a national HIE exists.[108] However, widespread interoperability is challenged by fragmented systems and inconsistent standards adherence. The broad adoption and enforcement of specific technical standards across all digital health solutions remain limited.[109]

4. Strategy and investment (3): The Uganda Health Information and Digital Health Strategic Plan 2020-2025 guides the strategic direction and priority interventions for health information management and the digitisation of the HIS.[110] It is built on the foundations of the National eHealth Strategy 2017-2021[111] and is fully aligned with the Ministry of Health Strategic Plan 2020/21-2024/25, National Development Plan 2020/21–2024/25 (NDP III) and the country's aspirations as expressed in the Uganda National Vision 2040.

Uganda's allocation of 3.8% of its GDP to health signifies a constrained fiscal environment for healthcare, which inherently limits the availability of domestic funds for digital health initiatives. Consequently, the country relies heavily on international partnerships and the private sector to advance its digital health infrastructure. In 2022, the Government of Japan, via UNICEF, committed $1.5 million to enhance Uganda's health information system for better tracking of under-immunised and unimmunised children.[112]

5. Legislation, policy and compliance (3): Uganda has foundational policies such as the National eHealth Policy 2016, which includes guidelines on information sharing and data management, and the Data Protection and Privacy Regulations 2021, which established a framework for the handling of personal data.[113] The Personal Data Protection Office, within the National Information Technology Authority, enforces data protection and privacy laws. However, a digital health specific legal framework for data protection and privacy is lacking.

6. ICT infrastructure (3): Uganda has made notable strides in ICT infrastructure, with 4,387 km of fibre optic cable laid across 57 districts and 1,567 government sites connected to fast, reliable internet via the National Backbone Infrastructure (NBI).[114] Mobile network coverage is strong, with 95% 3G, 88% 4G, and 15% 5G coverage, and an average mobile download speed of 21 Mbps. However, only 20% of the population own smartphones, limiting access to app-based health solutions. Unreliable electricity access, particularly in rural areas, and high internet costs are other key barriers to digital health adoption.

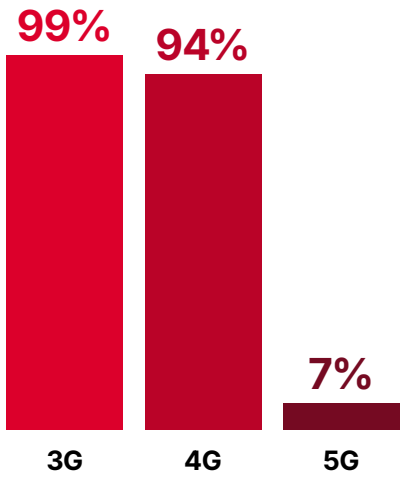
7. Leadership and governance (3): The Ministry of Health provides leadership in digital health and digitisation. The MoH has established several working groups on infrastructure and equipment, integration and interoperability, EMR deployment, change management and capacity building, and eCHIS. It is unclear how frequently these working groups convene or how effectively their activities are coordinated within the digital health ecosystem.

108 Digital Health Enterprise Architecture Framework for Uganda, Ministry of Health, Uganda
109 Egwar, A.A., et al. (2024). Framework for standardizing digital health in resource-constrained settings: a case study of Uganda's digital health communication infrastructure. Oxford Open Digital Health, Vol 2
110 The Uganda Health Information and Digital Health Strategic Plan 2020/21-2024/25, Ministry of Health, Uganda
111 Uganda National eHealth Strategy 2017 - 2021, Ministry of Health, Republic of Uganda, 2018
112 "Japan gives UNICEF US$1.5 million to improve tracking of under-immunized and unimmunized children," UNICEF, October 2022
113 Uganda National eHealth Policy November 2016, Ministry of Health, Uganda, 2016
114 "Uganda's Steady Progress in ICT is a Key Driver to Socio-Economic Transformation," GCIC, December 2024

Senegal

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

34%

Internet (network) quality (avg. download speed)

20.39 Mbps

No. of health apps

7

Connectivity

Côte d'Ivoire's digital health maturity

Côte d'Ivoire is making early digital health advances, but systemic gaps in governance, standards and training limit progress. The country benefits from a broader digital vision through its National Digital Development Strategy, but its health-specific digital strategy remains underdeveloped. Governance structures are weak, and the absence of national standards, a HIE, and interoperability frameworks slows digital health adoption. Academic programmes in health informatics have been introduced, but a shortage of digitally trained healthcare workers persists.

Côte d'Ivoire's digital health ecosystem shows isolated innovations, primarily led by the private sector. Orange Santé, Zipline, Zencey and Lapaire are innovating in drone logistics, AI-powered telemedicine and digital eyecare. The country has one of the highest under-five mortality rates in the region, and is tackling an increasing prevalence of NCDs alongside infectious diseases. This underscores the urgency of scaling digital solutions into national systems.

Progress in ICT infrastructure provides a strong foundation to expand basic digital health services. Côte d'Ivoire has achieved near universal 3G and 4G mobile coverage, and the PARAE project under the National Digital Development Strategy aims to improve digital public infrastructure, particularly in underserved areas. Unreliable electricity access in many public health facilities remains a persistent barrier to implementation.

Côte d'Ivoire has latent digital health potential but requires comprehensive system reforms to realise it. Moving forward, the country will need to establish a clear national digital health strategy, introduce enforceable standards for data and interoperability, and build workforce capacity. Without these foundational improvements, digital health will remain fragmented and unable to deliver at scale.

Digital health maturity

Health system

Health expenditure (% of GDP)
3.3%

Cause of death, by NCDs (% of total)
35.7%

Mortality rate, under-5 (per 1,000 live births)
79.7

Digital health maturity

Côte d'Ivoire's digital health maturity unpacked

1. Workforce and capacity development (2): Côte d'Ivoire currently lacks a formal digital health curriculum in pre-service training for health professionals. However, a digital health curriculum has been proposed and is under review for inclusion in in-service programmes. Degree programmes in digital health-related fields, such as health informatics and health information systems, are available through public and private institutions but integration into the workforce remains a challenge.[115] The country faces a significant shortage and uneven distribution of healthcare workers.[116]

2. Services and applications (2): Côte d'Ivoire has a very high under-five mortality rate, with many deaths resulting from preventable or treatable conditions, highlighting substantial room for improvement in maternal and child health services, vaccination coverage, and healthcare access.[117] While the prevalence of NCDs is rising, the country's epidemiological profile is still marked by a high prevalence of HIV, malaria and TB. Despite this, national health priority areas are not currently well supported by nationally-scaled digital health systems. Like many other Africa countries, DHIS2 is used for national health data management and no secure registry or MPI exists. Private sector initiatives, such as the Orange Santé platform, are introducing services such as online appointment booking and teleconsultations. Orange Santé, implemented by the French telecommunications company Orange, is a digital health platform that offers online appointment booking, teleconsultations and digitised medical records.[118]

3. Standards and interoperability (1): While Côte d'Ivoire has adopted DHIS2 as its primary national health information system and benefits from its interoperability with other platforms, the country lacks a national digital health architectural framework and has not yet established a HIE system. Additionally, the country does not have formalised digital health or health information standards in place to govern data exchange, transmission, messaging, security, privacy or hardware. This absence of a standardised framework limits interoperability across digital health systems and poses challenges for secure, coordinated and efficient health data sharing.

115 See: https://monitor.digitalhealthmonitor.org/country_profile/CIV
116 "How is Côte d'Ivoire health care system expanding coverage," Oxford Business Group, 2022
117 Country Cooperation Strategy: Côte d'Ivoire, WHO, 2016
118 "Orange and DabaDoc launch "Orange Santé" in Côte d'Ivoire, a platform dedicated to e-health," Orange, June 2022

4. Strategy and investment (3): Côte d'Ivoire's last e-health strategic plan, the Plan Stratégique de Cybersanté 2012–2016, has been assessed as lacking the robustness and implementation mechanisms needed to effectively guide digital health development.[119] An updated, high-quality health-specific digital strategy is lacking. The National Digital Development Strategy 2021–2025 aims to drive digital transformation across sectors, including health, and broader initiatives such as the $80 million Electronic Administration Support Project (PARAE), launched in 2025 with African Development Bank funding, are advancing government-wide digitalisation.[120] However, in the absence of a clear digital health strategy, the health sector risks being left behind in these broader efforts. This challenge is further compounded by limited health sector funding, with only 3.3% of its GDP allocated to health and 44% of healthcare financed by external resources in 2024.[121]

5. Legislation, policy and compliance (4): Côte d'Ivoire has established a strong legal foundation for digital health data protection, beginning with the Data Protection Law of 2013. By 2015, the country had specific legislation for patient data protection.[122] Additionally, protocols support secure cross-border data exchange for public health purposes. However, like many countries in Africa, Côte d'Ivoire has yet to develop specific policies addressing the use of AI in health.[123]

6. ICT infrastructure (3): Côte d'Ivoire has made significant strides in ICT infrastructure, with 97% 3G and 93% 4G coverage. The National Digital Development Strategy includes a focus on digital infrastructure through the PARAE project. This project aims to modernise public administration by digitalising public services, enhancing interoperability between government systems and strengthening cybersecurity infrastructure. These goals support the expansion of digital health services, especially in underserved areas. Côte d'Ivoire continues to struggle with reliable electricity access at public health facilities.[124]

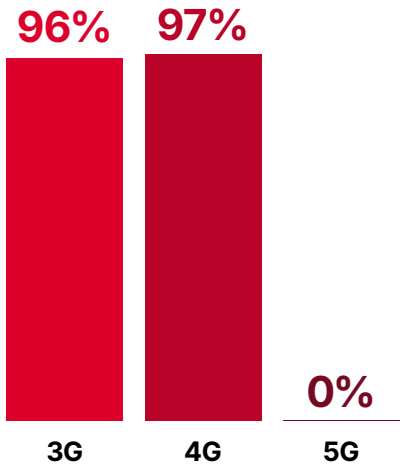
7. Leadership and governance (3): Côte d'Ivoire demonstrates political commitment to digital transformation, including in the health sector, led by the Ministry of Digital Transition and Digitisation through the National Digital Development Strategy 2021–2025. Digital health efforts fall under the remit of the Ministry of Health and Public Hygiene. According to the Global Digital Health Monitor's Côte d'Ivoire country profile, the country has a dedicated department or national working group specifically for digital health.[125] However, the absence of an updated digital health policy since 2016 indicates gaps in strategic guidance and highlights the need for more robust, health-sector-led digital governance to effectively drive digital health initiatives forward.

119 Olufadewa, I.I., et al. (2024). National eHealth strategy frameworks in Africa: a comprehensive assessment using the WHO-ITU eHealth strategy toolkit and FAIR guidelines. Oxford Open Digital Health 2
120 Cote d'Ivoire E-Government Strengthening Support Project (PARAE), African Development Bank, 2023
121 "66% of healthcare in Côte d'Ivoire is financed by domestic resources," Social Health Protection Network, June 2024
122 Progress Report On Utilizing eHealth Solutions To Improve National Health Systems in the African Region, WHO, August 2016
123 See: https://monitor.digitalhealthmonitor.org/country_profile/CIV
124 "How is Côte d'Ivoire health care system expanding coverage," Oxford Business Group, 2022
125 See: https://monitor.digitalhealthmonitor.org/country_profile/CIV

Gabon

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

34%

Internet (network) quality (avg. download speed)

16.94 Mbps

No. of health apps

51

Connectivity

Gabon's digital health maturity

Gabon's digital health progress remains nascent, with donor-driven efforts and limited national coordination undermining sustainability. The country shows some ICT readiness, with 96% 4G coverage and a relatively high smartphone penetration rate of 34%. It also benefits from one of the more robust legal frameworks for personal data protection in the region. The eGabon initiative is supporting early stage EHR infrastructure development.

Foundational weaknesses severely constrain Gabon's digital health maturity. The country lacks a comprehensive digital health strategy, and there are no national HIE or interoperability standards in place. There is no structured digital health training, and workforce capacity remains critically underdeveloped.

Digital service delivery is minimal, with few nationally scaled applications or platforms in place. The eGabon Project is trying to encourage digital innovation through health-focused incubator hubs. Despite good mobile coverage, connectivity outside urban centres is unreliable, limiting equitable access to digital services. These issues are compounded by persistently low public health spending (2.8% of its GDP), making Gabon one of the lowest investors in health among the countries reviewed.

To move forward, Gabon must shift from fragmented, donor-led efforts toward a nationally owned and coordinated approach. This will require updating its digital health strategy, investing in local workforce development, and introducing enforceable standards for system integration. Without deliberate action on these fronts, Gabon risks falling further behind in digital health transformation.

Digital health maturity

Health system

Health expenditure (% of GDP)
2.8%

Cause of death, by NCDs (% of total)
45%

Mortality rate, under-5 (per 1,000 live births)
43.2

Digital health maturity

Gabon's digital health maturity unpacked

1. Workforce and capacity development (1): Gabon currently lacks a national digital health curriculum for pre-service or in-service training of health professionals, and no dedicated degrees or diplomas in digital health or health informatics are offered. There is no formal training programme or workforce strategy that specifically addresses digital health capacity development, resulting in an ad hoc distribution of digital health skills among healthcare workers.[126] However, the World Bank's e-Gabon project aims to accelerate eHealth development by enhancing ICT skills for healthcare workers, with a particular focus on training women, signalling initial efforts to build digital health capacity in the country.[127]

2. Services and applications (1): Gabon is working towards digitising its healthcare system, including rolling out a national health information system to digitise patient records and improve healthcare access and quality through the eGabon project. The project plans to introduce EHRs to enhance information sharing among providers. With NCDs causing 45% of all deaths, Gabon's health system is increasingly focusing on chronic disease management and prevention alongside infectious diseases. Additionally, an under-five mortality rate of 43.2 per 1,000 live births highlights the need to prioritise improvements in prenatal and postnatal care. Despite these pressing national priorities, nationally scaled digital health interventions remain limited. The eGabon project also fosters innovation by supporting digital health content and services through incubators in Libreville, Port-Gentil, and Franceville.

3. Standards and interoperability (1): There is currently no national digital health architectural framework or HIE established in Gabon.

126 See: https://monitor.digitalhealthmonitor.org/country_profile/GAB
127 "Using Digital Technology to Improve Gabon's Health Care," World Bank, June 2016

4. Strategy and Investment (2): Gabon developed a strategic plan to strengthen the national health information system called the Schéma Directeur Stratégique du Système d'Information de Santé du Gabon (SDSSIS)—the Strategic Master Plan for the Health Information System of Gabon 2017-2022. This forms part of the country's Digital Gabon initiative which focuses on modernising public administration, enhancing digital infrastructure and promoting digital inclusion. This initiative is also supported by the World Bank, who is contributing $70 million.[128] Gabon's National Transition Development Plan (PNDT) 2024–2026 prioritises digital transformation as a key driver of economic growth and development. On the investment front, Gabon's low health expenditure (just 2.8% of its GDP) constrains funding for both essential health services and digital health initiatives. In addition, limited private sector engagement and investment further reinforce the country's reliance on donor support for advancing digital health efforts.

5. Legislation, policy and compliance (3): Gabon's foundational Personal Data Act 2023 (Act no. 025/2023) comprehensively defines personal and sensitive data, outlining strict obligations for data controllers regarding security and confidentiality, and mandating the appointment of a Data Protection Officer (DPO) in specific situations. The Authority for the Protection of Personal Data and Privacy (APDPVP) serves as Gabon's National Authority for Data Protection, overseeing compliance and advising public authorities.[129] As in many other African countries, Gabon lacks specific laws and guidance on the use of AI in health and secure cross-border data exchange and storage.

6. ICT infrastructure (2): Gabon's ICT infrastructure shows promising readiness for digital health, with a smartphone penetration rate of 34% and average internet speeds of 16.96 Mbps supporting connectivity. The country boasts extensive 3G and 4G coverage at 97% and 96%, respectively, although 5G is not yet available. This widespread mobile network access provides a strong foundation for implementing basic digital health services, but challenges remain in extending reliable connectivity beyond major cities, expanding smartphone access and preparing for future 5G deployment.

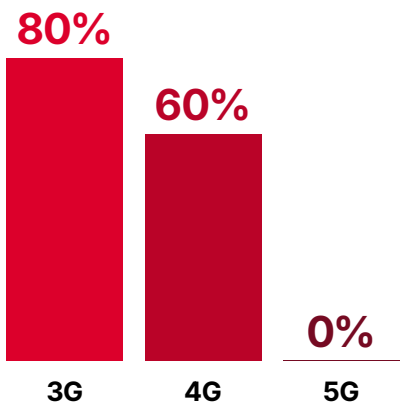
7. Leadership and governance (3): Gabon has demonstrated a commitment to digital health through the eGabon project, but lacks an updated eHealth strategy. Key implementing entities include the Ministry of Health and the National Health Insurance and Social Guarantees Fund (CNAMGS). The National Agency for Digital Infrastructure and Frequencies (ANINF) is also involved in the country's broader digital transformation efforts. At present there is no department or body solely dedicated to digital health.[130] This increases the risk of fragmented efforts, duplicated systems and inefficiencies that could undermine the long-term sustainability of digital health initiatives.

128 See: Digital Gabon Project
129 "Gabon: New data protection act and new authority – part one, DataGuidance, September 2024
130 See: https://monitor.digitalhealthmonitor.org/country_profile/GAB

Democratic Republic of the Congo

Connectivity

3G/4G/5G Coverage rates



Smartphone penetration

9%

Internet (network) quality (avg. download speed)

15.21 Mbps

No. of health apps

1

Connectivity

THE DRC's digital health maturity

The Democratic Republic of the Congo (DRC) is taking early steps in digital health, but foundational challenges in infrastructure, governance and capacity limit progress. DRC has introduced key building blocks such as the national rollout of DHIS2 and the adoption of a foundational data protection law. Donor-supported initiatives, such as the Mashako 2.0 m-health pilot and solar electrification of health facilities, have contributed to disease surveillance and expanded vaccination access in remote areas. This indicates early digital health innovation.

Digital health development in the DRC remains highly fragmented. There is no national HIE or interoperability framework, and weak governance structures prevent cohesive system integration. The DRC has among the lowest smartphone penetration rates in the region, posing a major barrier to the scale and usability of app-based services. Despite a high under-five mortality rate and pressing public health needs, national digital health systems are not yet supporting key priority areas effectively. Heavy reliance on external funding and limited public health investment raise concerns about long-term sustainability.

To unlock its digital health potential, the DRC will need to strengthen governance, invest in local capacity, and build interoperable infrastructure. Without these systemic reforms and a clearer national strategy, digital health in the DRC will remain pilot-heavy and donor-led, unable to scale or sustainably meet urgent population health needs.

Digital health maturity

Health system

Health expenditure (% of GDP)
3.5%

Cause of death, by NCDs (% of total)
34.1%

Mortality rate, under-5 (per 1,000 live births)
84.4

Digital health maturity

The DRC's digital health maturity unpacked

1. Workforce and capacity development (2): In the DRC, efforts to strengthen the digital health workforce are underway, with proposed curricula for both pre-service and in-service training currently under review.[131] However, the absence of formal degree programmes in digital health, health informatics or related fields contributes to a shortage of skilled professionals. This shortage of human resources in ICT and health informatics, coupled with low digital literacy among health workers, remains a persistent obstacle to effective e-health implementation. As such, capacity building is recognised as a crucial priority to unlock the full potential of digital health in the country.

2. Services and applications (2): The DRC's digital health landscape is gaining momentum, driven by increasing mobile phone penetration and government recognition of its potential.[132] The country uses the DHIS2 as its national health management information system. While some hospitals are beginning to incorporate EHRs, the lack of a standardised, nationwide EHR system and a comprehensive MPI pose challenges to achieving a fully integrated health information infrastructure. Successful m-health programmes include the Gavi-funded Mashako 2.0 plan, Preventative-Intervention-for-Cholera-for-7-days (PICHA7), and a disease surveillance system. Mashako 2.0 tracks routine immunisations and integrates birth registration with electronic vaccination cards and unique QR codes.[133] Programmes like this are especially important given the country's high under-five mortality rate of 84.4 (per 1,000 live births). The PICHA7 m-health programme uses automated messages to promote hygiene, significantly improving handwashing and reducing diarrhoea.[134] The National Centre for Epidemiological Intelligence operates a surveillance system that tracks 21 infectious diseases, with frontline workers transmitting data in real time via mobile devices.[135] Like many African countries, the DRC faces a dual burden of disease with NCDs and infectious diseases putting pressure on healthcare systems. Currently, 43.1% of all deaths are caused by NCDs. While m-health shows promise with some national health priority areas supported, more complex services such as telemedicine primarily exist as pilot projects .[136]

131 See: https://monitor.digitalhealthmonitor.org/country_profile/COD
132 Djamba, K.J., et al. (2025). E-Health implementation in the Democratic Republic of the Congo: Current position. International Journal of Health Sciences, Vol 1
133 Leveraging Digital Health for Vaccination Programs in the DRC, Gavi, 2024
134 Sanvura, P., et al. (2025). Process Evaluation for the Delivery of a Water, Sanitation and Hygiene Mobile Health Program: Randomized Controlled Trial of the PICHA7 Mobile Health Program. medRxiv.
135 "Digital solutions help catch and contain outbreaks in the Democratic Republic of the Congo," The Global Fund, January 2025
136 Kabuya, K.E., (2024). The Impact of Telemedicine on Maternal Health and Equity Outcomes in the Democratic Republic of Congo. International Journal of Science and Research, 13.

3. Standards and interoperability (2): The digital health landscape in the DRC is highly fragmented, with data often generated from siloed, donor-led systems, making interoperability and cross-platform analysis difficult.[137] A key challenge is the absence of common standards for data exchange, security, privacy and infrastructure, which prevents seamless integration across platforms. Although a national digital health architecture and HIE has been proposed, it has yet to be approved.

4. Strategy and investment (3): The DRC has a National Digital Health Strategy 2020-2024 aimed at leveraging technology for healthcare, particularly in immunisation and disease control. The country's NDP, the Plan National Stratégique de Développement (PNSD), 2019–2023, does not explicitly recognise digital transformation as a vehicle for development.[138] With health expenditure at just 3.5% of its GDP, the DRC faces significant constraints in financing both basic health services and digital health initiatives. The country relies heavily on external funding from partners such as Gavi, USAID and the World Bank for digital health initiatives, including vaccination programmes, disease surveillance and infrastructure electrification.

5. Legislation, policy and compliance (2): The DRC has made progress with the foundational Digital Code Law No. 23/010 of 2023. This law establishes the legal framework for digital activities in the country, covering aspects such as data protection, cybersecurity and digital services,[139] and includes provisions related to personal data protection, including health data. The Global Digital Health Monitor notes that laws on data security and privacy specific to digital health are proposed but still under review. No laws address AI use or cross-border data sharing. This regulatory uncertainty hinders coordinated, sustainable digital health implementation.

6. ICT Infrastructure (3): The DRC faces significant challenges in ICT infrastructure. A smartphone penetration rate of just 9% constrains digital service use, including digital health. Moderate 3G (68%) and 4G (57%) coverage means connectivity is uneven and often insufficient for high-data applications. The average download speed of 15.21 Mbps is modest but workable for basic internet use. The absence of 5G shows the country is still early in adopting the latest network technologies, which could limit future digital innovation and service expansion. Access to reliable electricity is also a major hurdle, with many primary health facilities lacking power. Initiatives such as the ECollectif project, funded by the Canadian government, are deploying solar energy systems to health centres.[140] The DRC Digital Transformation Project, funded by $400 million in International Development Association credit and €100 million from the French Development Agency, aims to increase inclusive access and use of the internet and strengthen the foundations for digitally enabled services in the country.[141]

7. Leadership and governance (3): The DRC has put governance structures in place to support digital health, with the Ministry of Health working to align ICT initiatives with the National Digital Health Strategy 2020-2024. The Agence Nationale d'Ingénierie Clinique et du Numérique de la Santé (ANICNS) leads the development and implementation of digital health policies.[142] However, coordination challenges persist. The National Digital Health Strategy 2020-2024 suffers from limited dissemination and weak harmonisation across MoH levels, undermining efforts to ensure cohesive and sustainable digital health implementation across the country.

137 Mutshipayi, G.B., (2019). The role of interoperable health information systems in improving health outcomes: the case of The Democratic Republic of Congo. Journal of Health Informatics in Africa, Vol 6, 1

138 Summary Findings from National Consultation in The Democratic Republic of Congo (DRC), EAC, 2023

139 Data protection laws in the Democratic Republic of Congo, DLP Piper, 2025

140 "An electrifying partnership transforms healthcare in the DRC," Santé Monde, April 2025

141 Inclusive Digitalization in Eastern and Southern Africa Program: Democratic Republic of Congo (DRC), World Bank, 2024

142 See: https://anicns.gouv.cd/

Annex 3: Digital Health Maturity scores for all African countries

Table 14:

Digital Health Maturity scores for all African countries

Country Name	Leadership & Governance	Strategy & Investment	Legislation, Policy, & Compliance	Workforce	Standards & Inter-operability	Infrastructure	Services & Applications	Overall Phase
Algeria	3	0	3	0	0	3	0	3
Angola	2	-1	2	-1	-1	3	-1	3
Benin	3	4	4	2	4	3	3	3
Botswana	3	0	3	0	0	3	0	3
Burkina Faso	2	-1	3	-1	-1	2	-1	3
Burundi	4	4	2	3	2	1	3	3
Cabo Verde	2	3	3	2	4	2	2	3
Cameroon	3	3	2	2	2	3	2	3
Central African Republic (the)	2	2	1	1	2	1	2	2
Chad	3	1	2	1	1	2	2	2
Comoros (the)	2	3	1	1	1	1	2	2
Congo (the)	-1	-1	1	-1	-1	3	-1	2
Côte d'Ivoire	2	3	4	2	1	3	2	3
Democratic Republic of the Congo (the)	3	3	2	2	2	3	2	3
Djibouti	0	0	0	0	0	0	0	0
Egypt	2	2	4	3	2	3	3	
Equatorial Guinea	0	0	0	0	0	0	0	0
Eritrea								
Eswatini	0	0	0	0	0	0	0	
Ethiopia	4	3	3	5	3	4	3	4
Gabon	2	2	3	1	1	2	1	2
Gambia (the)	2	-1	4	-1	-1	3	-1	3
Ghana	3	3	3	3	1	4	2	3

Phase of development	1	2	3	4	5

Country Name	Leadership & Governance	Strategy & Investment	Legislation, Policy, & Compliance	Workforce	Standards & Inter-operability	Infrastructure	Services & Applications	Overall Phase
Guinea	4	2	4	4	4	4	4	4
Guinea-Bissau	2	1	1	1	1	2	2	2
Kenya	4	3	4	2	5	4	4	4
Lesotho	3	2	3	2	3	4	3	3
Liberia	2	2	4	3	3	3	4	3
Libya	0	0	2	0	0	3	0	
Madagascar	4	3	3	2	3	2	2	3
Malawi	4	4	3	4	5	3	3	4
Mali	4	4	3	3	2	2	3	3
Mauritania	3	3	4	1	1	1	2	2
Mauritius	4	-1	4	-1	-1	4	-1	4
Mozambique	4	2	3	2	3	4	3	3
Namibia	3	3	4	2	2	3	3	3
Niger (the)	4	4	4	1	3	2	3	3
Nigeria	4	3	3	2	3	3	3	3
Rwanda	3	4	3	3	3	2	3	3
Sao Tome and Principe	2	1	2	1	2	1	2	2
Senegal	4	3	3	2	1	3	3	3
Seychelles								
Sierra Leone	4	3	3	2	2	2	3	3
Somalia								
South Africa	4	2	3	2	3	4	3	3
South Sudan	-1	-1	1	-1	-1	2	-1	2
Sudan (the)	-1	-1	2	-1	-1	3	-1	3
Tanzania	5	4	4	2	5	4	4	4
Togo	2	-1	3	1	1	1	2	2
Uganda	3	3	3	3	3	3	3	3
Zambia	3	4	3	2	3	3	3	3
Zimbabwe	4	3	2	3	2	3	2	3

Phase of development 1 2 3 4 5

Annex 4: Methodology and scenarios

Methodology

To examine the economic impact of digital health in Africa, our economic analysis integrates a blend of quantitative and qualitative approaches, collecting comprehensive data from various sources, including continental health metrics, and connectivity statistics.

Our econometric model utilises the aggregate production function approach, where GDP is a function of capital, labour, and digital infrastructure and services. Our empirical strategy employs a two-way fixed-effects panel data estimator to capture the effect of digital health on the economy. We focus on key variables such as the log of health expenditure (in PPP), under-five mortality rate (per 1,000 live births), the log of weighted download speed (Mbps), and the log of apps developed in the health sector. Given the high correlation among these variables, principal component analysis (PCA) is used to extract relevant information. The economic impact figures correspond to analysis conducted by GSMA Intelligence.[143,144]

We apply econometric models to estimate the GDP impact, focusing on the interplay between enhanced connectivity and healthcare delivery improvements. Our economic model uses panel data from 2010 to 2023 and applies parameters to model economic impacts from 1980 to 2030. Key data sources include the UN for GDP in health, GSMA Intelligence for mobile and IoT adoption, and impact parameters for mobile technologies and IoT.

Scenarios

The economic analysis employs two distinct scenarios to evaluate the potential impact of digital health transformation across Africa: the baseline scenario and the positive scenario.

1. **Baseline scenario:**

- Assumptions: This scenario assumes a moderate pace of digital health adoption, reflecting current trends and existing infrastructure constraints. It considers incremental improvements in connectivity and gradual integration of digital health technologies.
- Expected outcomes: In this scenario, the GDP contribution from digital health is projected to be significant but limited by existing infrastructural and regulatory barriers.

2. **Positive scenario:**

- Assumptions: This scenario envisions accelerated digital health adoption driven by proactive investments in infrastructure, policy support and enhanced stakeholder collaboration. It assumes rapid deployment of advanced connectivity technologies such as 5G.
- Expected outcomes: The GDP impact in this scenario is notably higher, reflecting the full potential of digital health solutions when barriers are effectively addressed.

143 The Mobile Economy 2025, GSMA, 2025
144 Economic growth and the digital transformation of enterprises, GSMA Intelligence, 2023

Key variables used in the analysis

Connectivity:

- Definition: Measures the adoption of mobile technologies (2G, 3G, 4G and 5G).
- Role: Enhanced connectivity enables telemedicine, real-time data transmission and remote monitoring, contributing significantly to economic growth.

Digital transformation:

- Definition: Uses IoT connections per capita to capture the integration of digital technologies into the healthcare system.
- Role: Digital transformation drives healthcare innovation, streamlining processes such as EHR management and patient data analytics.

Mobile technologies used in the sector:

- Definition: Refers to the adoption of mobile platforms and applications for health services, including m-health and IoMT.[145]
- Role: Mobile technologies facilitate widespread access to health services, especially in remote areas, and support continuous patient engagement and monitoring.

These scenarios and variables form the foundation of our economic analysis, providing insights into the potential economic impact of digital health across Africa. By comparing the baseline and positive scenarios, stakeholders can better understand the implications of various policy and investment decisions.

145 IoMT refers to a network of connected devices and applications that collect, analyse and transmit health data over the internet. These devices include wearable health monitors, smart medical equipment and mobile health applications.

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