The Case for Digital Health:
Accelerating Progress to Achieve UHC

Transform Health

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About Transform Health

Transform Health is a global coalition of organisations, individuals and institutions committed to achieving universal health coverage through the use of digital technologies and data. To learn more about Transform Health visit www.transformhealthcoalition.org

Executive Summary

In 2019, world leaders committed to extend universal health coverage (UHC) to everyone by 2030. Whilst most countries have expanded access to essential health services, the goal of UHC remains elusive for around half of the world's population, particularly those living in low and middle income countries.

Innovative approaches are urgently needed to put all countries on track to achieve UHC. Almost every person on the planet is now covered by a mobile broadband network meaning that they could potentially benefit from digitally enabled health systems and the adoption of digital health services and tools.

Digitalisation and the use of digital technologies is already an important and growing part of most health systems. However, national governments and international health partners are not yet fully unlocking the potential of digital health to scale up access to primary health care services as a pathway to achieve UHC.

In this digital age, health care and digital transformations are becoming inseparable. As we countdown to the year 2030, it is critical that the benefits of digital technologies and data are made available to everyone and that the risks of digital transformations for health are mitigated through strong and inclusive governance.

Unlocking the digital dimensions of UHC

The effective and equitable use of digital technologies and data can enhance each of the three dimensions of UHC—service coverage, population coverage, and financial coverage—as well as strengthen health governance. Through harnessing these digital dimensions of UHC, countries can build strong and resilient health systems and support individuals to better manage their own health.

Regardless of their level of digital maturity or economic development, countries across the globe are already demonstrating how including digital health as part of their UHC approach can lead to expanded coverage of health services and improved health outcomes.

However, several barriers at local, national and global levels are standing in the way of countries adopting or scaling up digital health solutions in ways that contribute to UHC. Without addressing these barriers, and overcoming ethical and human rights concerns in relation to digital technologies and data, the application of digital health risks exacerbating health inequities and undermining the pursuit of health for all.

Actions to accelerate progress towards UHC

Unleashing the potential of digital health for everyone will require coordinated, multi-sectoral action to close the digital divide and implement UHC-driven approaches to digital health. Transform Health is calling on political leaders, technology companies, international donors and other digital health partners to accelerate progress towards UHC in the digital age by taking the following actions:

Recommendations for Action

1 Put communities at the centre of digital health

2 Design and implement digital health strategies that will deliver UHC

3 Support health workforces to enable digital transformations

4 Ensure strong regulation and legislation to create an enabling environment for digital transformation while protecting the rights and privacy of citizens

5 Increase domestic and international investments to strengthen digitally enabled primary health care systems and empower communities

6 Create a global governance framework for health data to maximise the public benefits of data whilst safeguarding individual privacy, ownership and security

In this digital age, it is unacceptable that half the world's population are being deprived of essential health care. Digitalisation and the appropriate application of digital technologies should be a central part of countries' approaches as they redouble their efforts to achieve UHC by 2030.

Our health will continue to be transformed by digital innovations and new technologies. It is imperative that they are designed, used and governed in ways that will allow everyone to enjoy the benefits of digitally enabled care and realise their right to health.
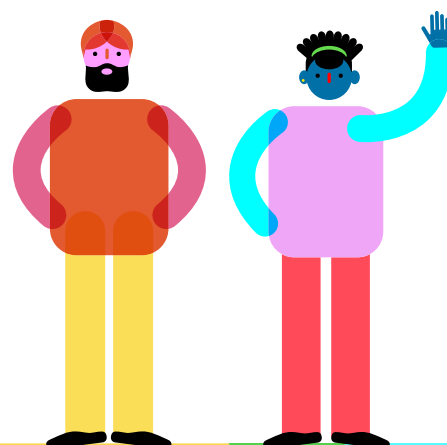
1. In an age of rapid digital transformations, health for all by 2030 remains elusive

At the United Nations High-Level Meeting on universal health coverage (UHC) in 2019, world leaders reaffirmed their Sustainable Development Goal (SDG) commitment to extend UHC to everyone by 2030. [1] UHC means that all people have access to quality health services, when and where they need them, without financial hardship. It includes the full range of essential health services, from health promotion to prevention, treatment, rehabilitation and palliative care. [2] Through pursuing UHC, governments can help to realise the right to health for their population and fulfill their SDG pledge to 'leave no one behind'.

Whilst most countries have expanded access to health services and coverage of key interventions over the last two decades, on current trends many countries— particularly low and middle income countries (LMICs)— will not meet the goal of UHC by 2030 (see Figure 1).

Figure 1: Insufficient progress is being made towards UHC
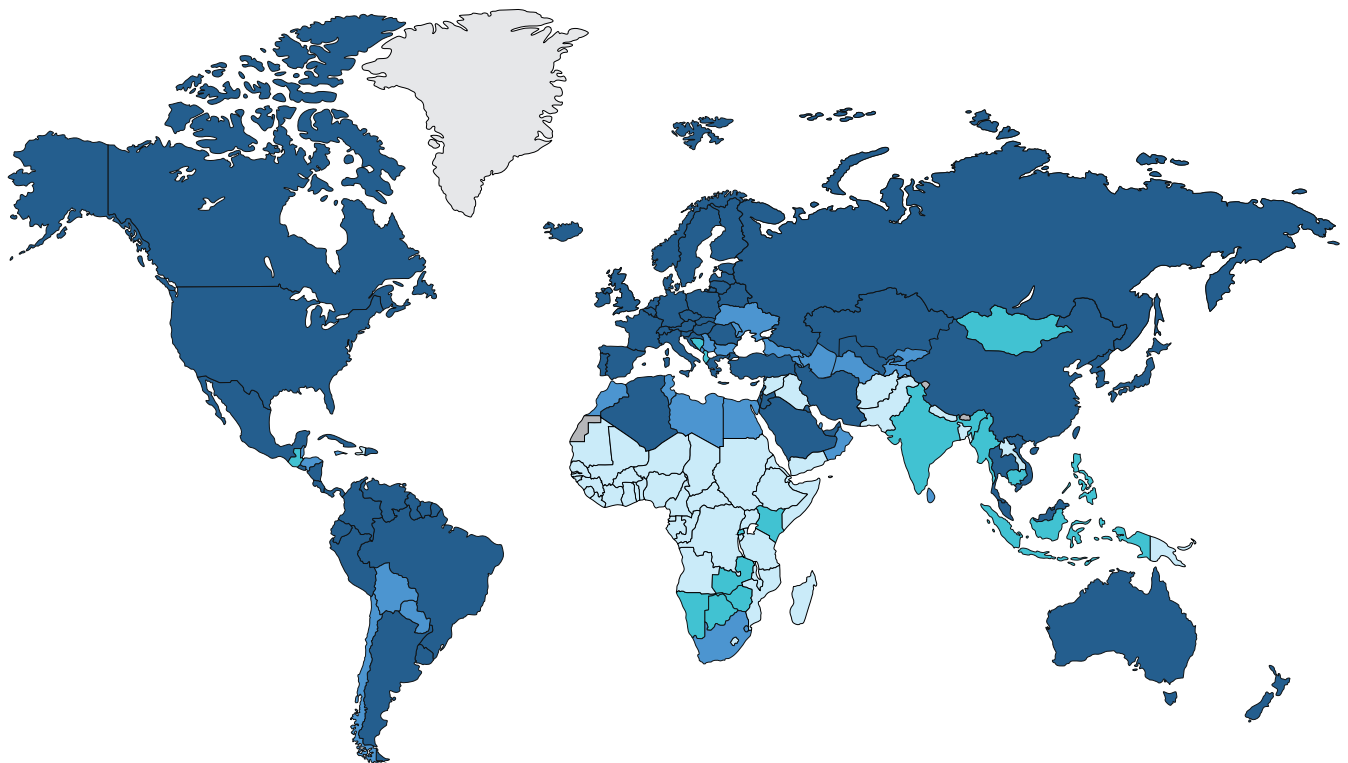
Proportion of the population that can access essential quality health services.
Source: WHO, Global Health Observatory.

UHC service coverage index

> 71   63 - 71   52 - 63   0 - 52

With less than a decade remaining to achieve UHC:

- **Around half of the world's population still lacks access to essential primary health care.**
- **At least 400 million people cannot obtain even the most basic health services.**
- **The proportion of the world's population impoverished by out-of-pocket health spending is increasing—930 million people are currently at risk of falling into poverty. [3]**

Primary health care as a pathway to UHC

Comprehensive primary health care (PHC) is an essential foundation for achieving UHC. [4] A well-functioning PHC system can cover most of a person's health needs throughout their life. By bringing health systems and services closer to communities, PHC reaches underserved communities and improves health equity. Despite its importance, PHC is often underfunded, understaffed, fragmented, and not given the same level of political attention as secondary and tertiary health care. [5]

If the expansion of PHC is not accelerated, billions of people will continue to be subjected to poor, unreliable and costly health services with many not having access to health care at all, undermining their right to health. Innovative approaches are urgently needed to expand PHC and get countries on track to achieve UHC by 2030. With the majority of the world's population now covered by some form of broadband internet network, the adoption of digital technologies could help LMICs move forwards in providing their populations with essential health services. [6] Digital health therefore has the potential to become an important driver to help countries achieve UHC and health for all. [7]

2. What is digital health?

Digital technologies and data are transforming health care as well as other aspects of our lives. The field of digital health is broad and continuously evolving (see Figure 2). According to WHO, "digital health is the field of knowledge and practice associated with any aspect of adopting digital technologies to improve health, from inception to operation". [8] It includes the application of information and communication technology (ICT) to health services and systems such as health informatics, telemedicine, mobile health (mHealth) and eHealth. Digital health also encompasses the digitisation of health records and use of emerging and frontier technologies in health care such as wearable devices and sensors, internet of things (IoT), artificial intelligence (AI), genomics, blockchain, virtual reality, and big data analytics.

In addition to transforming formal health systems and services, digitalisation also offers novel ways for individuals to self-manage and promote their own health. Websites and social media platforms, for example, have become important sources of health information for people with internet access, and there are a fast-growing number of apps and devices available for individuals to promote fitness and nutrition, monitor vital statistics, and support treatment adherence.

Digital health technologies and data present enormous opportunities for advancing UHC, but only if they are developed and used in ways that are aligned with public health values and human rights. As discussed below, the successful application of digital technologies to health depends on effective governance and a supportive enabling environment that includes: high level political support; policies, legislation and regulation to build trust and guide the use of technologies and data; adequate levels of funding; health workforce capacity building, training and support; effective and integrated management structures, and an incentive system for staff to adopt and use digital tools; and oversight and accountability mechanisms.

Figure 2: What is digital health?

Use of technologies — also enables the — Self-management of healthcare

Enabling environment — Governance — Funding — Political will
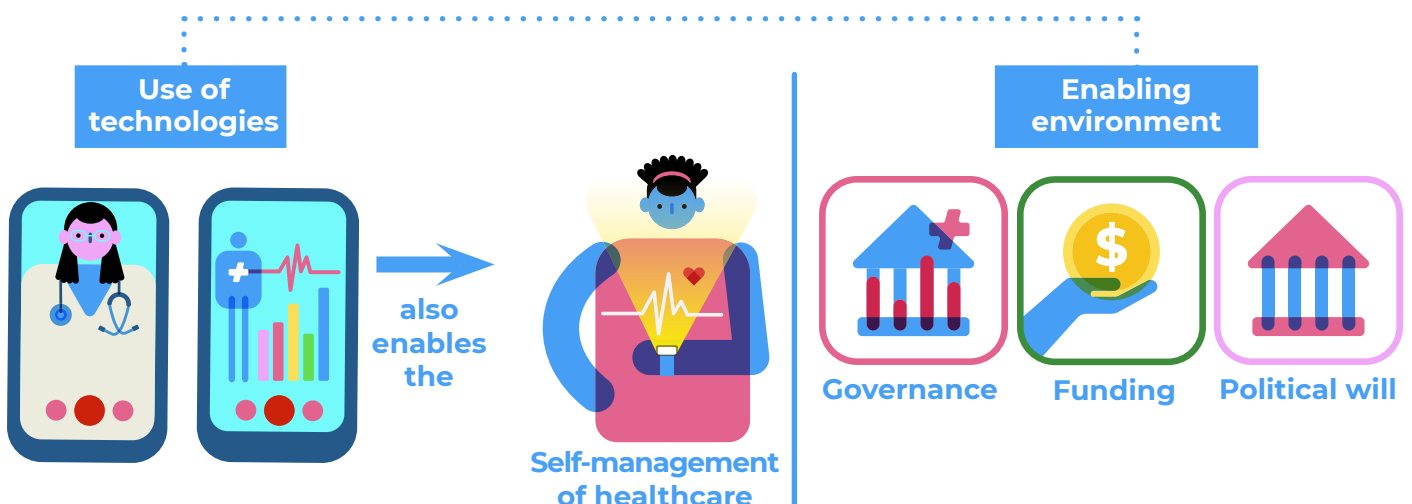
Health in the digital age

The way we interact with others and the world around us has been radically altered by the increasing adoption of digital technologies. The gradual digitalisation of different areas of life has thrown up new possibilities for delivering and accessing essential services, both for those connected to the digital ecosystem, and for those who are currently not. Spurred by the use of advanced analytics and big data technologies, digital health technologies open up new possibilities for how health systems are understood, structured and operate. The COVID-19 pandemic has accelerated the pace of digitalisation in many contexts (see Box 1).

Box 1: COVID-19 and digital health

Prior to the COVID-19 pandemic, the uptake of digital health technologies was slow in many settings due to entrenched practices and lack of incentives for organisations or systems to change their ways of working. [9]

Increased pressure on health services and restrictions on people's movements at the outset of the pandemic shifted perceptions of digital health tools from being an additional perk to being a necessity for both responding to COVID-19 and maintaining regular health services. As a result, the digitalisation of health information systems and the adoption of digital health tools has increased substantially. Digital health tools have been used during the pandemic to support communication and information, including tackling misinformation; surveillance and monitoring; the continuing provision of health care such as through remote consultations; and the rollout and monitoring of vaccination programmes. [10]

Digital technologies have played an important role in the response to COVID-19, for example, facilitating the swift discovery and sharing of genetic information about the virus, enabling the live sharing of epidemiological data around the world and facilitating coordinated research and clinical trials for diagnostics, treatments, and vaccines. At the same time, digital tools have been used to undermine the COVID-19 response. A primary example being people using social media platforms to undermine scientific and medical guidance and discourage people from getting vaccinated. Overall, the pandemic has highlighted our growing dependence on digital access and the importance of digital skills and literacy for not only our health and wellbeing, but also for employment, learning and communicating with others.

The digitisation of health records, as well as connected diagnostics and consumer applications, are exponentially increasing the availability of health data. Digitally enabled task shifting and task sharing among health workforce teams are optimising peer-to-peer collaboration and enhancing the provision of care in low and middle income countries with a scarcity of skilled health care workers. Improved analytical capabilities enable new insights to be extracted from data with the potential for better informed decision-making and ultimately improved health outcomes and health system efficiency. Digitisation of data from other sectors such as environmental health and education is also compounding the availability of data that can be used to address social and environmental determinants of health, for example by predicting disease outbreaks and extreme weather events, and assessing which population groups are most affected by different drivers of health inequities and require differentiated support.

Over time, as the digital transformation of health continues, health systems will inherently become more and more digital, resulting in the notion of digital technologies and approaches becoming inseparable from health care. We will come to speak less of digital health, but rather of health in the digital age. As we countdown to the year 2030, it is critical that the benefits of digital technologies and data are made available to everyone and are applied in support of UHC.

3. The digital dimensions of UHC

UHC is traditionally conceptualised along three dimensions of service coverage, population coverage, and financial coverage. [11] The effective and equitable use of digital technologies and health data can enhance each of these dimensions (see Figure 3).

When applied in an ethical and equitable manner, particularly in support of PHC, digital tools can strengthen health systems, support individuals to better manage their own health, and enhance the availability, accessibility, affordability and quality of health services. In addition to these three dimensions, digital technologies and data can support the achievement of UHC by strengthening health governance. By supporting the different dimensions of UHC, digital technologies and data can bolster public health responses and build resilience against future health threats. The case studies from Bangladesh, Kenya and India on pages 11, 12 and 13 illustrate just some of the ways in which digital health interventions are helping to expand UHC in LMICs.[1]

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[1] *A larger collection of digital health case studies is also available on the Transform Health website www.transformhealthcoalition.org/ resources.*

Figure 3: Digital dimensions of UHC
Graphic based on the three dimensions of UHC [11]
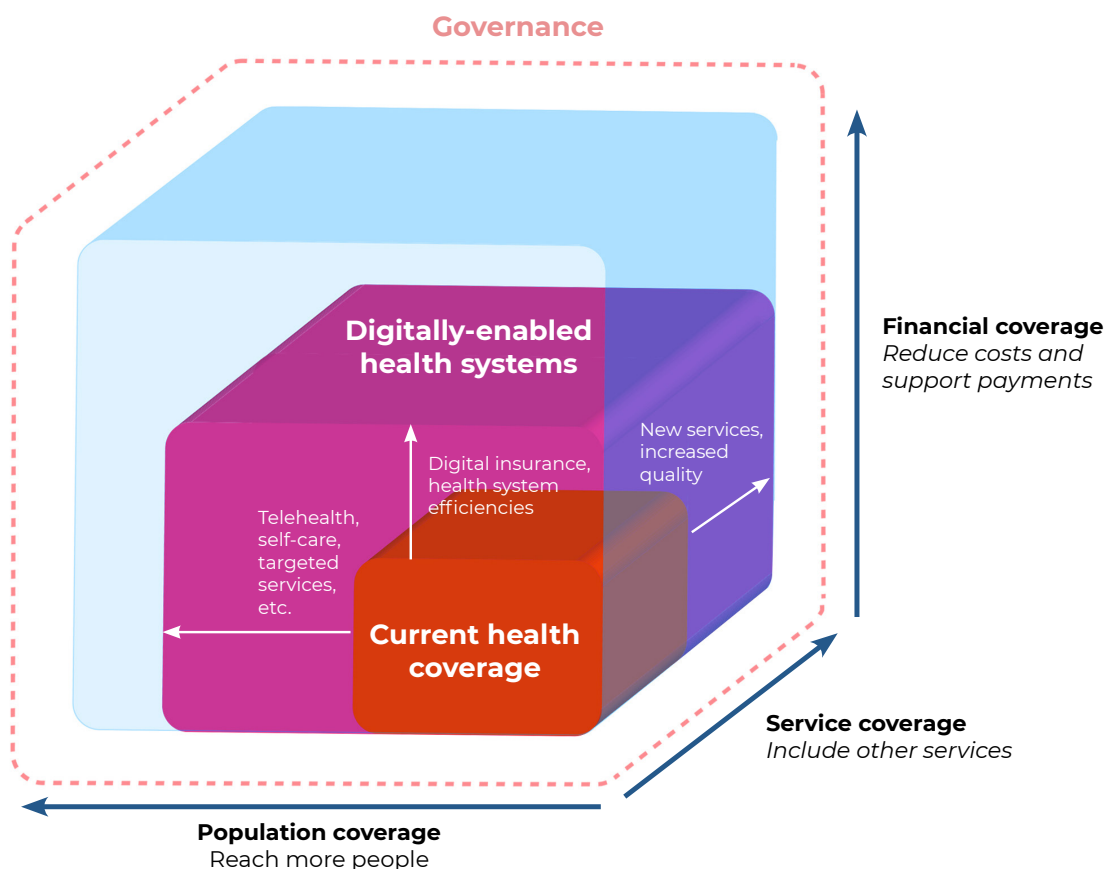
CASE STUDY 1: Digitally-equipped community health workers fight COVID-19 in Bangladesh [*]

BRAC, an international non-profit founded in Bangladesh, has been at the forefront of the COVID-19 response. Despite reaching more than 81 million people across Bangladesh through mobilisation activities, a more intensified approach was required to combat recurring waves of COVID-19 throughout 2021.

BRAC saw an opportunity to leverage digital technologies to disseminate key information about the pandemic to communities and enable data-sharing with government partners. Digital tools enabled more efficient delivery of critical health services by BRAC's network of more than 50,000 community health workers (CHWs) and augmented gaps in Bangladesh's fragmented health care system.

BRAC leveraged its mHealth platform to conduct syndromic surveillance under its 'Community Fort in Resisting COVID-19' project. Equipped with digital tablets, 2,600 CHWs were trained to identify suspected COVID-19 patients. The app's algorithm helps CHWs identify higher-risk suspected cases who display more severe symptoms. Suspected cases are then reported to local government officials for national case identification and tracking. Currently, over 200 officials are actively using this platform to track and monitor suspected cases and leveraging this data to inform decision-making on resource allocation as the pandemic evolves.

Once a suspected case is identified, the patient is connected to a telemedicine hotline managed by BRAC staff. Hotlines were primarily established to provide telemedicine services to these suspected cases. An average of 800 calls are received per day—a number that has continued to climb—67 per cent of suspected cases reported symptoms through the hotline. This technology has greatly improved the speed at which CHWs identify, monitor and follow up on suspected cases and ensures that communities receive tailored and timely medical guidance. In some areas, these hotlines have greatly reduced demand on health facilities as people can receive support from home without overburdening hospitals that are already inundated with COVID-19 cases.

The use of digital technologies has greatly improved the speed at which communities access health information. CHWs, supported with digital tools, have acted as trusted sources of health information. They have curtailed the spread of misinformation, identified suspected COVID-19 cases, and ensured proper adherence and follow up at the household level.

With data-sharing becoming even more critical, BRAC is working alongside the government to improve interoperability and capacity building for more targeted and proactive response efforts. BRAC is also collaborating with a variety of partners to explore how data science solutions can improve health outcomes in Bangladesh and other countries, and to showcase the impact of CHWs.

(Photo: BRAC)

CASE STUDY 2: Bringing telemedicine to underserved communities in Kenya [*]

One of the main obstacles in achieving UHC in Kenya is the unequal access to health-care services, in part due to the inequitable distribution of health workers and health facilities across the country. Addressing this challenge conventionally calls for significant financial investment to build new health facilities. However, a private sector entity is pioneering a low cost model that leverages digital health to increase access to primary health care and support Kenya's UHC aspirations.

Access Afya provides primary health care services through an integrated network of micro-clinics and mobile health programmes. Its asset-light clinics located in informal settlements offer a variety of services including consultations, lab testing, chronic condition management, immunisations, family planning, maternal and child health, first aid and emergency care.

The clinics are run by clinical officers who are guided in their work by the use of digital clinical decision support tools that give prompts on the right questions to ask or laboratory tests to order. If further assistance is needed, the connection to a remote doctor is made via telemedicine. The clinical officers also access continuous health education via an e-learning platform.

The clinics deploy mobile outreach teams to the community who conduct screening for non-communicable diseases via a mobile phone application.

The application displays a risk score that informs community health workers on the need to refer a patient to a clinic for treatment. This hub and spoke model allows the clinic to expand its penetration into the surrounding community.

Access Afya also operates pharmacies with integrated telemedicine and rapid test services making pharmacies sites of first contact with the health system. SMS texts are sent to the patients providing health education and medication reminders are sent to patients in between visits and medication refills. To enhance operational efficiency, the network of clinics runs on a digital health information system that collects patient demographic, medical history, treatment, purchasing and outcomes data.

Access Afya's programmes are aligned with the government's digital health strategy which aims to use digital health technologies to enhance equitable access to health care. The strategy includes a commitment to collaborate with the private sector to promote the use of telemedicine to increase coverage to the underserved counties in Kenya. This led to the creation of an eHealth systems registration and audit framework for creation of a database of certified and licensed eHealth systems. Access Afya became one of Kenya's first fully licensed digital health companies.

(Photo: Access Afya)

CASE STUDY 3: Delivering digital health services to offline communities in India [*]

Delivering UHC for a population of approximately 1.4 billion people is a significant task for the Indian government, particularly when the majority of the population use private facilities over public health providers.

In 2018, India launched the world's largest UHC scheme named *Ayushman Bharat Pradhan Mantri - Jan Arogya Yojana* which includes plans to transform primary health centres into better-resourced health and wellness centres. So far, more than 80,000 such centres have been built, providing a national health protection scheme for over 100 million poor and vulnerable families. In October 2021, the government announced the Ayushman Bharat Digital Mission to connect the digital health solutions of hospitals across the country and provide every citizen with a digital health ID.

Whilst the COVID-19 pandemic has accelerated the adoption of digital health services—especially telehealth—in India, much of this growth has been limited to higher income, urban areas. Many digital health solutions don't work effectively in rural regions (home to 65 per cent of India's population) with lower incomes, low-to-no internet connectivity and low levels of digital literacy. Digitally enabled health care innovations driven by the private sector are therefore being implemented across India to support and extend government initiatives to underserved communities.

In September 2020, tech social enterprise reach52 launched an 'offline-first' health platform in Karnataka state where many families are unable to afford the cost of hospital treatments. Through the platform, community health workers (known as ASHAs) are equipped with mobile apps to provide services such as collecting patient data on healthcare needs, running targeted health education and screening programmes and e-commerce for essential health products. Critically, the apps can run offline and work on basic phones with simple functionality to reflect the lower digital literacy levels of the users.

As of October 2021, over 500,000 users had been enrolled onto the reach52 platform across Karnataka and Gujarat and data on health care needs captured. Through a partnership with Aditya Birla Health Insurance, reach52 is also offering users of the offline-first digital health service affordable health insurance plans to provide protection from catastrophic health expenditures and motivate early treatment seeking.

The success of this digital health model in rural India demonstrates how offline-first digital health platforms, community involvement and partnerships with local government and other private providers can be used to accelerate access to health care for low-connectivity populations beyond the reach of traditional public and private sector services.
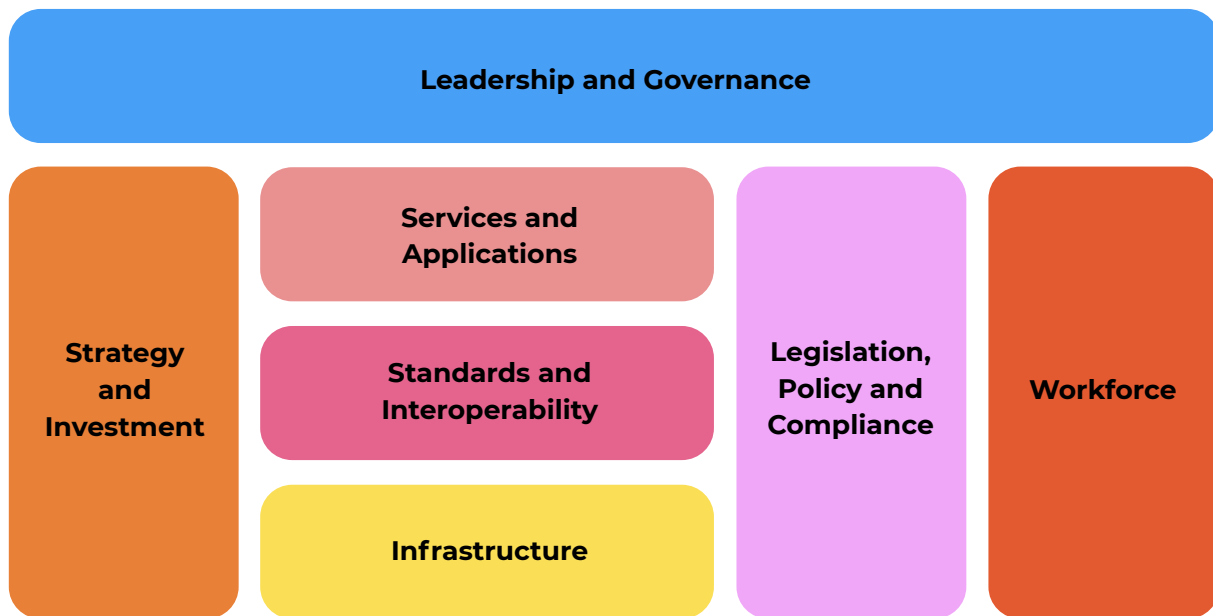

(Photo: reach52)

Table 1: How digital technologies can support different dimensions of UHC

Dimension	Description	Relevant digital interventions
Service coverage	· Introduce new and enhanced services into a package of essential health services; · Improve the quality of services, including through digital training and learning opportunities for health workers, and improved supervision and feedback mechanisms for health workers and supervisors; · Leverage telehealth and telemedicine to make specialist services more widely available; · Enhance dissemination and reach of health information; · Generating demand to increase uptake of health services, including reminders; · Strengthen continuity of care between service levels; · Foster intersectoral collaboration.	**1.3** CLIENT TO CLIENT COMMUNICATION **1.4** PERSONAL HEALTH TRACKING **1.6** ON-DEMAND INFORMATION SERVICES TO CLIENTS **2.3** HEALTHCARE PROVIDER DECISION SUPPORT **2.5** HEALTHCARE PROVIDER COMMUNICATION **2.6** REFERRAL COORDINATION **2.8** HEALTHCARE PROVIDER TRAINING **2.9** PRESCRIPTION AND MEDICATION MANAGEMENT **2.10** LABORATORY AND DIAGNOSTICS IMAGING MANAGEMENT
Population coverage	· Extend coverage of health services to remote and rural populations through eHealth and telehealth tools; · Reach underserved and marginalised populations with more tailored and targeted services; · Reduce the overall burden on health systems through enabling individuals to access health information and manage preventative and self-care services.	**1.1** TARGETED CLIENT COMMUNICATION **1.2** UNTARGETED CLIENT COMMUNICATION **2.1** CLIENT IDENTIFICATION AND REGISTRATION **2.4** TELEMEDICINE **2.7** HEALTH WORKER ACTIVITY PLANNING AND SCHEDULING **4.3** LOCATION MAPPING
Financial coverage	· Reduce the cost of services for households and providers; · Reduce other direct and indirect costs associated with accessing services (e.g. transportation costs, opportunity costs); · Increase efficiencies in the management of health budgets; · Provide greater access to cost sharing options; · Eliminate the use of cash in exchange for mobile payments; · Link services directly to insurance schemes and third party payments for wider populations.	**1.7** CLIENT FINANCIAL TRANSACTIONS **3.5** HEALTH FINANCING
Health governance	· Foster inclusive processes by increasing opportunities for civil society and diverse communities to meaningfully participate in policy making and governance mechanisms through digital platforms; · Increase accountability and transparency by making facility, regional, and national-level data available to the public online; · Create feedback mechanisms allows progress to be monitored and can build trust; · Exercise more effective decision making driven by increased availability of data; · Use improved analytical tools to support more effective and equitable policymaking, planning and allocation of resources; · Increase timeliness of data sharing and efficiency in use of health personnel and supplies through digitisation of health information systems and health records.	**1.5** CITIZEN BASED REPORTING **2.2** CLIENT HEALTH RECORDS **3.1** HUMAN RESOURCE MANAGEMENT **3.2** SUPPLY CHAIN MANAGEMENT **3.3** PUBLIC HEALTH EVENT NOTIFICATION **3.4** CIVIL REGISTRATION AND VITAL STATISTIC **3.6** EQUIPMENT AND ASSET MANAGEMENT **3.7** FACILITY MANAGEMENT **4.1** DATA COLLECTION, MANAGEMENT, AND USE **4.2** DATA CODING **4.4** DATA EXCHANGE AND INTEROPERABILITY

The range of ways that specific digital health interventions can support health systems and population health needs is wide and will continue to evolve due to the inherently dynamic nature of this field. The World Health Organization developed a classification of digital health interventions to highlight the ways in which current technologies can support health system needs. [12] Organising these interventions across the UHC dimensions, the opportunities for countries to leverage digital health interventions in support of their overarching health goals are clear (see Table 1).

For digital health interventions to be effectively applied towards UHC, sufficient investment is needed to establish and maintain the foundations of digital health (see Figure 4). This includes building the digital health infrastructure required to connect every health facility, and eventually every household and individual, to the internet; building a strong enterprise architecture; and increasing the digital literacy and skills of the health workforce and general public. Addressing the basic building blocks of digital health is critical to close the digital divide and ensure everyone benefits from the digital transformation of health systems.

Figure 4: National eHealth Strategy Building Blocks

Leadership and Governance

Strategy and Investment

Services and Applications

Standards and Interoperability

Infrastructure

Legislation, Policy and Compliance

Workforce

Source: National eHealth Strategy Toolkit [21]

4. Unblocking barriers to achieving health for all in the digital age

Digitalisation and the use of digital technologies is already an important and growing part of most health systems. However, national governments and international health partners are not yet fully unlocking their potential to scale up PHC as a pathway to achieve UHC. Health systems around the world are at very different stages of digital transformation. Efforts to assess the digital health readiness and maturity of countries have highlighted ongoing challenges for all countries in establishing an enabling environment for digital health, and in implementing sustainable digital health solutions at scale (see Box 2).

Box 2: Current tools are inadequate for measuring digital health maturity

The Global Digital Health Index (GDHI) and Maturity Model is the most comprehensive attempt to date to measure digital health maturity. The GDHI was created through a participatory process and uses 19 core indicators for measuring progress in digital health across the seven components of the WHO/ITU eHealth Strategy Framework (see Figure 4). To determine a country's level of digital health maturity, a self-assessment process was carried out by the Ministry of Health with the support of national digital health partners.

Of the 22 countries participating in the 2019 pilot of the GDHI, most assessed themselves to be at an average level of digital health maturity (half of the countries were at maturity phase 3 out of 5, with the other half almost equally split just above and below average).

There was no relationship found between a country's income level and digital health maturity. Country self assessments suggest the greatest progress was made in the component of Leadership and Governance; whereas Standards and Interoperability was the area where least progress had been made. [13]

Digital Square has since attempted to extend the GDHI methodology to more than 130 countries but found that existing indicators were insufficient to develop an objective tool for assessing digital health maturity. [14] The Governing Health Futures 2030 Commission has also argued that existing tools for measuring digital and digital health readiness are inadequate for assessing the extent to which a country can harness digital technologies in support of UHC. [9] Additional research is needed to develop a tool for reliably assessing digital health maturity, taking UHC and other considerations into account.

Barriers to leveraging digital technologies for UHC

Several, interrelated barriers are preventing countries from fully harnessing digital technologies in support of UHC. These barriers can be grouped into four categories: individual or community-level barriers; national-level barriers; transnational barriers; and ethical and human rights concerns (see Figure 5).

Figure 5: Barriers to achieving health for all in the digital age

Individual	National	Transnational	Ethical and human rights
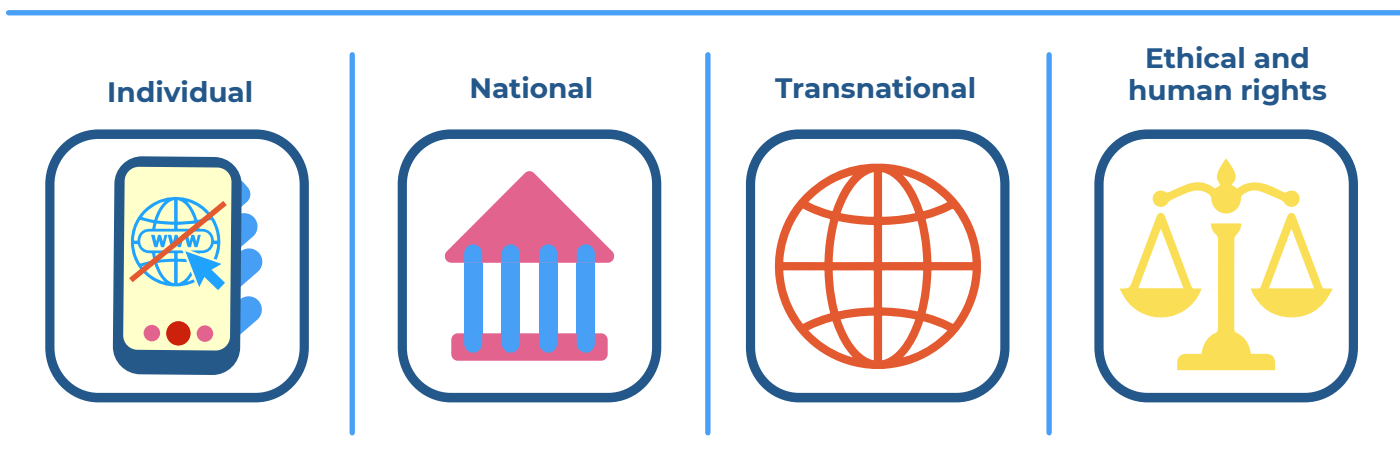
1. Individual / community-level barriers

Knowledge, resource, and system coverage constraints have led to the exclusion of large groups of people from enjoying the benefits of digital health. This is contributing to existing inequity at national and local levels, making it harder for those who are traditionally left behind to access the health information and services they are entitled to. Major barriers include:

Lack of connectivity:
Almost half of the world's population are not connected to the internet—and even more have irregular or unreliable access—which prevents them from being able to take advantage of digital tools to learn about or manage their health (see Box 3). Most of the world's offline population live in the least developed countries. Those unable to access the internet include disproportionate numbers of women and girls; and poor people living in remote and rural areas, with lower levels of formal education. [15]

Non-inclusive processes:
Digital health innovations that contribute to UHC must be driven by the needs of those groups who experience the greatest burden of disease or who have least access to health services. However, children, youth, women, people with disabilities, people in resource-constrained settings, and those who are part of socio politically marginalised communities are overlooked

Box 3: Removing barriers to connectivity could open up opportunities for billions to access health services

Mobile broadband networks offer a critical pathway to digital health inclusion for underserved populations. Mobile is the primary way people access the internet, especially in LMICs and is the backbone of mHealth and eHealth services in many countries. Most of the world's population (94 percent) are now covered by a mobile broadband network meaning that they could potentially benefit from digitally enabled health systems and use smartphones or other personal devices to access a range of digital health services and tools. [15]

However, despite living in an area covered by a mobile broadband network, 43 per cent (3.4 billion) of people were not accessing mobile internet services in 2020, largely due to the cost of digital devices and data packages, and low levels of digital literacy and skills. [15] If these and other barriers to connectivity were overcome, it would be an important step towards extending the benefits of digital health services to all.

in the innovation process and design of digital health tools. This can result in digital tools that are inaccessible, irrelevant, or even harmful for different populations. These same groups are also routinely excluded from, or are hidden in, data for monitoring progress towards UHC and other goals. [16]

Low digital health literacy:

Digital skills and digital literacy are essential for individuals to take full advantage of digital technologies and to ensure they support, and don't undermine, their health, wellbeing, and other rights. Those without adequate digital skills and literacy are less likely to be able to effectively use digital health technologies and manage their health data. Communities who are not informed about the opportunities and risks related to digital technologies and data sharing are less likely to expect, let alone demand, quality data-driven health systems, services and digital tools that can meet their health needs and respect their rights.

Digital literacy alone is insufficient for people to use and interpret online health information in ways that are supportive to personal and public health. The COVID-19 pandemic has highlighted the ways in which digitally literate people can exploit digital platforms to spread misinformation and undermine public health goals. Gaps in combined digital health literacy prevent people from making health-related decisions that are informed by scientifically-driven, evidence-based recommendations and data.

Mistrust of digital technologies:

The acceptance and successful adoption of digital health technologies depends on high levels of trust from individuals, communities and health professionals. Trust—or mistrust—in digital health is built upon a combination of factors such as perceptions of how easy a tool is to use, the quality of advice and care provided, cost, how a user believes their data will be handled and the reputation of the provider. For health professionals, training requirements, interoperability and whether a digital tool decreases their workload are also important considerations. [17] The failure of governments and digital health providers to instill public trust can lead to suspicion among communities about the introduction of new digital health tools and reluctance to adopt them. [18]

Vested interests:

The adoption of digital technologies may be slowed down by some of the very people it is being introduced to assist. Groups with vested interests in the status quo may resist the introduction of new technologies. For example, health professionals working at the primary care level, such as general practitioners, may stand to lose power and status if tasks are shifted to technology enabled community health workers or to patients themselves. [19] Digitalisation has become an important tool for increasing transparency and reducing corruption. [20] As a result, organisations, officials or health workers profiting from analogue systems may oppose digitisation processes.
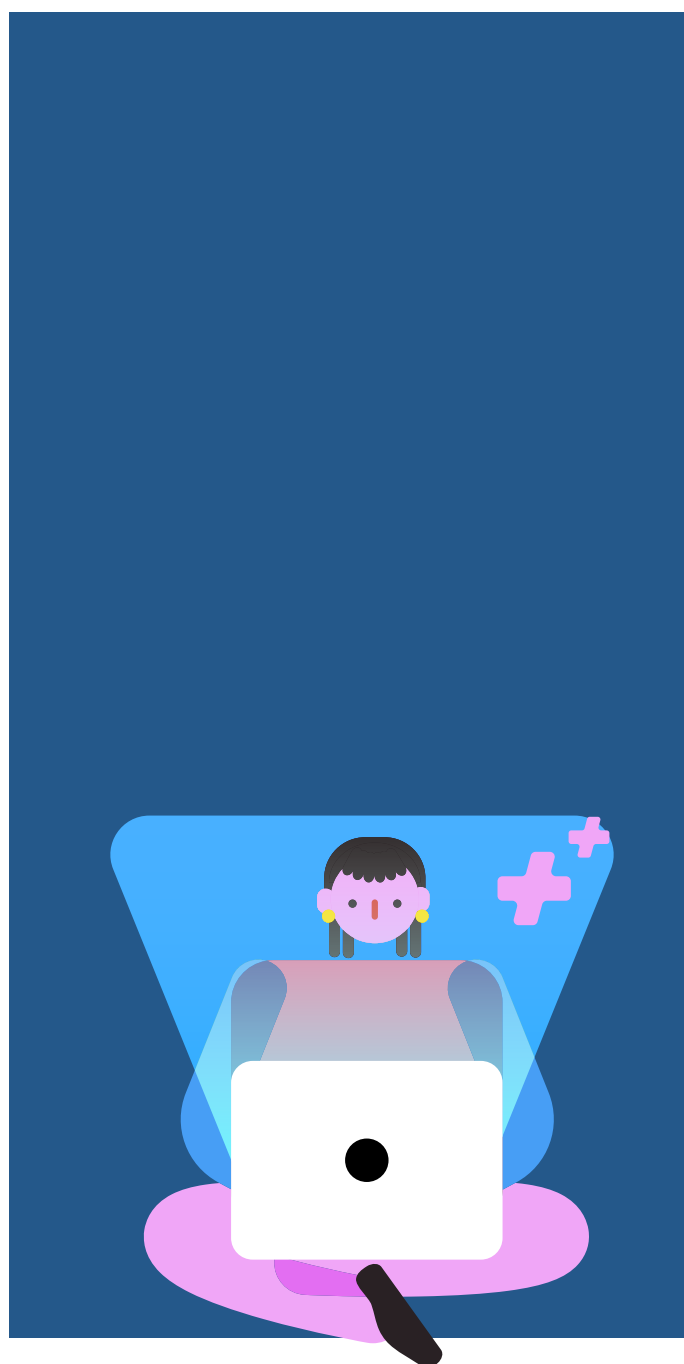
2. National-level barriers

According to the WHO-ITU eHealth Strategy Toolkit, seven components, or building blocks, are required for an effective national digital health environment (see Figure 4 above). [21} Monitoring tools such as the Global Digital Health Index suggest that no country has yet reached full maturity in all of these areas (see Box 2). Table 2 describes some of the national-level challenges that stand in the way of countries fully harnessing digital technologies in support of their UHC goals.

Table 2: National-level barriers to harnessing digital technologies for UHC

Digital health components	Description of potential national-level barriers
Leadership and governance	• Lack of unified direction and leadership on the use of digital health to support UHC among policymakers and government officials; • Weak oversight and coordination of different digital health stakeholders and activities; • Lack of governance mechanisms for stewardship and monitoring of digital health technologies and data; • External actors (donors, private sector) drive the national digital health agenda in ways that are not supportive of UHC or national health plans.
Strategy and investment	• No / weak national digital health strategy and/or lack of alignment with UHC goals; • Insufficient domestic and external resources for investment in digital health and UHC; • Digital health financing not aligned with UHC priorities; • Short-term approach to strategy and investment in digital health resulting in costly and unsustainable implementations; • Insufficient prioritisation of equity in digital health strategy, plans and financing.
Services and applications	• Insufficient tangible means for enabling digital health services and systems; • Insufficient access to, and exchange and management of information and content.
Standards and interoperability	• Fragmented health information management systems; • No / weak standards to enable consistent and accurate collection and exchange of health data across health systems and services; • No / weak ICT for health management systems, structures and capabilities.
Infrastructure	• Weak foundations for electronic information exchange across geographical and health-sector boundaries; • Weak physical infrastructure (e.g. networks, reliable energy) to connect health facilities and individuals.
Legislation, policy and compliance	• No / weak national policies and legislation to guide areas such as data ownership and security; • No / weak legislative environment governing the use of digital technologies for public good purposes; • No / weak policies on the application and remuneration of digital health providers working with the national health system; • No / weak legal and enforcement environment to establish trust and protection for consumers / patients and industry in digital health practice and systems; • Weak enabling environment for innovation.
Workforce	• Health workforce is not sufficiently informed about or involved in the digitalisation process or introduction of digital tools; • Health workforce (including community health workers) lack relevant digital health knowledge and skills; • Management and incentive structures do not encourage adoption of digital technologies for use in frontline health care, particularly in the PHC sector; • Digital health and data governance is not part of pre and in-service education and training programmes for health workers.

3. Transnational barriers

The global nature of the internet brings many positive opportunities for advancing UHC across countries. This has been exemplified during the COVID-19 pandemic where digital technologies have helped to mitigate and reduce interruptions to the delivery of routine health services and have facilitated the fast development of new vaccines (see Box 1).

Whilst an open internet allows individuals to access health information from diverse sources and use health apps and services developed around the world, it also presents challenges for legislative and regulatory bodies wishing to assure the quality of digital health tools, prevent health misinformation and protect users' data. Governments have failed to exercise their power over technology companies whose persuasive design features expose people, particularly children and other already vulnerable groups, to marketing of unhealthy products, harmful content and other information that is detrimental to their health and wellbeing. [22] Moreover, weak global governance has allowed several large technology companies to enter the digital health ecosystem without safeguards to ensure these actors use digital health tools and data to support public health goals rather than purely for commercial gain. [23]

Weak and fragmented approaches to the governance of digital health technologies and health data are a barrier to maximising the benefits of digital health for UHC. The lack of coordinated national quality control measures for digital health tools and digital platforms, and the inability or unwillingness of large tech companies to distinguish between scientific health facts from unsubstantiated opinions places many people at risk of poor quality health advice and misinformation. Whilst some governments and partners are taking steps to manage the current health infodemic, [23] slow and fragmented efforts to validate health online information prevent people from making informed and timely decisions about their health.

4. Ethical and human rights concerns

Ethical and human rights-based concerns arising from the application of digital technologies in health, and collection and use of data for health, risk undermining confidence in the benefits and opportunities technologies offer, thereby posing a threat to the achievement of UHC. These risks include:

Biased and unrepresentative data:
The data used to develop AI algorithms and other technologies is rarely representative of all ages, genders, ethnicities and regions. [25] Therefore, when health planners are looking to allocate resources to address the health needs of the population, they will base their decisions on the data available. If certain groups are under-represented in the data then their health needs will not be prioritised and this will increase the gap between those who stand to benefit from digital health technologies, and those who are excluded or discriminated against.

Data extractivism:
To close data gaps, those already marginalised and left behind can be locked into perverse ecosystems that extract data without informed consent and without gaining any benefit from the data collected on them. [26]

Data ownership:
Our data, including health data, is constantly being recorded, stored, and shared, but the rules about who owns that data are unclear. Unresolved questions about the ownership of health data are at the centre of many concerns about technology and data use. Most individuals, even those with relatively high levels of digital literacy, do not understand who is collecting their data, why it is being collected, how it is used and what their rights of ownership are.

Increased surveillance of individuals:
Digital technology has provided states and private companies with new ways of tracking disease outbreaks and surveilling individuals at risk. [26] Whilst some invasions of privacy may be accepted in exceptional times, authorities may continue to justify mass surveillance and further encroachments on the right to privacy in the name of health or security. Many countries lack the regulatory frameworks and other guardrails to prevent health surveillance from being used beyond public good purposes.

Misuse of data:
In addition to concerns about surveillance and lack of privacy, there are concerns that the commercial potential of health data will drive governments and corporations to use it in ways that undermine or even contradict the right to health. [28] For example, insurance companies may use an individual's health data to justify increased insurance premiums or reduced

coverage. To maintain their commercial advantage, technology companies may refuse to share health data that could be used for a wider public good. Marginalised communities and political opposition groups fear that health data may be misused by authoritarian governments to identify them and undermine their human rights. [29]

Protecting the most vulnerable:
Certain groups require additional protections from online harms. As in the offline world, women and girls, LGBTIQ+ communities and people with disabilities are at greater risk of online bullying and abuse. [30] The rights of children and adolescents are particularly at risk in the digital environment. [31] Children have no say on how their life is monitored and quantified from day one.

They are often unable to understand the implications of sharing data online and are vulnerable to exploitation from digital marketing. Exposure to harmful online content, online violence and excessive use of digital tools negatively impacts young people's health and wellbeing. [32]

Environmental impact:
The environmental and human health impacts of data storage, digital waste and the energy required to power our digital lives are becoming increasingly well documented. [33-34] Failure to address the negative environmental consequences of increased technology use will contribute to climate change and ultimately damage the health of future generations.

CASE STUDY 4: Digital health accelerating the Philippines' journey towards UHC [*]

The Philippines' journey towards UHC started as early as 1969 through the Philippine Medical Care Act. The Philippine Health Insurance Corporation (PhilHealth), which serves as the foundation for the present-day UHC scheme, was introduced in 1995.

Over the past two decades, the Philippines government has turned towards digital technology to cover its population's health needs. In 2009, it introduced legislation on telehealth, health passports and other eHealth services. In 2012, the Department of Health (DoH) implemented the National Telehealth Service Program as part of the 10-point action plan of the Aquino Health Agenda towards Kalusugan Pangkalahatan (universal health care). The 2013 Philippine eHealth Strategic Framework and Plan serves as the country's roadmap on the use of digital technologies in the health sector.

The expansion of the Philippines' digital health ecosystem has been a process of integrating patient care solutions, improving healthcare access, and promoting administrative efficiency. Over the past decade, the DoH and PhilHealth have mandated the adoption of electronic medical records in health facilities and implemented projects to establish the country's health information exchange infrastructure. Through grants, international development partners supported the country's eHealth vision by building enterprise architecture capacities in the government. Key government personnel underwent training programmes for IT governance, programme management and evaluation.

In 2019, the signing of the Universal Health Care Act served as an impetus to shift many governance paradigms in the health system. PhilHealth expanded its coverage and automatically enrolled all Filipinos into the programme. Provincial governments were given greater accountability to manage local health systems. Policies and guidelines on digital health were also issued to accelerate the adoption of technology and optimise the use of data for evidence-based approaches and programme planning.

The COVID-19 pandemic reinforced digital health as a mainstream solution in improving care in the Philippines, underscoring the importance of data privacy and the use of clinical information standards. The government scaled telemedicine across the country through a sandbox approach, simultaneously developing regulatory controls on quality, safety and efficiency in partnership with the National Privacy Commission. Policies to vet and evaluate technologies proposed for nationwide use were also developed by the Department of Information and Communications Technology (DICT).

Internet connectivity and human resource limitations impede broader coverage of digital health services in the Philippines. Building infrastructure and a cadre of digital health staff are therefore among the steps being taken by the government to enable the further adoption of digital health technologies.

CASE STUDY 5: Digital-First Integrated Care: Rwanda's innovative digital health care service [*]

In order to help people on low incomes access affordable medical care, as part of its drive to achieve UHC, the Rwandan government established Mutuelle de Santé, a community-based health insurance scheme that covers 90 percent of the population. Despite this the country's largely rural population still faces challenges accessing health facilities due to the hilly terrain and weak transport infrastructure.

To overcome these barriers, the Government of Rwanda is harnessing ICT to transform the health sector. Rwanda's Digital Health Strategic plan 2018-2023 has an overarching goal to improve health service delivery, quality and accessibility through digital health. The Ministry of Health's strategic plan aligns with the SmartRwanda Masterplan under the Ministry of ICT in prioritising the use of telemedicine technologies to increase accessibility to health services. Through telemedicine, patients can consult physicians at any time of the day, through video, web chat, or phone. This reduces both time and cost for patients, especially for those living in rural communities.

Rwanda's success in implementing digital health solutions at a national scale is partly due to its high mobile network coverage and effective collaboration with the private sector. One notable example is the partnership with Babyl, the largest digital health service provider in Rwanda. Through a combination of technology platforms including SMS; mobile money; a call centre; and artificial intelligence triage system, Babyl delivers more than 5,000 virtual consultations per day. Since its launch in Rwanda in 2016, Babyl has registered over 2 million users and performed more than 1.3 million consultations.

The Ministry of Health signed a Memorandum Of Understanding with Babyl to develop a new health-care delivery model called 'Digital-First Integrated Care', for convenient access to qualified doctors and nurses, especially for remote populations. Rwanda's National ID Agency (NIDA) also partnered with Babyl allowing patients to use shared mobile devices to register and access medical appointments. This change alone saw a 64 per cent increase in female registration and a 55 per cent increase in daily consultations.

To foster development of more long-term, sustainable partnerships with the private sector in digital health, Rwanda passed a public-private partnership (PPP) law. To further grow telemedicine and digital health as a means of achieving UHC, the Ministry of Health also plans to introduce telemedicine standards and further strengthen the legal and regulatory framework for security, confidentiality and controlled access to health data.

(Photo: Teddy Kamanzi/The New Times)

CASE STUDY 6: How digital health is helping Zanzibar to achieve UHC [*]

Zanzibar is among the world's first examples of a government-led digital community health programme achieving full scale. By ensuring all of its 1.6 million citizens have access to digitally-equipped community health volunteers (CHVs), the Zanzibar government has brought the archipelago closer to UHC than ever before.

Jamii ni Afya is a programme led by the Zanzibar Ministry of Health (MoH) and supported by D-tree International. Its comprehensive digital system connects communities, health facilities throughout all of Zanzibar to transform how care is delivered. 2,300 CHVs are equipped with digital tools that guide them in providing high-quality services in maternal and child health; nutrition; water, sanitation and hygiene; and early childhood development using digital tools. Data collection is automated and digitally links referred clients to primary health facilities.

For supervisors and decision-makers, Jamii ni Afya provides valuable data—visualised on dashboards—to monitor and improve performance of the health system. The programme is also integrated into Zanzibar's health management information system (DHIS-2), allowing the government to use this vast data set in resource planning and decision-making at scale and enabling them to have, for the first time, a real-time understanding of community health in Zanzibar.

In August 2021, Jamii ni Afya reached full scale. Although in its early stages, the programme is already making an impact through increasing the number of women and children receiving care at a health facility. More than one million people have been registered in the programme, demonstrating strong community acceptance and buy-in. Due to the strong digital monitoring and supervision system, more than 75 percent of CHVs consistently meet performance targets to deliver quality, timely home-based visits.

The Zanzibar government has taken important steps to ensure long-term ownership and financing of the programme into the future. To formalise the use of digital tools within the primary health care system, the government revised its Community Health Strategy (2019-2025) to recognise digitally-enabled CHVs as part of the government's health system. By embedding Jamii ni Afya in the strategy it is eligible to receive direct government funding from the Zanzibar Ministry of Finance and from multilateral donors.

The government has also shown strong commitment to strengthening the enabling environment for digital health. In 2020, it developed the first National Digital Health Strategy (2020-2025) and corresponding Digital Health Investment Roadmap, outlining plans for a coordinated digital health ecosystem. By transforming primary health care, Jamii ni Afya is contributing to the implementation of these strategies and proving catalytic in strengthening Zanzibar's health system and advancing its goals for UHC.

(Photo: Kevin Ferguson)

5. Political action to strengthen digitally enabled health systems

Regardless of their level of digital maturity or economic development, countries across the globe are harnessing digital technologies and data to expand coverage of health services and improve health outcomes. The case studies from the Philippines, Rwanda and Zanzibar demonstrate what is possible when governments prioritise digitalisation as part of their UHC approach (see pages 22, 23 and 24).

To ensure that everyone is able to benefit from the positive and transformative effects of digital health technologies and data, governments—with the support of partners—must now accelerate and expand equitable access to digitally enabled PHC as part of broader efforts to achieve UHC. This must happen alongside action to strengthen governance frameworks to fairly distribute the benefits of innovation and mitigate the ethical and human rights concerns associated with digital technologies outlined above.

The pace of digital transformations continues to accelerate. Governments will therefore need to regularly assess which digital tools and services should be included in their publicly-financed UHC package and how to continue improving their availability, accessibility, acceptability, and quality, prioritising equity. Regularly addressing needs of different population groups including children and youth, women, and marginalised communities will be necessary to understand which digital tools and services can best meet their health needs. Governments will also need to simultaneously address the digital divide and other barriers to the adoption of digital technologies in order to avoid exacerbating health inequities.

Digital technologies, and the data they generate, are not a panacea. They can complement and enhance, but should not replace traditional health service delivery models, nor should they become a substitute for human interaction. To be effective and sustainable, digital health approaches must be fully integrated into broader health system strengthening efforts, and be aligned to national health strategies and priorities.

Strong political will and leadership are essential for creating an effective and sustainable digital health ecosystem that delivers UHC, and for the effective governance of health data and digital technologies. Health financing is a core component of UHC and governments need to prioritise increased overall domestic financing for health which will enable greater investment in digitally enabled health systems, alongside other key areas of investment for UHC.

Global agreements are needed to protect individuals, particularly children and other vulnerable groups, from potential digital harms. Clearer international rules and principles on data ownership and use would also help realise health data as a global public good and maximise the benefits of digital technology and health data. Greater coordinated action among governments and international organisations is also needed to reduce health inequalities between and within countries at different stages of digital development whilst also supporting innovation.

Recommendations for action

Governments must act now to unlock the potential of digital technologies and data to scale up PHC and ensure that everyone has access to the health services they need, without financial hardship. This will be vital to delivering on SDG3 and achieving UHC by 2030.

Unleashing this potential will require coordinated, multi-sectoral action to close the digital divide and implement UHC-driven approaches to digital health. Transform Health is calling on political leaders, technology companies, international donors and other digital health partners to accelerate progress towards UHC in the digital age by taking the following actions:

1. Put communities at the centre of digital health

To ensure that approaches to digital health support UHC and leave no one behind, governments and technology developers must involve diverse communities in the planning, design, decision-making, implementation and monitoring of digital health policies and programmes. In particular, those groups that stand most to gain from digitally enabled PHC—or lose if approaches to digital health are not grounded in equity and human rights—such as children, youth, women, people with disabilities and marginalised populations must be given adequate opportunities and resources to shape digital health and data governance and hold those in power to account.

2. Design and implement digital health strategies that will deliver UHC

National governments, with the involvement of communities and partners, should develop, strengthen and implement national digital health strategies that prioritise the application of digital health solutions in support of PHC, in line with core principles such as equity and human rights. Digital health strategies should be fully costed and financed and outline the steps that will be taken to leverage digital health tools in support of all UHC dimensions.
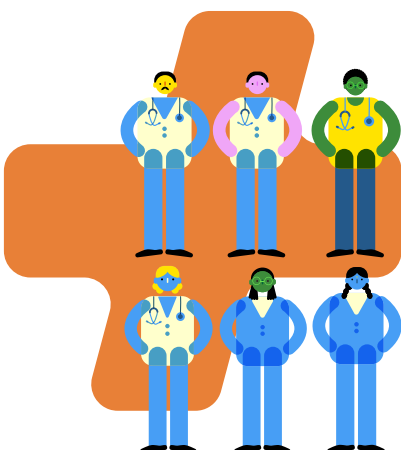
3. Support health workforces to enable digital transformations

Frontline health staff, including community health workers, should be adequately equipped, supported, and remunerated to fulfil their critical role in the achievement of UHC. This includes providing all cadres of health workers with pre and in-service training on digital health skills and literacy so they can use digital technologies and data effectively and ethically. Health system managers and policymakers should consult frontline health workers before introducing different digital approaches or technologies to ensure that innovations will increase the efficiency and impact of their work, and not create additional burdens. Effective management structures should be established to enable health workers to use digital technologies and data to improve health access and quality.

4. Ensure strong regulation and legislation to create an enabling environment for digital transformation while protecting the rights and privacy of citizens

Regulation and legislation governing the operations of health service providers should be updated for the digital age and address the positive and negative implications of digitisation and adoption of digital technologies within the health sector. Governments must update regulation, legislation and standards to enable digital health providers to operate in a much more effective and efficient manner in support of UHC.

This could include new legislation on the use of electronic health records, regulation on the ability of telemedicine platforms to make basic prescriptions, and guidance on legal recognition and remuneration of different digital health providers and services. Broader regulation and legislation related to data and the digital environment must also be assessed and reformed from UHC and human rights perspectives. Users of technologies and digital platforms, particularly children and other vulnerable groups, should be protected from digital harms and commercial practices that are detrimental to health and wellbeing.

5. Increase domestic and international investments to strengthen digitally enabled PHC systems and empower communities

National governments and international donors must increase their investments in equitable, digitally enabled PHC and a digitally-equipped frontline health workforce, including community health workers, as part of wider efforts to increase health financing and reduce out-of-pocket health care costs. Adequate investments must be made to increase digital health literacy across the population so that current and future generations can take full advantage of digital transformations in health. Sufficient, long-term resources should also be invested in mechanisms for civil society and communities to participate in digital health governance.

6. Create a global governance framework for health data

To create an environment where all people and institutions can share, use, and benefit from data, an inclusive and collaboratively developed global framework for the governance of health data is needed. Governments should work with WHO, regional bodies, civil society, technology companies and other partners to create and implement a global governance framework that maximises the public benefits of health data whilst promoting UHC, equity and human rights. This global framework should be endorsed by governments and regional bodies, and be swiftly implemented domestically.

In this digital age, it is unacceptable that half the world's population are being deprived of essential health care. Digitalisation and the appropriate application of digital technologies should be a central part of countries' approaches as they redouble their efforts to achieve UHC by 2030. Our health will continue to be transformed by digital innovations and new technologies. It is imperative that they are designed, used and governed in ways that will allow everyone to enjoy the benefits of digitally enabled care and realise their right to health.

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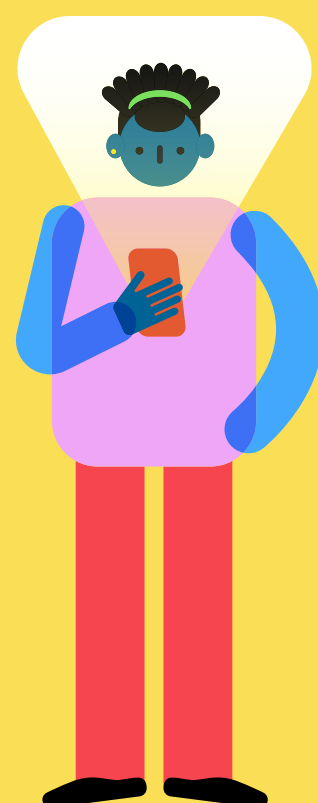
Glossary

Artificial intelligence
Branch of computer science concerned with building smart machines which can perform tasks that typically require human intelligence.

Data
Information, usually in the form of facts or statistics, that can be analysed and used in decision-making.

Digitisation
The process of converting information from a physical (e.g. paper-based) format into a digital format.

Digitalisation
The application of digitised information and digital technologies to improve processes (e.g. service delivery).

Digital health
The field of knowledge and practice associated with the development and use of digital technologies to improve health.

Digital transformations
The changes that come about as a result of integrating digital technologies and data into different areas of life, including health.

Equity
The absence of unfair and avoidable differences between groups of people. An equity approach recognises that some people may need greater levels of support to reach an equal outcome because of their different circumstances.

Information and communication technologies (ICT)
The set of technologies developed to store, send and receive information from one place to another.

Primary health care (PHC)
A whole-of-society approach to health and wellbeing centred on the needs and preferences of individuals, families and communities. It addresses the broader determinants of health and focuses on the comprehensive and interrelated aspects of physical, mental and social health and wellbeing.

Sustainable development goals (SDGs)
A set of 17 goals adopted by the General Assembly of the United Nations in 2015 to achieve a better and more sustainable world for all by 2030. SDG Goal 3 (Ensure healthy lives and promote wellbeing for all at all ages) includes a target to achieve UHC by 2030.

Universal health coverage (UHC)
Where all individuals and communities receive the health services they need without suffering financial hardship.