



**Transform
Health**

Establishing Gender Equitable Foundations for Digital Health Transformation *to Advance Universal Health Coverage*

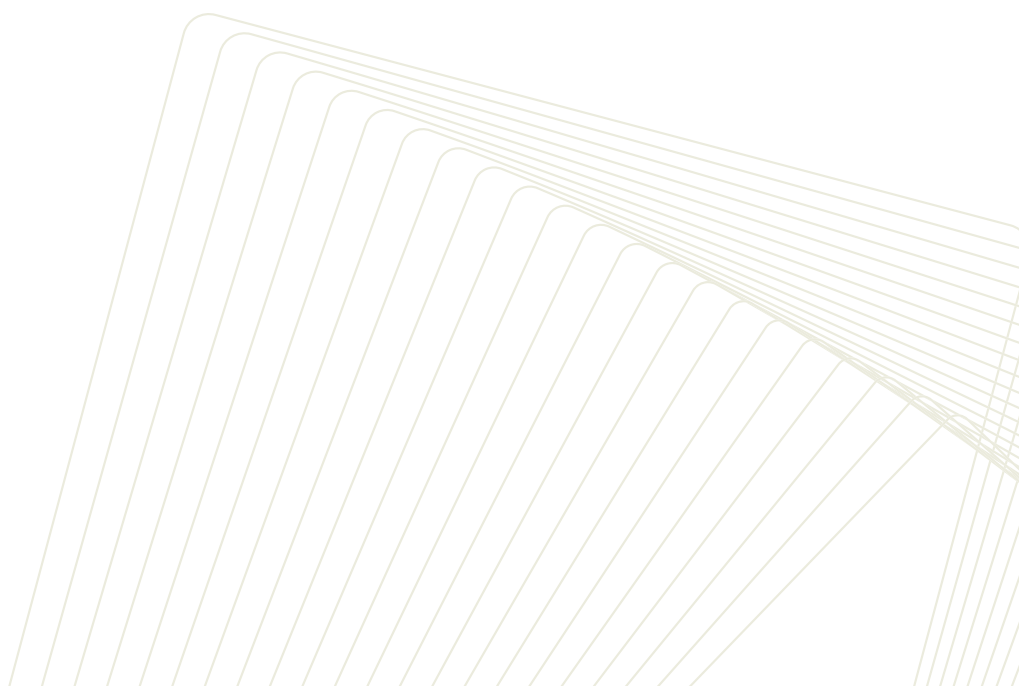


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ACRONYMS AND ABBREVIATIONS

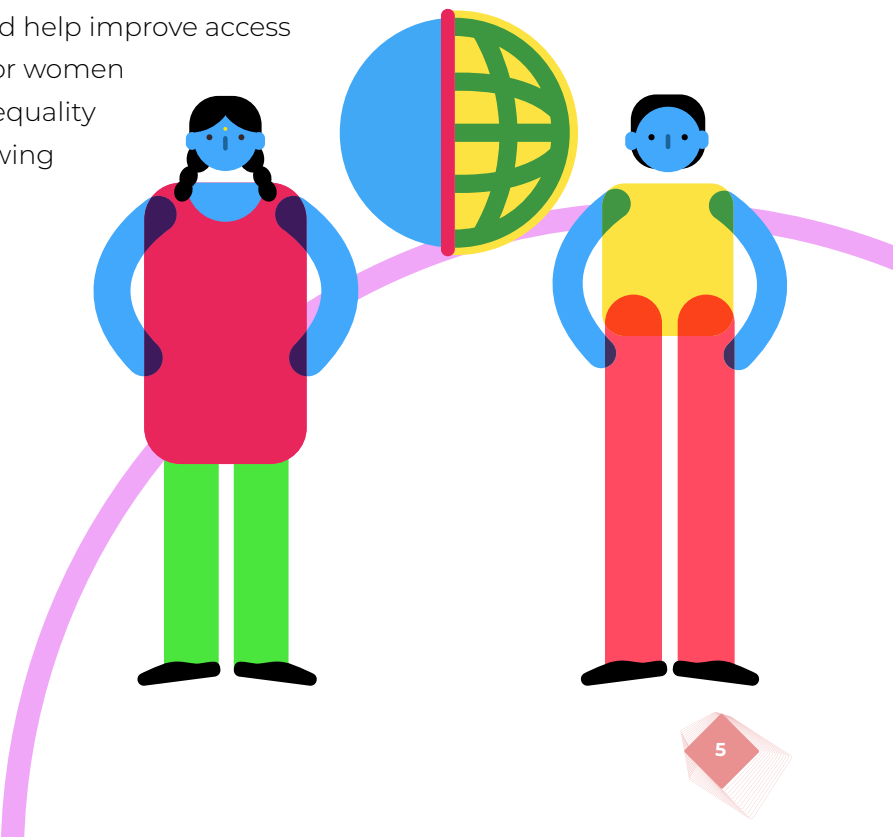
AI	artificial intelligence
CHW	community health worker
GBV	gender-based violence
HIV	human immunodeficiency virus
ICT	information and communications technology
ITU	International Telecommunication Union
LGBTQ+	lesbian, gay, bisexual, transgender, queer and others
LLM	large language model
LMICs	low- and middle-income countries
SDG	Sustainable Development Goal
TFGBV	technology facilitate gender-based violence
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNGA	United Nations General Assembly
WHO	World Health Organization

INTRODUCTION

Progress towards achieving the Sustainable Development Goal (SDG) of universal health coverage by 2030 has stalled. More than half the world's population – 4.5 billion people – lacked full access to essential health services in 2021 ([WHO and World Bank, 2023](#)). Decades of underinvestment in the fundamental underpinnings of public health systems are widening the gap between high-income populations, with ever more advanced, digitalised private healthcare and underserved communities in low-resource settings ([Chidambaram, 2024](#); [United Nations, 2024](#); [Dickson, 2021](#)).

Gender disparities in accessing health services, especially in low- and middle-income countries (LMICs), are well documented ([Saxena et al., 2023](#)). Millions of women continue to face significant barriers when seeking essential healthcare, treatment, and support ([World Economic Forum, 2024](#)). Reproductive, maternal, newborn, and child health services have seen minimal or no improvements in access and capacity since 2000 ([WHO and World Bank, 2023](#)). Preventable pregnancy-related complications claim the lives of more than 800 women and nearly 7,000 newborns every day worldwide ([World Economic Forum, 2023b](#)). These gender inequalities intersect with disparities related to income, education, place of residence, race, caste, ethnicity, religion, disability, language, and other social determinants of health¹ ([Richardson et al., 2022](#)). The most underserved group comprises the poorest and least educated women ([Udenigwe, 2022](#); [WHO and World Bank, 2023](#)).

The digital transformation of health² could help improve access to health services and health outcomes for women and girls, if designed to advance gender equality and health equity.³ However, there is growing



1. Social determinants of health are defined as conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks (Center for Disease Control, cited by [S. Richardson et al., 2022](#)).
2. "Digital health", as a concept, encompasses the field of knowledge and practice associated with the development and use of digital technologies to improve health. Digital health expands the concept of e-health to include digital consumers, with a wider range of smart devices and connected equipment ([Transform Health, 2022](#)).
3. Health equity refers to the absence of health inequities, which are differences in health that are unnecessary, avoidable, unfair, and unjust ([Richardson et al., 2022](#)).

concern that the rapid digitalisation of health is widening health disparities between the digital haves and have nots ([Richardson et al., 2022](#); [Sieck, 2021](#)), and that the digital ecosystem itself is an increasingly important determinant of health ([Kickbusch et al., 2021](#); [Richardson et al., 2022](#)). This concern is particularly pronounced in settings where scarce public health funding is diverted from reducing health worker shortfalls, building capacity, and strengthening infrastructure in primary health centres to digital transformation ([WHO, 2019](#)), and where face-to-face options for unconnected women and girls are not provided ([Kaihlainen et al., 2022](#)). Even in high-income settings, “digital health may have exacerbated existing disparities in healthcare provisions, with those who can afford it paying for premium telemedicine consultations and remote monitoring services” ([McCool et al., 2020](#)). To quote the World Health Organization: “Digital health interventions are not a substitute for functioning health systems” ([WHO, 2019](#)).

Access to digital technology is a key determinant of health, yet inequalities in digital access prevent millions of women and girls from benefiting from the digital transformation of health. Connected women and girls also face challenges in digital use, which can harm their physical and mental health. Gender biases and discriminatory social norms are root causes of these issues. At the systems level, decisions about national digital health strategies and the design and implementation of digital health programmes are rarely informed by gender analysis and gender equity perspectives. Instead, “health systems reflect and reinforce the gender biases and restrictive gender norms in society, undermining the functioning of health systems and compromising the safety and wellbeing of providers and the health of communities” ([Hay, K. et al., 2019](#)). At the population level, research over the past decade has shown that discriminatory social and gender norms, both online and offline, are critical barriers to digital access and use for women and girls.

In applying a gender equity lens to digital health, this policy brief focuses on women and girls in LMICs because they have been an underserved population for so long ([Bill & Melinda Gates Foundation, n.d.\(b\)](#)).⁴ It summarises evidence that digital technologies can extend disadvantaged women’s and girls’ access to health information and services, and can improve service delivery and outcomes. It then discusses key challenges that not only limit this potential, but also risk exacerbating gender equity gaps in access to healthcare and harming the physical and mental well-being of connected women and girls. The brief then investigates the root causes of these challenges before making recommendations on how to address them.

The policy brief and its recommendations draw on the results of primary and secondary research, including a literature review, an online survey, and key informant interviews with gender and digital health thought leaders around the world. It makes the case for substantial investment and action to establish the foundations and guardrails for a gender equitable digital health ecosystem. It aims to contribute to national and international discourse, and provide a set of recommendations to ensure that the digital transformation of health advances progress towards universal health coverage, to the benefit of all.

4. While it is not in the scope of this brief, we recognise the imperative of further research and action to respond to the diverse needs of other sexual identities, orientations, and genders.

THE OPPORTUNITY

Advancing health outcomes for women and girls

Digital transformation of health shows great promise for advancing universal health coverage and improving the health outcomes of women and girls ([WHO, 2024a](#)). If effectively designed, digital health transformation could bolster gender equity by: (i) extending access to underserved populations, especially women and girls in low-resource settings ([Figueroa et al., 2021](#)); (ii) providing greater access to evidence-based information; and (iii) enhancing healthcare processes, including decision making and service delivery, to increase the effectiveness and efficiency of health service delivery ([Sinha and Schryer-Roy, 2018](#)).

DIGITAL HEALTH TRANSFORMATION CAN BOLSTER GENDER EQUITY



Extend access to underserved populations



Provide greater access to evidence-based information



Enhance healthcare processes and the effectiveness and efficiency of service delivery

Extending healthcare coverage to underserved populations, especially women and girls in low-resource settings

Digital technologies can extend the reach of health services to underserved populations ([WHO, 2024a](#); [Kirkwood et al., 2022](#); [Udenigwe et al., 2022](#)), including in remote areas ([Collins, 2023](#)). For example, digital health solutions such as telemedicine can help women and girls overcome some of the diverse obstacles they encounter in accessing in-person health services ([Singh et al., 2023](#)). These include obstacles related to childcare, household chores, inadequate finances, and time ([Figueroa et al., 2021](#)); discriminatory social and gender norms that constrain women's mobility, decision making, and autonomy;⁵ and limited privacy, confidentiality, and social approval ([UNICEF, n.d.](#)).

5. WHO cites studies indicating that "autonomy has been identified as the main internal motivation for choosing to use telemedicine for abortion, in addition to privacy and the desire to choose where, when, and with whom to perform the abortion" ([WHO, 2024a, page 31](#)).

A recent WHO report stated that, “Digital Health Technologies seem to offer a pathway for women to access health-care services in a more private, accessible and empowering manner, increasing their autonomy and decision-making capacity” ([WHO, 2024a](#)).

Increasing women’s and girls’ access to evidence-based health information

Digital technologies can provide women and girls with direct access to evidence-based health information. This can promote healthy behaviours and enhance preventive care for women at risk of, or living with, non-communicable diseases ([Collins, 2023](#)), while also improving drug adherence ([Hurt et al., 2016](#)). Digital technologies can also enable women and girls to access information about stigmatised topics in conservative societies, such as sexual and reproductive health ([Lefevre et al., 2022](#); [Ippoliti and L’Engle, 2017](#); [Morris and Rushwan, 2015](#)), which can mitigate risks associated with unsafe practices, misconceptions, and inaccurate medical advice. This is particularly true for young people living with stigmatised illnesses such as HIV ([Goldstein et al., 2023](#)). “mHealth overcomes many barriers experienced by young people when seeking [sexual and reproductive health] information and services. Youth commonly report stigma and discrimination from health care workers... along with cost prohibitions and transportation challenges in reaching health facilities” ([Ippoliti and L’Engle, 2017](#)). Virtual groups or communities can also provide women and girls with access to peer-to-peer networks outside their local context and a safe environment to ask questions and have discussions while preserving anonymity ([Humphries-Waa et al., 2023](#)).

Enhancing healthcare processes, including decision making and service delivery

Digital health technologies can play a pivotal role in improving women’s health outcomes by providing better access to specialised medical services, enhancing performance levels, and facilitating screening tests ([WHO, 2024a](#)). In resource-limited settings, health professionals often lack the necessary support and tools to adhere to scientifically backed guidelines for diagnosing, treating, and managing patients. Digital health technologies can bridge this gap by integrating patient health data and on-the-spot diagnostic results with scientifically validated clinical procedures, thereby enhancing the standard of care ([Pellé et al., 2020](#)).

Data plays a central role in “care delivery, disease prediction and diagnosis, biopharma and medtech innovation, and patient outcomes” ([McKinsey & Company, 2023](#)). Data science and big data analytics can manage and analyse fragmented, structured, and unstructured data generated by health systems ([Subrahmanya et al., 2022](#)). If gender equity gaps were closed in health data, machine-learning algorithms could provide gender-disaggregated insights and data for strategic decision making, contributing to better patient care, early disease detection, and affordable treatments specifically for women ([McKinsey & Company, 2023](#)).

Digital health technologies can have a positive impact on community health worker (CHW) performance and service quality ([Feroz et al., 2020](#)). These benefits include workload reduction for CHWs ([Figueroa et al., 2021](#)); improved data collection, reporting, and monitoring; provision of quality healthcare services; supportive supervision; better organisation of CHW tasks; and overall improvement in community health outcomes ([Feroz et al., 2020](#)).

THE CHALLENGES

Hindering the transformative potential of digital health for women and girls

A number of challenges constrain the transformative potential of digital health for women and girls. These can be broadly categorised as (a) challenges in digital access, (b) challenges associated with digital use, and (c) root causes of these issues at population level and systems level. Challenges in digital access are driven by the gender digital divide, which, according to GSMA's *Mobile Gender Gap Report 2024* (GSMA, 2024), still excludes 785 million women in LMICs from the internet, and therefore from many of the benefits of digital health transformation. This is compounded by underinvestment in health workers, which further excludes unconnected women and girls from healthcare. Challenges in digital use, which are experienced by connected women and girls, include: (i) low levels of digital literacy; (ii) exposure to misinformation and disinformation; (iii) increasing use of the internet to self-diagnosis and self-medicate; (iv) exposure to online gender based violence; (v) exploitation of women's and girls' personal health data, (vi) and gender equity gaps and biases in Artificial Intelligence.

CHALLENGE AREAS HINDERING THE TRANSFORMATIVE POTENTIAL OF DIGITAL HEALTH FOR WOMEN AND GIRLS



Challenges in digital access



Challenges associated with digital use

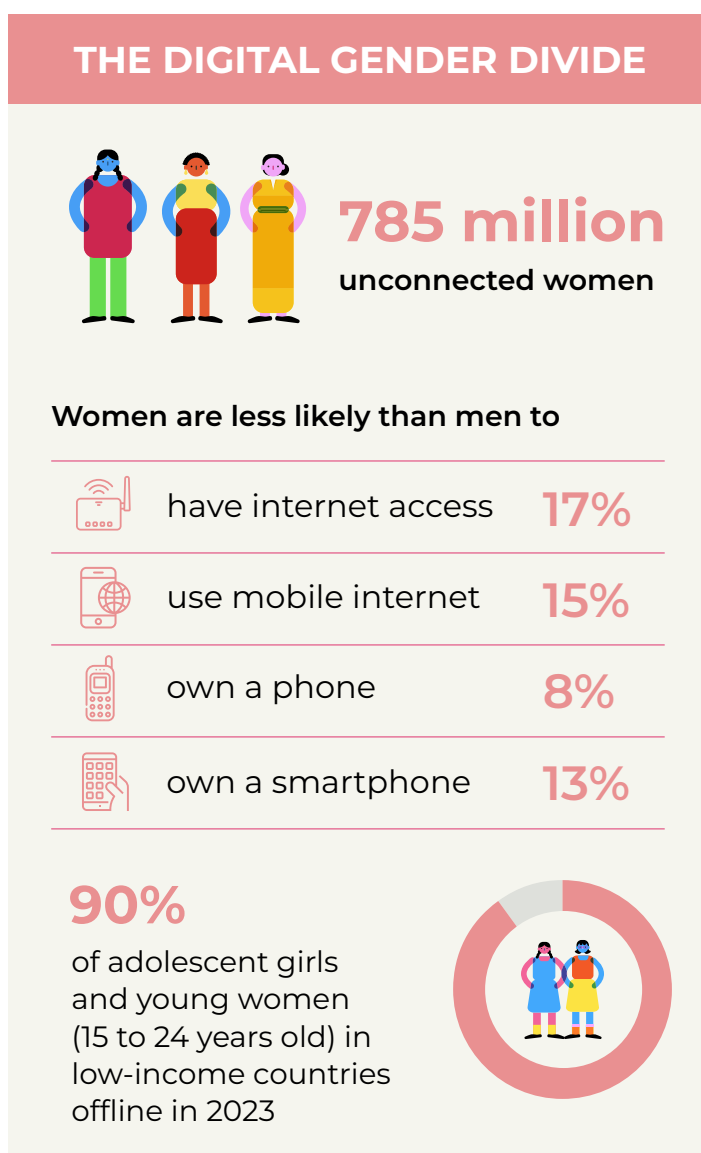


Root causes of these issues at population level and systems level

The digital gender divide excludes millions of women and girls from the benefits of digital health transformation

Access to digital devices and internet connectivity has been identified as a critical digital determinant of health ([Kickbusch, 2021](#); [Sieck, 2021](#); [Chidambaram, 2024](#)), enabling not only access to digital health information and technologies, but also “applications for employment, housing, and other assistance programmes, each of which influences an individual’s health, and are increasingly, and sometimes exclusively, accessible online” ([Sieck, 2021](#)). Yet in 2023, an estimated 2.6 billion people, representing 33 percent of the global population, were still offline⁶ ([International Telecommunication Union, 2023](#)). In low-income countries, 73 percent of the population was offline as opposed to 7 percent in high-income countries ([ITU, 2023](#)). The unconnected were more likely to be women, poorer, less educated, rural, and persons with disabilities ([GSMA, 2023a](#)).

Although significant progress was made in reducing the gender digital divide in LMICs in 2023 ([GSMA, 2024](#)), 785 million women still remained unconnected, with approximately 60 percent residing in South Asia and sub-Saharan Africa, where mobile gender gaps are widest ([GSMA, 2024](#)). Seventeen percent more women were offline compared with men - a disparity that is increasing ([ITU, 2023](#)). Women were still 15 percent less likely than men to use mobile internet, 8 percent less likely to own any type of phone, and 13 percent less likely to own a smartphone ([GSMA, 2024](#)). According to UNICEF, 90 percent of adolescent girls and young women aged 15 to 24 years in low income countries were offline in 2023 ([UNICEF, 2023](#)). The gender digital divide therefore presents a formidable challenge to gender equity in digital health, and to harnessing digital technologies to advance universal health coverage.



6. Populations that are “offline” have never used the internet.

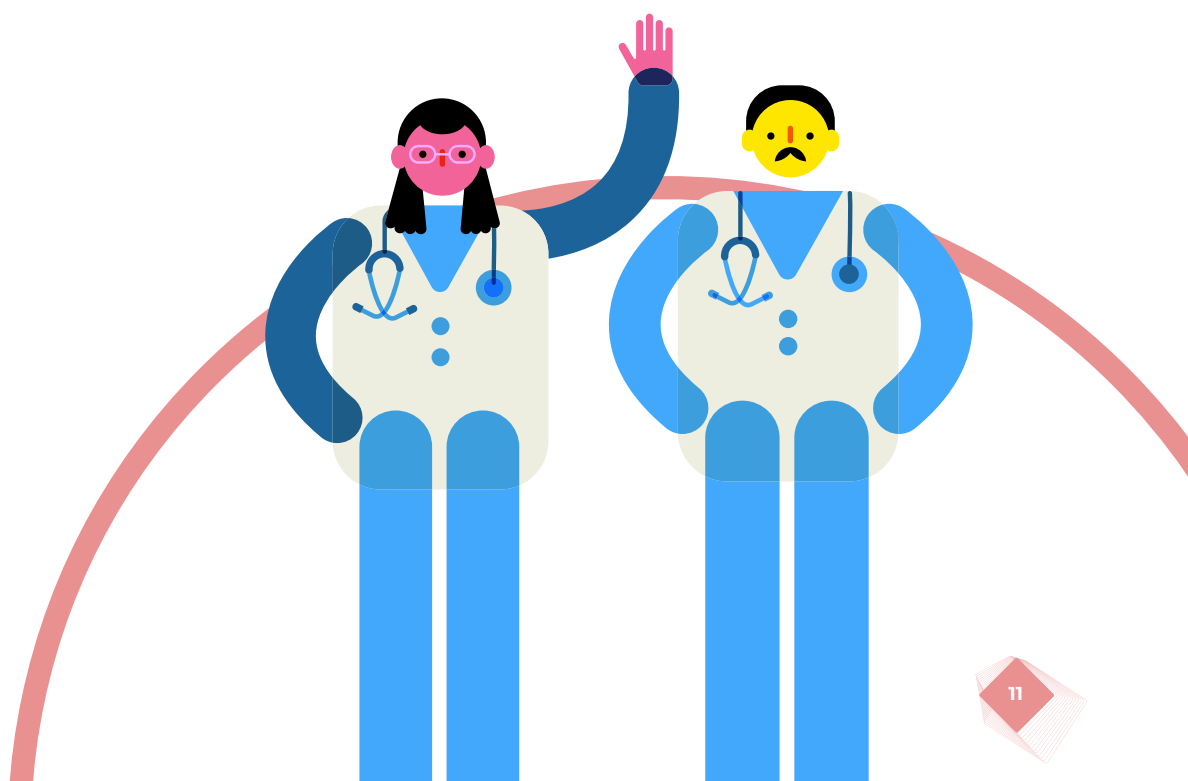
Disadvantaged women and girls are the most excluded

Gender inequalities in digital access intersect with disparities related to income, education, age, race, ethnicity, caste, religion, language, disability, and gender identity ([EQUALS Global Partnership, 2024](#)). Disadvantaged women and girls are therefore more likely to face challenges in accessing digital health solutions ([Goldstein, 2023](#)). “Research has shown how older people, women, people living with ill health or disabilities and those from lower socioeconomic backgrounds tend to experience poorer levels of Internet access and digital skills, which inadvertently affects their ability to benefit from accessing, using and engaging with digital health technologies” ([WHO, 2024c](#)). If not addressed, the gender digital divide will make existing inequalities in health access worse by not just limiting progress towards universal health coverage but potentially reversing it.

Underinvestment in health workers is further excluding unconnected women and girls

Health workers in primary health care centres, including community health workers, could be the bridge between digitally enhanced public health systems and unconnected populations, especially for women and girls. WHO has advocated for optimising and expanding the capacity of CHWs as a path to universal health coverage ([Blondino et al., 2024](#)). Yet WHO also estimates a projected shortfall of 10 million health workers by 2030, mostly in LMICs ([WHO, n.d.](#)). This is in part due to persistent under-investment in education and training, and employment strategies that do not respond to health systems and population needs.

Health worker shortages limit the transformational potential of digital health, especially for disadvantaged and unconnected women and girls. “In LMICs, inadequate human resources pose a significant threat to the successful integration and use of eHealth” ([Asah and Kaasbøll, 2023](#)). Research also indicates that health workers’ ability to adopt and use digital health solutions is constrained by “inadequate ICT skills, high cost of ICT, under-developed IT infrastructure, and a need for more information about appropriate ICT solutions” ([Asah and Kaasbøll, 2023](#)). CHWs, for example, lack training on new digital health solutions, have weak technical support, and face internet connectivity issues ([Feroz et al., 2020](#)).

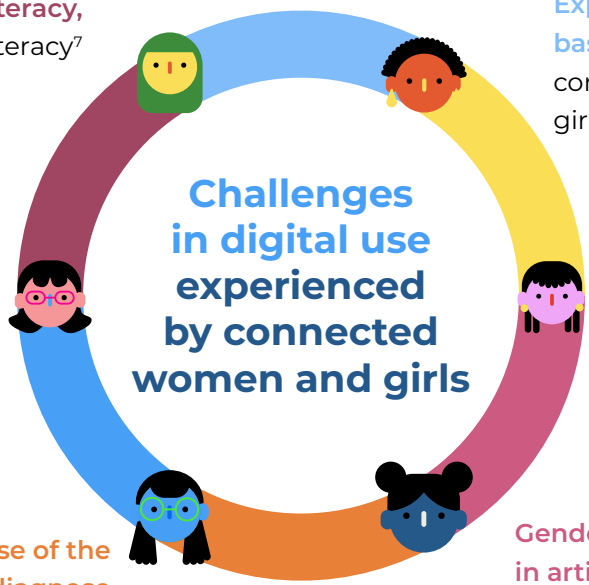


CHALLENGE: DIGITAL USE

Low levels of digital literacy, including digital health literacy⁷

Exposure to misinformation and disinformation, especially about sexual and reproductive health

Increasing use of the internet to self-diagnose and self-medicate



Challenges in digital use experienced by connected women and girls

Exposure to online gender-based violence, with disastrous consequences for women's and girls' mental and physical health

Exploitation of women's and girls' personal health data

Gender equity gaps and biases in artificial intelligence, which amplify discrimination and prevent AI solutions from meeting women's and girls' health needs

Low levels of digital literacy limit women's and girls' ability to benefit from digital health technologies

Digital literacy has been identified as a key digital determinant of health ([Kickbusch, 2021](#); [Sieck, 2021](#); [Chidambaram, 2024](#)).

"Individuals with better technological skills are more informed and empowered in managing their health using digital apps, equipment, platforms, and telemedicine, which in turn is positively associated with better health-seeking, health-promoting behaviours, health knowledge, and attitudes" ([Chidambaram, 2024](#)).

Conversely, low levels of digital literacy have been identified as a barrier to women's use of digital health services ([Kaihlane et al., 2022](#)), which increases their vulnerability to the exploitation of personal health data, and to the negative health impacts of misinformation and disinformation online.

Millions of women and girls lack the necessary digital competencies – i.e. the knowledge, attitudes, and skills required to confidently, critically, and responsibly use and engage with digital

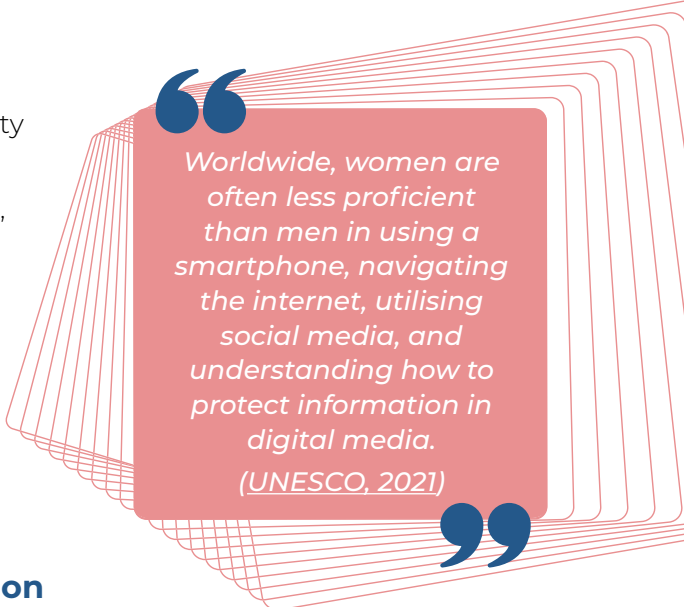
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Individuals with better technological skills are more informed and empowered in managing their health using digital apps, equipment, platforms, and telemedicine. (Chidambaram, 2024)

”

7. An individual's health literacy is defined as the ability to find, understand, appraise, and use information and services to make health-related decisions that correlate with health outcomes. Digital health literacy refers to the ability of an individual to effectively interface and interact with digital technology, encompassing all the skills they require to find, understand, appraise, and apply health information specifically from electronic sources ([Chidambaram et al., 2024](#)).

technologies for learning, work, and participation in society ([EQUALS Global Partnership, 2024](#)). “Worldwide, women are often less proficient than men in using a smartphone, navigating the internet, utilising social media, and understanding how to protect information in digital media” ([UNESCO, 2021](#)). In 2024, GSMA reported that in most countries, men use the mobile internet across a wider range of use cases than women, and use cases with low levels of adoption include those related to health and government services ([GSMA, 2024](#)).



Worldwide, women are often less proficient than men in using a smartphone, navigating the internet, utilising social media, and understanding how to protect information in digital media.
(UNESCO, 2021)

Exposure to misinformation and disinformation

The internet, especially social media, has been identified as a significant contributor to the dissemination of misinformation, which poses a serious public health concern ([Zenone, 2022](#)). A systematic review by the WHO in September 2022 revealed that misinterpretations of health-related information, which tend to escalate during crises and disasters, often adversely affect mental health, foster vaccine scepticism, and cause healthcare delivery delays ([WHO Europe, 2022](#)). Women and girls are particularly vulnerable. A survey by Plan International involving more than 26,000 girls from 26 countries revealed that a substantial number of respondents are negatively affected by exposure to disinformation, with a third of respondents indicating that it has impaired their mental health, leading to increased stress and anxiety levels ([Plan International, 2021](#)).

Connected women and girls increasingly turn to the internet to self-diagnose and self-medicate

Connected populations, including women and girls, are increasingly bypassing under-resourced clinics and health workers and instead using the internet to self-diagnose and self-medicate ([Nakakande et al., 2023](#); [McVay, 2023](#); [Ceney et al., 2021](#)). Underinvestment in face-to-face public healthcare contributes to this. This is especially risky in contexts where sexual and reproductive health services, including access to free and safe abortion, are limited or banned. Exposure to misinformation and disinformation through the internet exacerbates the situation. For example, there are reports of young women in LMICs seeking information about emergency contraceptive pills online, purchasing them without consulting a clinician, and taking them at the wrong stage in their pregnancy, with disastrous consequences (Key informant).

Exposure to online gender-based violence

Online forms of violence against women and girls are associated with psychological, social, and reproductive health impacts, and often with offline physical and sexual violence ([UN Women, 2020](#)). Online gender-based violence (GBV) is an increasingly powerful deterrent to women and girls using the internet, thus perpetuating the gender digital divide ([ITU, 2020](#); [Pasricha, 2016](#)). Recent surveys show a global prevalence of online GBV ranging from 16 to 58 percent ([Hicks, 2021](#)). Women with intersecting inequalities (e.g. women of colour, LGBTQ+ individuals, women with disabilities), in abusive intimate partner relationships, in marginal social locations, and in leadership positions, face higher levels of online GBV ([Hicks, 2021](#)). Men and boys also

experience online abuse in high numbers, but it is less likely to be gender based. According to the 2022 UN Secretary-General's report, current laws addressing digital violence lack clear and consistent definitions and have not kept pace with technological developments and different forms of violence in digital contexts ([United Nations General Assembly, 2022](#)). The effectiveness of legislation can also be undermined by poor implementation, inadequate financing and resources, limited awareness of laws, weak enforcement, and consequent impunity for violence against women and girls ([UNGA, 2022](#)).

Weak governance and exploitation of health data

Growing apprehension exists about the potential for personal health data to be traded, sold, and disseminated by third parties ([Kickbusch et al., 2021](#)). Misuse can occur for commercial or political gains, or to stigmatise individuals with health conditions, thereby risking the erosion of public trust in data systems and the loss of opportunities offered by digital technologies and data ([Transform Health, 2021](#)). These risks also pertain to information that may not be strictly considered health data, such as internet searches about abortion. In America, for instance, women's and girls' search histories, location data, text messages, and call logs could become part of investigations and court proceedings in states where helping to provide access to abortions is criminalised ([Korn and Duffy, 2022](#); [Friedman, 2022](#)). "Ever wider aspects of our bodies and lives are being 'datafied'. In an era where we can link information, and use seemingly innocuous information to derive health relevant conclusions, everything is potentially sensitive data and everything is potentially health data" ([Prainsack, 2020](#)). Health data can also be exploited to identify and target marginalised and vulnerable groups, such as individuals identifying as LGBTQ+ or those who are HIV positive ([Kovacs et al., 2019](#)).

While there has been an increase in the number of national data protection laws, there are considerable gaps, with some countries lacking legislation or with incomplete or outdated laws ([United Nations Conference on Trade and Development, 2016](#)). "The technology landscape is evolving so quickly that governments are struggling to implement effective laws to protect consumers and ensure data is being used in reasonable ways" ([Bloomberg Law, 2019](#)). Data protection legislation is also not always health specific, or it does not have adequate provisions for health data ([Transform Health, 2021](#)). Weak data governance not only increases the risk of exploitation of health data, but also results in missed opportunities to better use data for improved health outcomes (e.g. decision making, diagnosis, etc.), including for women and girls.



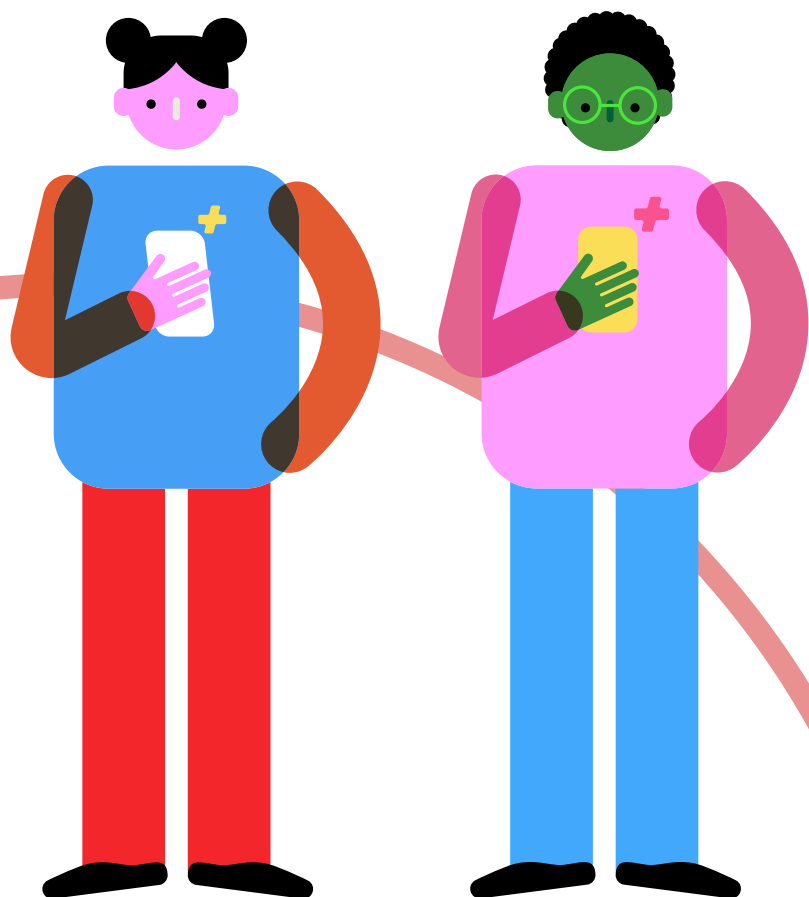
The technology landscape is evolving so quickly that governments are struggling to implement effective laws to protect consumers and ensure data is being used in reasonable ways.
([Bloomberg Law, 2019](#))

The increasing participation of the private sector and commercial entities in digital health has led to a surge in health data being generated, collected, and stored outside conventional clinical and health system contexts (e.g. Personal health monitoring, such as menstrual and fertility tracking). Private entities and those operating outside the health system may not be subject to the same standards as those within it, potentially exempting them from legislation governing data collection, storage, confidentiality, and sharing that applies to traditional health providers ([WHO,](#)

[2024b](#)). A lack of adequate legislation and regulation to govern all actors in a country involved in the collection, use, and storage of health data is therefore a concern.

Gender biases and gaps in artificial intelligence

Artificial intelligence (AI) in health has immense potential to transform healthcare delivery, including by enhancing diagnosis and clinical care, improving health research and drug development, and supporting disease surveillance, outbreak response, and health system management ([WHO, 2021b](#)). However, despite the potential of advancements for women - such as AI-enhanced breast cancer screening - concrete improvements in women's health are not yet evident ([The Lancet Digital Health, 2022](#)). Serious concerns have also emerged, including: gender gaps in health data for training AI systems; AI algorithms reflecting and amplifying gender and race discrimination in healthcare; errors and "AI hallucinations" in the provision of medical information; amplification of misinformation and disinformation on health, particularly about sexual and reproductive health ([WHO, 2024b](#)); and the inability of generative AI systems to understand low-resource languages⁸ in LMICs (see Box 1).



8. There are different definitions for low-resource languages, such as a language for which there is no automated human language technology, or where for a certain task no algorithm exists using available data to automatically, and adequately, perform the task ([Shamsfard, 2019](#)).



ARTIFICIAL INTELLIGENCE RISKS FOR WOMEN'S HEALTH

Gender gaps in health data

Studies have identified sex and gender differences in various common diseases, such as cancers, cardiovascular issues, metabolic disorders, autoimmune conditions, and neurological diseases. Nonetheless, clinical practice still predominantly relies on data collected from men and therefore there are evidence gaps of what works for women ([Hariharan, n.d.](#)). This can have serious consequences for women's health. A study by the University of California, Berkeley and the University of Chicago found that due to drug doses historically being based on clinical trials with men, women are more likely to experience negative side effects of medicine ([Science Daily, 2020](#)). In 2019, The Lancet reported that "women are dying because of the gender data gap in medicine – in medical research, in medical education, in medical practice – and it needs to be closed as a matter of absolute urgency" ([The Lancet, 2019](#)). These gender data gaps limit the ability of generative AI systems to effectively support women's health ([Hariharan, n.d.](#)).

Generative AI systems make mistakes

Generative AI systems – models in which algorithms are trained on data sets to create new content, such as text, images, and videos – also make mistakes ([WHO, 2024b](#)). They make errors in reasoning, and can generate inaccurate or misleading information with no factual basis, referred to as "hallucinations" ([Lappin, 2024](#)). Large language models (LLMs) have, for example, "hallucinated convincing medical misinformation" ([Singhal, 2023](#)). "The fact that LLMs do not reliably distinguish fact from fiction makes them dangerous sources of (mis) information" ([Lappin, 2024](#)).

AI algorithms can amplify gender discrimination in healthcare

Discrimination against women in healthcare, especially women of colour, presents an enormous challenge to artificial intelligence since "AI algorithms, in essence, learn from the historical behaviour and decisions of humans, in which biases, stereotypes and assumptions are ingrained" ([Hariharan, n.d.](#)). There is therefore concern about the potential for generative AI to perpetuate gender and race discrimination in society ([Omeye et al., 2023](#)). For example, "Multiple studies have found that AI models built to predict conditions, such as liver disease, are more likely to miss disease in women than in men. Additionally, machine learning algorithms designed to diagnose common infections in women have been shown to present diagnostic biases among ethnic groups" ([Mihaila, 2024](#)).

AI technologies may accelerate the dissemination of false information

AI-powered technologies are making it even easier to create and disseminate false information. "For example, an AI conversational agent, trained using unverified data sets, might spread myths about contraceptive methods and abortion, such as misconceptions regarding links to infertility or suitability for specific demographics". Manipulation and targeted disinformation is also a risk. For example, information may be deliberately used to "discourage access to [sexual and reproductive health] services, such as safe abortion" ([WHO, 2024b](#)).

Generative AI systems do not understand low-resource languages

Large language models lack adequate familiarity with low-resource languages in LMICs, leading to "low performance" ([Cahyawijaya, 2024](#)). "Despite the majority of the world's languages being low-resource, current Machine Translation (MT) systems still perform poorly on them or do not include them at all" ([Robinson et al., 2023](#)). This limits the usefulness of LLMs in providing accurate health information to millions of women and girls in LMICs ([WHO, 2024b](#)).

Direct-to-beneficiary AI solutions are particularly problematic

Direct-to-beneficiary AI solutions can be especially problematic, as AI gaps, biases, and errors may be further amplified by users themselves inputting inaccurate information about their health status during self-diagnosis. This also holds true for AI applications in the hands of poorly trained health workers, who may input incorrect patient data and as a result receive incorrect treatment recommendations.

Population level

Discriminatory social and gender norms contribute to the gender digital divide

There is a substantive body of evidence highlighting the critical role that regressive social and gender norms play in perpetuating the gender digital divide ([EQUALS Global Partnership, 2024](#)). For instance, a 2019 study by Johns Hopkins in India found that traditional gender norms that emphasise domestic roles, obedience, purity, and the preservation of family relationships limit women's financial independence and equal access to jobs outside the home. As a result, families often prioritise ensuring that men have continuous access to a working phone, while women's phone usage can be sporadic and often on inferior devices ([Scott et al., 2021](#)).

Violence against women offline is reflected online

Digital platforms have provided women with a platform to express their views and opinions, connect, and collaborate, but have also become conduits for violence against women. The systemic inequality and discrimination that women face in the physical world have found a new avenue in the digital world ([Fontanella et al., 2024](#)). "Many forms of violence occurring offline are replicated and intensified in digital spaces. Digital spaces reflect, reinforce and exacerbate systemic structural gender inequality, deep-seated cultural and social norms, as well as patterns of harmful masculinities that drive all forms of violence against women" ([UNGA, 2022](#)).

Systems level

Gender inequalities are ingrained in health systems

There is extensive research showing how ingrained gender inequalities are in health systems across the globe, which hinders efforts to achieve universal health coverage ([Hay et al., 2019](#)). For example, research in high-income countries indicates that women are diagnosed later than men for more than 700 diseases, including six non-specific types of cancer ([Science Daily, 2019](#)). Yet gender-based analysis is still not a standard practice in health systems governance ([Morgan, 2018](#)). "The absence of a strong health equity and gender analysis when designing, implementing and evaluating digital health policies and programmes can lead to ignoring or exacerbating existing health inequities and gender inequalities, or even creating new ones" ([Sinha and Schryer-Roy, 2018](#)).

Gender inequality is also rife in healthcare delivery. "Women hold approximately 70% of health worker jobs worldwide, over 80% of nursing roles, and more than 90% of midwifery roles. Despite leading the delivery of health to 5 billion people and contributing an estimated US\$ 3 trillion annually to global health, half of which is in the form of unpaid work, women only occupy 25% of leadership roles in health" ([Women in Global Health, 2023](#)). Gender inequality in health systems is reflected in the under-representation of women in digital health leadership, and in the lack of gender intentionality in digital health solution design.

Digital health is rarely designed from a gender perspective

Digital health is seldom designed from a gender perspective, despite the opportunities it offers to improve gender equity, including in access to services and reducing the burden of unpaid care ([Figueroa, 2021](#)). Current methodologies employed in the design of digital health have inadvertently led to systems that grapple with gender inequality and inequity. There is a pressing need for a more gender equitable approach to the design and implementation of digital health programmes, not just in LMICs, but around the world. “As digital technologies began to take hold, they did so only accounting for a narrow set of voices, primarily straight white men. Women, people of colour, LGBTQIA+ [persons], and people with disabilities and special needs have consistently been under-represented, both as builders and as users” ([Omidyar Network, n.d.](#)).

Women are under-represented in the tech sector in general and in digital health in particular

As of 2023, women made up 29.4 percent of entry-level roles in the tech industry, only 17.8 percent of vice president roles, and a mere 12.4 percent of senior executive positions ([World Economic Forum, 2023](#)). “Women are still under-represented, underpaid, and often discriminated against in the tech industry” ([White, 2023](#)) and are “being left behind at every step of the Artificial Intelligence (AI) life cycle” ([World Economic Forum, 2022](#)). There is also a notable absence of women in leadership roles in the digital health ecosystem ([Mejía Chacón, 2022](#); [Speak Up Africa, 2023](#)). Reflecting disparities in the wider tech sector, the majority of women in digital health are in entry-level positions or are involved in routine work such as data capture rather than in senior tech roles. Similar gender inequalities exist in digital health research. In 2022, *The Lancet Digital Health* reported that only 27 percent of corresponding authors of submitted manuscripts identified as female ([The Lancet Digital Health, 2022](#)).



THE SOLUTION

Recommendations for a gender equitable digital health ecosystem

There is a pressing need for investment and action to support the equitable, inclusive, and sustainable digital transformation of health systems to advance universal health coverage ([Transform Health, 2024a](#)). This must prioritise establishing the foundations for a gender equitable digital health ecosystem, including actions to: (i) mainstream gender in digital health; (ii) invest in people; and (iii) strengthen regulation and legislation to protect women's and girls' rights. This policy brief makes the following recommendations for public sector stakeholders and their partners, including civil society organisations and technology solution providers. While several of these recommendations are relevant to the private healthcare ecosystem, these are not comprehensive.



MAINSTREAM GENDER IN DIGITAL HEALTH

Gender should be mainstreamed across health systems, including in digital health. This includes action to: (i) increase gender expertise; (ii) integrate gender indicators into formal processes; (iii) root human-centred design in gender analysis and participatory approaches; and (iv) increase the number of women in digital health leadership and decision-making roles.

Increase gender expertise

The lack of gender expertise in health systems in general, and digital health programmes in particular, is a critical barrier to reducing gender inequality and inequity in healthcare. There is a need for roles staffed by gender experts who can provide in-house technical expertise and feed into the design of national digital health strategies, programmes, and tools. Where the opportunity for such roles is limited, institutions could contract external gender experts for independent reviews and guidance.

“
Without addressing the role of restrictive gender norms and gender inequalities within and outside health systems, we will not reach our collective ambitions of universal health coverage and the Sustainable Development Goals.
”
(Hay, 2019)

There is also a need for gender sensitisation among existing personnel. Investment is needed in training programmes for health workers, policymakers, and administrators to enhance their understanding of gender dynamics and the specific needs of diverse populations. This does not mean that every individual must be a “gender expert”, but rather that they should possess an increased awareness of the unique challenges women and girls face when engaging with digital health tools in different contexts, so that these can be addressed.

Integrate gender indicators into formal processes

Gender indicators should be integrated into health system processes and digital health programmes, including in theories of change, functional and technical specifications, and monitoring, learning, and evaluation plans. This includes integrating the diverse needs of women and girls from different backgrounds into the theories of change for digital health programmes and at each stage of the development life cycle of technology and tools. It also entails integrating gender-specific metrics into monitoring, learning, and evaluation frameworks for digital health programmes, including to monitor potential harms.

Gender-disaggregated health data should be collected to identify disparities and inform evidence-based interventions, including regularly analysing health outcomes by gender to assess progress. Gender audits of existing work should be carried out to identify relevant metrics and to inform programmatic decisions.

Root human-centred design in gender analysis and participatory approaches

Human-centred design is important to ensure that end users and their needs are central to the design and implementation of digital health transformation and digital solutions. This must be rooted in gender analysis, defined as “a critical and systematic examination of the constraints and opportunities available to an individual or group of individuals based on their sex and gender identity” ([Bill & Melinda Gates Foundation, n.d.](#)). In the context of digital health, gender analysis involves research to answer the following questions:

1

What problem is a digital health intervention trying to solve, and how do people experience the problem differently, based on their gender?

2

Who is most affected by the problem?

3

What is the context of the problem? What social, economic, political, religious, and historical factors influence it?

4

What gender gaps and barriers exist in relation to the problem, including, for example, discriminatory social and gender norms?

Time and budget must also be allocated for participatory design processes that meaningfully involve women and girls who are most affected by the problem, as well as key influencers in their social networks. This is crucial to understand their specific challenges and needs, identify promising solutions, and design and test solutions and approaches in response to these.

Increase the number of women in leadership and decision-making roles in digital health

Enhancing the representation and active participation of women in digital health leadership and decision-making roles is important to foster greater gender sensitivity within health systems and the design of more inclusive and equitable digital health approaches and solutions. These individuals can help advocate for gender mainstreaming, monitor progress, and drive change ([Women in Global Health, 2023](#)). Initiatives such as African Women in Digital Health,⁹ for example, provide mentorship, training, and networking opportunities to women, preparing them for leadership roles in digital health. Although recruiting women in digital health leadership positions does not automatically guarantee that a gender lens will be applied to digital health programme design and implementation, representation does matter. “Representation matters profoundly... Technology can instantly be more responsive and responsible by vastly expanding who finances, creates, governs, and delivers it” ([Omidyar Network, n.d.](#)).



INVEST IN PEOPLE

Investment is needed in people to ensure that digital health transformation closes gender equity gaps in health access. This includes action to: (i) address the health worker deficit so that they can act as a bridge between digital health and unconnected women and girls; (ii) invest in reliable digital infrastructure and technical support for primary healthcare facilities and health workers; and (iii) invest in building the digital literacy of health workers, women, and girls.

Invest in addressing the health worker deficit

Investment should be prioritised to address the health worker deficit, especially in community health workers, so that they can act as a bridge between digital health and unconnected women and girls. Most low-literate, low-income women and girls rely on face-to-face healthcare and therefore online services and digital tools must complement, rather than replace, in-person care. Hybrid strategies should be designed that “include both high- and low-tech perspectives and a combination of online and offline strategies” ([Kaihlainen et al., 2022](#)). With women constituting 67 percent of the health and social workforce, investing in this sector also presents a significant opportunity to generate decent employment opportunities for women ([WHO, n.d.](#)).

Invest in digital infrastructure and technical support for health workers

Health workers, including community health workers, will only be able to effectively utilise digital health technologies if they have access to reliable infrastructure, connectivity, and technical support ([Kaboré et al., 2022](#); [Feroz et al., 2020](#)). This requires targeted investments in: (i) reliable electricity; (ii) broadband mobile internet access; and (iii) functioning devices and computers for primary health facilities in low-resource settings. Health workers, including CHWs, should also

9. <https://www.speakupafrika.org/program/african-women-in-digital-health>

be equipped with smartphones to strengthen digital literacy and to ensure that patient data is not stored on personal phones. Technological support systems for infrastructure, connectivity, and digital health solutions should also be established to promptly address technical issues and ensure uninterrupted digital health services.

Invest in building the digital literacy of health workers, women, and girls

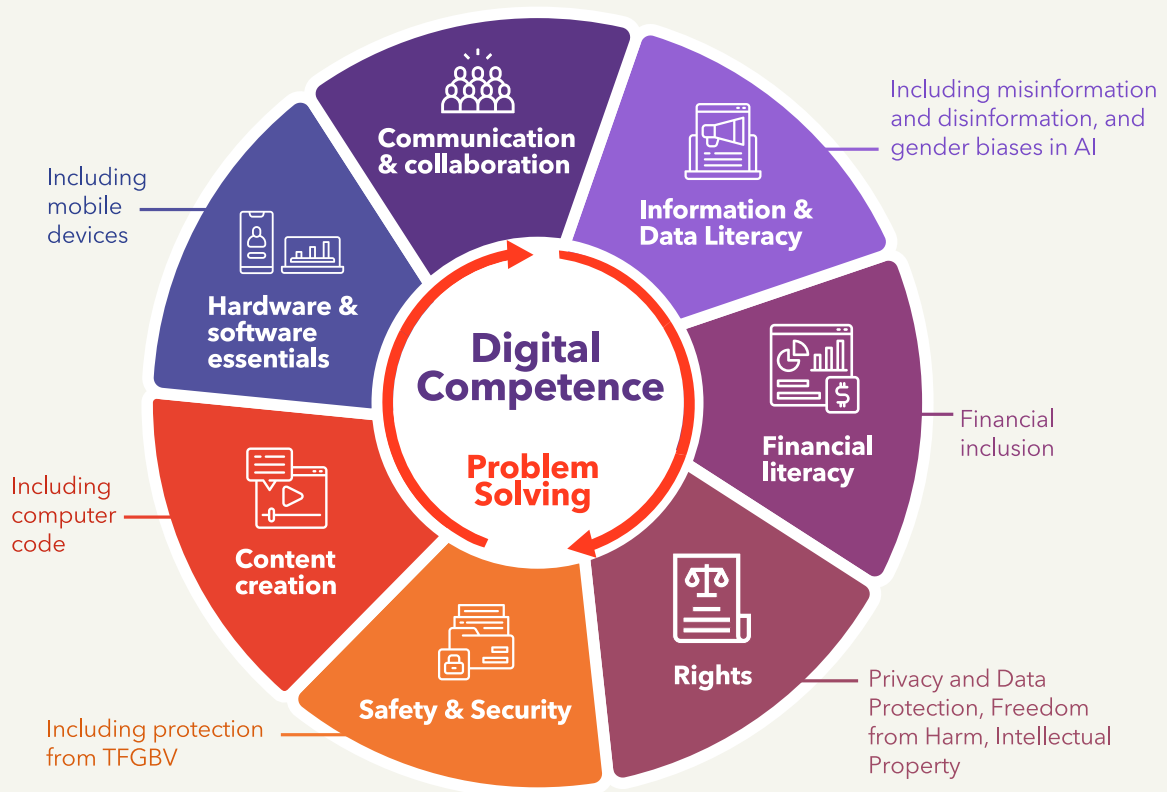
A lack of digital competencies – i.e. the knowledge, attitudes, and skills required to safely, critically, and responsibly use digital technologies – has been highlighted as a key barrier to accessing accurate health information and services online and to using digital health technologies to advance universal health coverage. Significant efforts need to be made inside and outside classrooms to increase the digital competencies of connected women and girls. Training is also required for personnel at all levels of public health systems, especially CHWs, to strengthen the digital health ecosystem and support the effective use of digital health technologies. The European Commission has identified core areas of digital competence in its Digital Competence Framework for Citizens ([Vuorikari, 2022](#)), which has been adopted by 22 countries and enhanced by UNESCO to support the measurement of digital literacy skills for SDG Indicator 4.4.2 ([UNESCO, 2018](#)). It is now being adopted by the International Telecommunication Union to support the measurement of SDG Indicator 4.4.1. The EQUALS Global Partnership has further enhanced the framework using a gender equity lens ([EQUALS Global Partnership, 2024](#)) - see box 2.



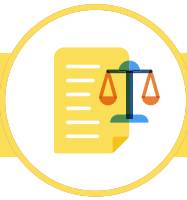
BOX 2

A gender equity lens on digital competencies for the safe, critical, and responsible use of digital technologies for health

The EQUALS Global Partnership¹⁰ has used a gender equity lens to enhance the European Commission's Digital Competence Framework for Citizens. These enhancements, which are particularly relevant to digital health, include emphasising the need for digital knowledge, skills and attitudes to: (i) support the identification of misinformation and disinformation, and gender equity biases in AI; (ii) increase knowledge of rights under data protection and privacy legislation, and (iii) enable better protection of personal health data, and (iv) mitigate the risk of technology facilitate gender-based violence (TFGBV). Other key digital competence domains include digital communication and collaboration; content creation (for example to support remote diagnosis of health conditions); and the essential competencies required to operate hardware and software, which are especially relevant for CHWs ([EQUALS Global Partnership, 2024](#)).



Source: Chamberlain, S., 2024, [EQUALS Global Partnership Skills Coalition, 2023](#)



STRENGTHEN LEGISLATION AND REGULATION

Robust legislation and regulation is essential to protect women's and girls' rights. This includes action to: (i) address violence against women and girls online; (ii) strengthen the governance of health data to protect people, promote health value, and prioritise equity; and (iii) regulate artificial intelligence to protect human rights and dignity.

Address violence against women and girls online

In 2022, the UN General Assembly (UNGA) called on Member States to acknowledge violence against women and girls in digital contexts as a human rights violation and a form of gender-based violence ([UNGA, 2022](#)). UNGA has urged the introduction of effective laws, policies, and regulatory frameworks in line with existing international human rights instruments to criminalise and prohibit all forms of violence in digital contexts and to strengthen the capacities of law enforcement agencies to effectively investigate and prosecute such crimes ([UNGA, 2022](#)). Regulations and accountability mechanisms should also be established for internet intermediaries such as large platform providers and the tech sector to increase transparency and accountability in relation to TFGBV.

Investment is also needed to improve the implementation of legislation, including to raise awareness about laws, strengthen enforcement, and reduce impunity for violence against women and girls. The capacities of law enforcement agencies should be strengthened to effectively investigate and prosecute crimes related to online gender-based violence.

A multi-sectoral response is required to address gender-based violence, and health systems have an important role to play in it ([WHO, 2021](#)). This includes “supporting long-term efforts to sensitise, train and support health professionals at all levels to provide a safe and effective response for gender-based violence survivors” ([WHO, 2021](#)). Long-term prevention of violence against women and girls relies on fostering social norms that support non-violence and gender-equitable relationships and promote women's empowerment through comprehensive and evidence-based whole-of-government strategies ([UNGA, 2022](#)).

Strengthen the governance of health data to protect people, promote health value, and prioritise equity

Digital health has significantly increased the generation of health data. To ensure that this data is governed effectively and equitably, a strong legislative and regulatory framework is essential to: protect people (e.g. data privacy and rights, and mitigating and managing the risks of data breaches and misuse); promote health value (e.g. through responsible data use for the public benefit); and prioritise equity. This needs to be complemented by transparent accountability mechanisms and avenues for redress in the event of data misuse.

Recognition of the need for more robust approaches to data governance has been growing, including recently through the adoption of the Global Digital Compact¹¹ by governments during

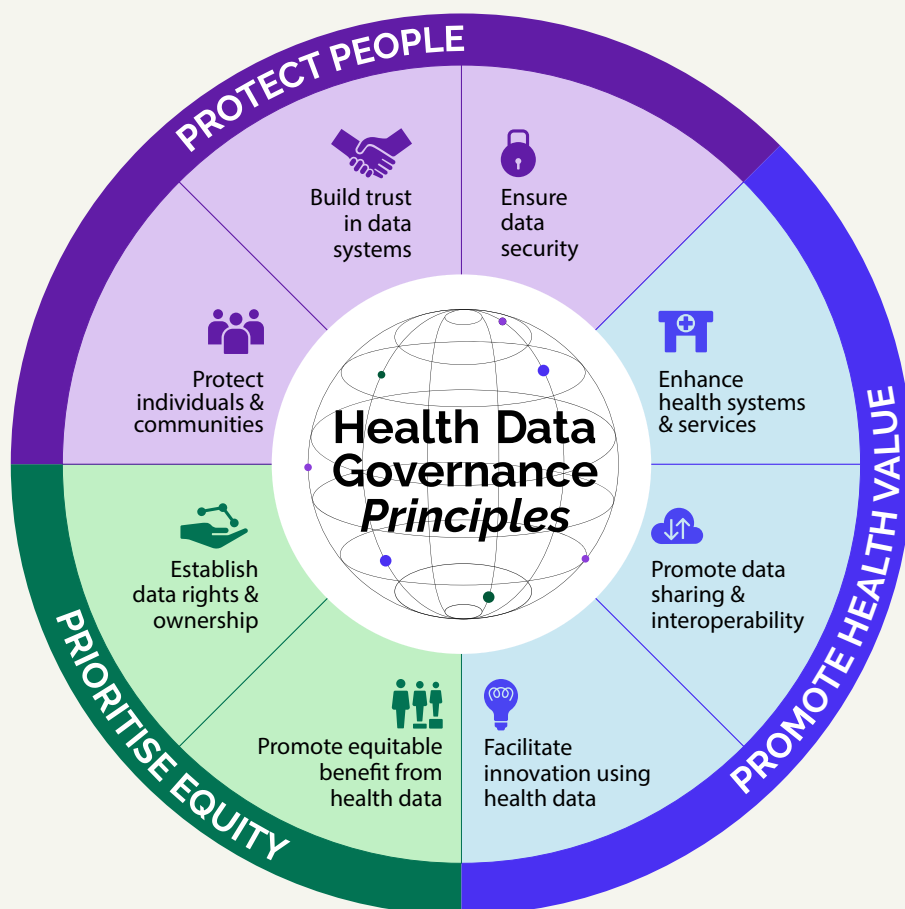
11. <https://www.un.org/techenvoy/global-digital-compact>

the Summit of the Future in September 2024. Among many other global and national initiatives, Transform Health and partners have been supporting efforts to improve health data governance, including stewarding the development of equity- and rights-based principles (box 3) and a model law on health data governance (box 4). This is alongside efforts to call for the development and endorsement by governments of a global (and regional) health data governance framework, informed by the principles and model law, through a World Health Assembly resolution and regional processes. This could help pave the way for stronger national legislation and regulations by fostering consensus and commitment around a global standard, and providing a flexible framework that governments could leverage to enhance national approaches.

BOX 3

Equity and rights-based health data governance principles

The health data governance principles bring a human rights and equity lens to the use of data within and across health systems. They aim to align policymakers and other stakeholders around a shared vision of equitable health data governance, where all people and communities can share, use and benefit from health data - maximising the public value of health data whilst protecting individual rights. The principles have been endorsed by more than 170 organisations and governments.



Source: [Transform Health, 2022](#)

BOX 4

Model law on health data governance

Transform Health, Africa CDC, OECD, Asia eHealth Information Network (AeHIN), Pan African Health Informatics Association (HELINA), RECAINSA, and Young Experts Tech for Health (YET4H) have been supporting the **development of a draft model law on health data governance**, which could form the basis of a global and regional framework. It has been **developed through a consultative process, engaging nearly 1000 stakeholders and experts** across the globe.



As a template law, it provides a blueprint and flexible framework that can be used by countries (fully or in part) to support efforts to strengthen national laws and frameworks on health data governance. It articulates core elements, legislative guidance and reference legal text that can suit the legal systems of different countries. The Model Law is designed to be non-prescriptive and allows for flexibility and adaptability to local contexts and needs.

Source: [Transform Health, 2024b](#)

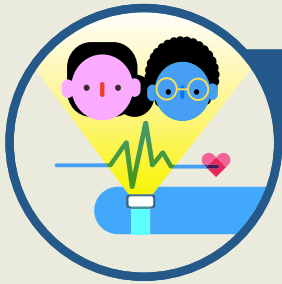
Regulate artificial intelligence to protect human rights and dignity

Regulation of AI is necessary to ensure its ethical use, protect individuals, and maintain public trust. According to Stanford University's AI Index, a number of nations, including European Union members and the United States, enacted significant AI-related policies in 2023, and AI was mentioned in the legislative proceedings of 49 countries ([Stanford University, 2024](#)). However, there is no standard approach to regulating AI nationally. Rather the legislative landscape is fragmented, ranging from comprehensive legislation, to focused legislation for specific use cases, to voluntary guidelines and standards. ([IAPP, 2024](#)).

Legislation to regulate AI in health should be based on ethical principles and prioritise equity and rights. In 2021, WHO defined a set of guiding principles that provide detailed recommendations for: (i) protecting human autonomy; (ii) promoting human well-being and safety and the public interest; (iii) ensuring transparency, explainability, and intelligibility; (iv) fostering responsibility and accountability; (v) ensuring inclusiveness and equity; and (vi) promoting AI that is responsive and sustainable ([WHO, 2021b](#)). If legislation to govern the use of AI in health was based on these principles and was effectively implemented, it would go a long way towards mitigating substantial risks to women and girls.

CALL TO ACTION

Digital health transformation offers an important opportunity to help close equity gaps in health access and outcomes. However, there is a pressing need for advocacy, investment, and action to establish the foundations for a gender equitable digital health ecosystem to advance universal health coverage. For this to happen, we call on decision makers and all stakeholders to prioritise the following actions.



MAINSTREAM GENDER IN DIGITAL HEALTH

- 1 Increase gender expertise in government bodies responsible for digital health, and in organisations designing and implementing digital health solutions and programmes.
- 2 Integrate gender indicators into health system processes and digital health programmes, including in theories of change, functional and technical specifications, and monitoring, learning, and evaluation plans.
- 3 Root human-centred design in gender analysis and participatory approaches that involve women and girls who are most affected by the problem.
- 4 Increase the number of women in leadership and decision-making roles in digital health.



INVEST IN PEOPLE

- 1 Invest in addressing the health worker deficit, to extend the reach of digital health services to unconnected populations.
- 2 Invest in digital infrastructure and technical support for health workers, including reliable electricity, broadband connectivity, and functioning devices.
- 3 Invest in building the digital literacy of health workers, women, and girls.



STRENGTHEN LEGISLATION AND REGULATION

- 1 Introduce, implement, and enforce laws to tackle violence against women and girls online.
- 2 Strengthen legislation and regulations that govern health data to protect people, promote health value, and prioritise equity.
- 3 Regulate artificial intelligence to protect human rights and dignity.

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