

GLOBAL BROADBAND DEVELOPMENT: DIGITAL SKILLS

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ABSTRACT

Regulation have shifted from focusing on basic access to telecommunications and the internet to recognizing different types of digital inequalities and their implications for access to education, healthcare, e-government services, employment opportunities, and participation in the digital economy. This paper presents the first part of a review of global broadband technology development, based on the findings of the ITU report "Status of Broadband Targets." Explore solutions to making broadband policy universal and broadband more accessible. It will also address issues of global internet coverage. It is the second part of the paper "Broadband as key digital infrastructure", continuing this topic, provide an overview, which examines promoting digital skills development, increasing the use of digital financial services, connecting small and medium-sized enterprises to the internet, and bridging the gender digital divide.

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Introduction

The global broadband market is moving steadily forward, with fiber optics continuing to lead the way. In the first quarter of this year, the number of fixed broadband subscribers reached an impressive 1.45 billion, showing steady growth after a slight decline at the end of last year.

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According to Point Topic, 17.6 million new connections were added in the first quarter, with fiber optics accounting for the bulk of the growth, along with wireless technologies to a lesser extent. Satellite, on the other hand, saw a decline in subscribers, but this is likely temporary, and we'll see changes in future reports. The first quarter's growth rate was 1.22%, significantly higher than the previous quarter's growth rate of less than 1%, the lowest since 2019. For the past nine quarters, excluding the most recent, global growth has fluctuated between 1.2% and 1.9%.

The market recovery is largely driven by subscriber growth in East Asia, particularly in China, which accounts for 50.2% of the region's global market share. China is actively developing its space program, recently launching a new batch of LEO satellites as part of the G60 Starlink project, which is designed to compete with SpaceX's Starlink project. By the end of next year, more than 10,000 satellites of the G60 Starlink constellation, also known as Qianfan, are expected to be in orbit.

Meanwhile, home broadband access via fixed wireless access (FWA) is becoming increasingly popular in some global markets, such as the US, Canada, and Italy. Overall, wireless broadband (primarily FWA/5G and fixed LTE) saw connection growth of 8.1% in the first quarter.

Point Topic attributes this growth to demand for connectivity in remote and underserved areas where wired infrastructure is impractical, as well as the desire of some consumers to migrate from traditional broadband services.

Despite impressive growth, wireless broadband still holds a small market share compared to fiber and, to a lesser extent, cable. Fiber remains the clear leader, accounting for over 70% of total connections. The growth in fiber demand is primarily seen in developing countries—six of the ten fastest-growing markets are in emerging economies.

Thus, fiber still leads the global broadband market, but competition is increasing. Satellite communications, FWA and other technologies pose a real threat, and it will be interesting to watch how this competition develops in the future.

The ITU report [1] notes that policymaking has evolved to include new and emerging topics such as digital transformation and artificial intelligence. Significant progress has been made in ensuring accessibility, with the mobile broadband access target achieved globally, while the fixed broadband access target has not yet been met. More than two-thirds of the population regularly uses the internet, and digital skills generally continue to develop as more people become online.

Broadband infrastructure has proven versatile, providing broadband internet access as well as new services and applications, such as distributed computing and artificial intelligence (AI), that rely on broadband infrastructure.

Digital skills

Digital literacy is often identified as one of the main causes of digital exclusion and often among the top answers when people are surveyed about why they do not use the Internet. Digital skills are vital for leveraging ICTs for economic prosperity, human rights, peace and social well-being, as well as acquiring other knowledge and skills (e.g. the use of online platforms such as Duolingo and Babbel for language learning). This Advocacy Target calls for 60% of youth and adults to have achieved at least a minimum level of proficiency in sustainable digital skills by 2025.

This is a target beset with measurement problems. Initial frameworks sought to distinguish between basic, intermediate and advanced skills. More recently, frameworks seek to evaluate ICT skills based on competencies and capabilities and whether individuals can perform certain activities with different types of digital skills: communication & collaboration; problem-solving; safety; content creation; and information & data literacy:

- Communication/collaboration refers to sending messages (e.g. e-mail, messaging service, SMS) with attached files; making calls over the Internet; participating in social networks; and taking part in consultation or voting via the Internet.

- Problem-solving refers to finding, downloading, installing and configuring software; connecting and installing new devices; transferring files or applications between devices; electronic financial transactions; doing an online course; and purchasing or ordering goods or services.

- Safety refers to changing privacy settings and setting up effective security measures.

- Digital content creation refers to using copy and paste tools; creating electronic presentations; using basic arithmetic formulae in a spreadsheet; editing online text, spreadsheets, presentations; and uploading self/user-created content.

- Information/data literacy refers to verifying the reliability of information e.g. getting information about goods or services, reading or browsing newspapers, seeking health-related information.

However, competencies can generally only be measured by in-depth surveys at the local or national level, making comparisons between countries at the international level very difficult. Such local and national surveys are costly and expensive to carry out, meaning that they are mainly confined to high-income countries and regions. Relatively few countries therefore provide data for digital skills, and rarely for all skill areas, due to the cost and difficulty involved.

Further, when digital skills are measured by online surveys, a sample self-selection problem may arise (whereby people without the digital skills to go online or respond to survey are de fact excluded from the survey in the first place). Self-reporting of ICT skills is also very subjective (e.g. some people with strong digital skills may be modest about their achievements, compared to arrogant people who may over-report their paltry digital skills).

Perhaps not surprisingly, communication/collaboration scores the highest across all countries for which data are available, followed by information/data literacy. Upper middle-income countries score lowest for safety and problem-solving.

Another interesting development is the involvement of the private sector in boosting and promoting digital skills in different aspects of life. Insight 5 presents the experience of KT's AIVLE School in promoting digital skills and pioneering AI education. Another interesting development is the involvement of the private sector in boosting and promoting digital skills in different aspects of life. Insight 5 presents the experience of KT's AIVLE School in promoting digital skills and pioneering AI education.

Pioneering Inclusive AI Education in Korea

In an era defined by rapid technological advancements, the need for accessible and inclusive education in artificial intelligence (AI) has never been greater. KT's AIVLE (AIVLE means 'AI + Vision + abLE') School emerged in response to this rising demand, and the program was designed to have participants engage in real-world projects, receive mentorship from industry experts, and gain exposure to AI applications across various domains. It has demonstrated significant impact over the past three years. With approximately 1,800 trainees enrolled, it has a successful employment rate of around 60%, showcasing its effectiveness in preparing participants for the workforce.

The programme aims to be inclusive through its platform-based approach, allowing access to high-quality education from anywhere with Internet and a laptop. It also offers a consultant track, that addresses the market's need for non-IT/humanities majors to participate, and this approach helps ensure individuals from diverse academic backgrounds can contribute to the burgeoning field of AI.

Through collaboration with the government, KT AIVLE School provides free education, ensuring accessibility regardless of income. By bridging the gap in access to AI education and job opportunities, KT's AIVLE School is spearheading a movement towards a more equitable and empowered workforce in the Republic of Korea [1].

Mzansi Digital Learning, an educational platform co-developed by Vodacom and Microsoft, is dedicated to bridging the digital skills gap in South Africa. It offers a broad spectrum of free, zero-rated courses, ranging from basic digital literacy to advanced topics like cybersecurity and generative AI, designed to democratize education and empower all South Africans.

The platform's comprehensive curriculum caters to various levels, ensuring continuous skill advancement in line with individual ambitions. It has made significant strides since its inception, with over 100,000 registered learners, many of whom have successfully completed courses and obtained internationally recognized certifications. This initiative extends its impact beyond individual learners, by fostering a digitally skilled population and contributing to broader societal goals of digital inclusion. A digitally literate society is better equipped to participate in the economy, drive innovation, and address social challenges.

Through Mzansi Digital Learning, Vodacom is contributing to the creation of a digitally proficient and competitive society. The platform's success in advancing digital literacy aligns with the national agenda of reducing unemployment and promoting economic growth through education and skill-building, making it a transformative force in South Africa's journey towards a digitally inclusive future [2].

Digital financial services hold immense potential to transform financial inclusion and allow the most vulnerable within society to access basic financial services including savings accounts, payments, and credit.

The nature of digital financial services continues to evolve –traditional banking services are supplemented and, in some cases, replaced by mobile money services, cryptocurrency transactions and, increasingly, e-wallet services. For example, in China, Chinese residents can now pay for shop transactions by scanning their face, while overseas mobile phone numbers can be used to register Alipay, WeChat Pay, and to make payments either from overseas bank cards, mobile wallets or for some regions, overseas e-wallet for payments by scanning codes.

The GSMA finds international remittances and merchant payments were among the fastest-growing mobile money use cases in 2023, driven in part by the consequences of the COVID-19 pandemic.

Demand for mobile financial services is likely to remain high among unbanked and often marginalized populations. Among registered mobile money account holders, some 1 billion people are still not active regularly on a monthly basis, a big opportunity for the industry to deepen financial inclusion and economic participation.

Beyond infrastructure, increasing use of digital financial services relies on changing people's attitudes and preferences for these services. It also needs financial literacy and awareness, and successful partnerships among the government, financial institutions, and technology providers to provide the training necessary to use digital financial services effectively and safely.

Digital Skills and Digital Financial Capabilities in the UK

In conjunction with a number of partners, Lloyds Bank (2024) runs an annual survey into digital and financial capabilities of UK consumers. The results provide evidence that financial and digital capabilities have different profiles, although they are linked. For example, financial capabilities remain broadly the same among the UK population, independent of age (prudent and less responsible financial behaviour in terms of spending and/or savings habits are relatively independent of age). However, digital capabilities clearly diminish with age (Figure 1).

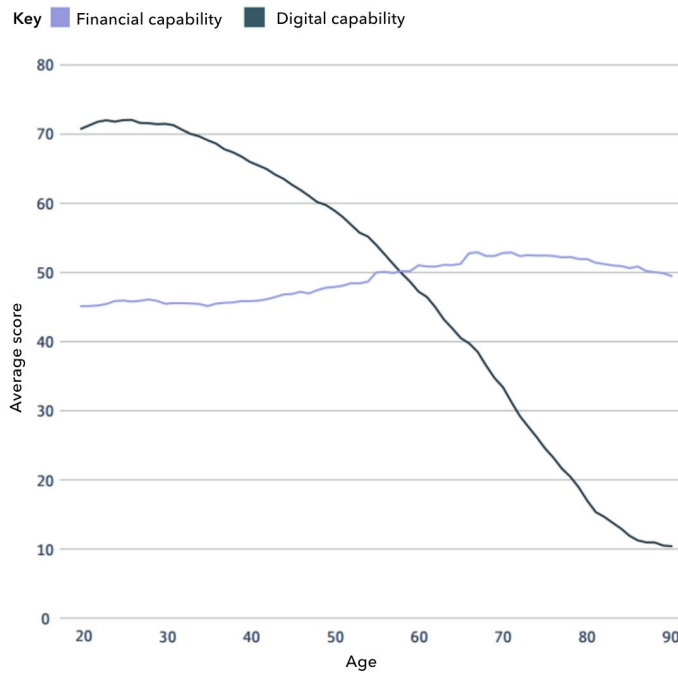


Figure 1. Financial and digital capability in the UK by age, 2023 [1]

Financial and digital capabilities are still linked in some senses, however. Lloyds Bank finds that, for those in the high digital capabilities segment, shopping around for cheaper deals online has helped people to save money during the cost-of-living crisis. The Internet can provide individuals (for 30% of those surveyed) with cheaper deals that can help them with the cost of living. Comparison shopping is not the only way being online can help individuals to save money and manage their finances more effectively. Using budgeting tips (12%) and looking at spending analytics via an app (12%) have also helped people save money. The Internet can enable consumers to manage their finances more effectively.

Along with opportunities come risks, however. People with low digital capabilities might seem more likely targets for some scams, but in fact, time online and exposure are bigger factors in being targeted online. Those with the highest digital capability are more than 11 times more likely to be scammed than those with the lowest digital capability. Looking at victims who have actually been scammed, 50% were in the Very High digital segment, while 4% were in the 'Very Low' segment. Length of exposure to online risks through time online may effectively outweigh any degree of digital capabilities.

Digital Financial Inclusion in Jamaica

There has been a steady increase in the number of individuals and businesses in Jamaica using digital payment platforms, including mobile payments, online banking and electronic payments. According to one survey in 2022, 69% of people had some form of account – 10% had a credit union account, 58% had a bank account, and 1% a mobile money account.

On the supply side, a few pilot platforms were tested prior to 2022, but did not prove successful. In 2022, the Bank of Jamaica introduced the Lynk digital wallet, as well as Jamaica's first digital currency, JAM-DEX. At least two banks and one telecom service provider have developed plans to introduce digital wallets, including one mobile wallet (a type of digital wallet based solely on mobile devices, including phones or smart watches). These developments enabled the Jamaican Ministry of Labour and Social Security (MLSS) and World Food Programme (WFP) to deliver cash transfers to vulnerable populations affected by COVID-19 via a digital payment provider, WiPay.

Through collaboration among the MLSS, WFP and WiPay, adjustments were made to programme delivery, including a dashboard to track distribution and redemption of cash. This dashboard included real-time updates on uptake per location, which then facilitated swift decision-making in deploying mobile payment units in hard-to-reach communities. WiPay also increased its network of agents from 25 agents at the end of 2021 to over one hundred by April 2022.

Problems identified among potential users included a distrust of digital financial services, a fear of being scammed, and a clear age gap in knowledge of and use of digital financial products and services, for both men and women. Among retailers, a digital readiness survey found that retailers had limited knowledge and use of digital payments. 60% of retailers indicated that people in their community do not use digital wallets, while another 34% did not know if their customers used digital wallets.

Micro-, Small- and Medium-sized Enterprises (MSMEs), both formal and informal, make up over 90% of companies worldwide, accounting for 70% of total employment and up to 50% of global Gross Domestic Product (GDP). Broadband connectivity can enable MSMEs to reach new markets, increase their competitiveness and enable them to participate in global market. Broadband connectivity is increasingly vital for accessing digital financial services and e-government services.

The UN Broadband Commission's Advocacy target focuses on improving the sectoral connectivity of MSMEs by 50% over the time period 2018 to 2025, which is relatively ambitious. For example, a sector in which MSMEs are 60% unconnected in 2018, will have only 30% unconnected by 2025. However, data availability for MSMEs globally is very sparse – where data exists, data mostly describes large firms and multinationals, making it difficult to assess this target for SMEs.

MSMEs face considerable and numerous challenges in broadband adoption, including the availability of technologies and suitable apps and services; the ability of SMEs to plan, finance, implement and optimize transformation through digital skills. For a start, adopting digital technologies is often costly. Large firms are generally more resilient, and have greater opportunities to access finance, and can spread these investments over either consumers or different years. In contrast, small businesses may have reduced access to finance, and are less able to pass on the costs to customers.

Many entrepreneurs and firm owners worry about cybersecurity and data privacy, as well as other risks. As a result, MSMEs are less likely to have a strategy to deploy ICT, and are more likely to view ICT training as a 'luxury item' beyond their budget, instead of an investment to save time and costs. Limited budgets, lack of skills and expertise, and concerns about safety and compliance can hinder the ability of small firms to fully embrace digital transformation.

As a result, small businesses may risk falling behind their larger counterparts, and face difficulties in competing effectively in an increasingly digital and an increasingly global marketplace. Digital technologies are often cited as opening up access by firms to foreign markets, but this is a two-way street, and depending on local regulation, digital technologies may also permit foreign firms to enter previously relatively protected markets.

To address these challenges, as well as data availability, the Broadband Commission Working Group on Connectivity for MSMEs, co-chaired by the GSMA and the International Trade Centre (ITC), researched and released the Making Digital Connectivity Work for MSMEs report [3], which outlines barriers and opportunities to MSME connectivity.

Connectivity data disaggregated by enterprise size is generally available for high-income nations, although not always for micro-enterprises. For most low- and middle-income countries, aggregated data on enterprises with Internet access is rarely available. The nature of Internet connectivity also matters – a single person micro-enterprise might find having a smartphone with wireless access sufficient to carry out most operations.

Europe has good SME data availability, due to Eurostat's regular surveys. In 2023, a vast majority (94%) of all EU enterprises⁶ used a fixed broadband Internet connection, while 78% had a website, 61% used social media, 50% used e-business applications and 22% made e-commerce sales. These broadband connectivity stats were sharply defined by business size, however (Figure 2, top graph). For example, in 2023, 99% used a fixed broadband connection, including 93% of small enterprises and 97% of medium-sized enterprises with broadband access.

In 2023, 45% of all EU enterprises used cloud computing services and 61% used social media. Large enterprises enjoyed significant advantages over all other sizes of firms in terms of access to cloud computing (between 10 and 20 percentage points higher), use of social media, e-commerce and AI (between 1 and 15 percentage points higher) – Figure 2, bottom graph.

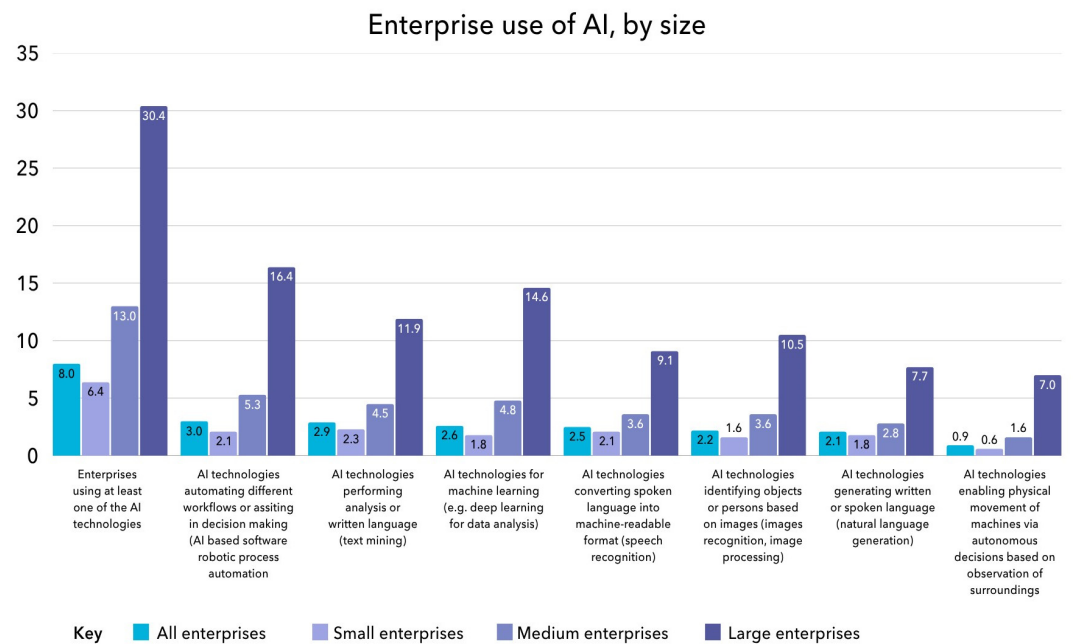
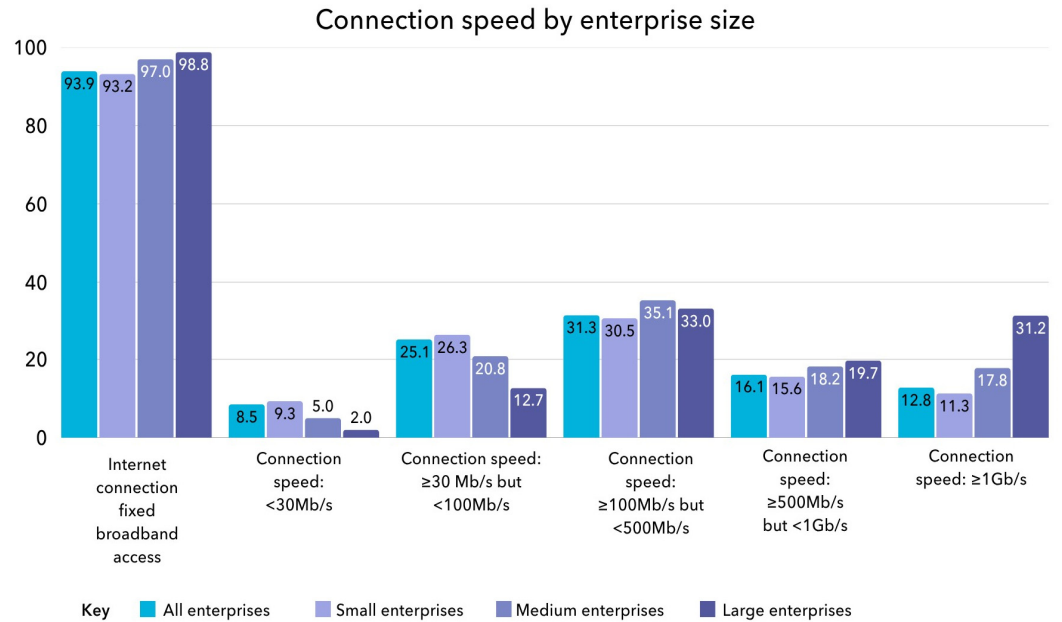


Figure 2. Enterprises with fixed broadband connection in the EU and using AI technologies, 2023 (% enterprises) [1]

By comparison, an IFC/World Bank survey of 3,325 microenterprises enterprises in seven African countries found low levels of smartphone and computer use. Use of the Internet for business purposes was around 7% on average, ranging from 24% in South Africa to 1% in Rwanda. Computer ownership is also low with over 90% of businesses surveyed in Ghana, Kenya, Mozambique, Nigeria, Rwanda, Tanzania and Uganda reporting not having one. Most cited not having a need for Internet access or computers in their business. A UNDP survey focusing on MSMEs in Kenya revealed that they were adversely affected by the pandemic, with one out of every 10 enterprises surveyed indicating a shutdown of their businesses due to the pandemic.

Bridge the gender digital divide aims to ensure that the benefits of broadband Internet can reach everyone, regardless of gender.

According to the latest ITU estimates, in 2024, 70% of all men used the Internet in 2024, compared to 65% of all women (Figure 3). These proportions have increased marginally from 2022, when 69% of all men were using the Internet, compared to 63% of all women.

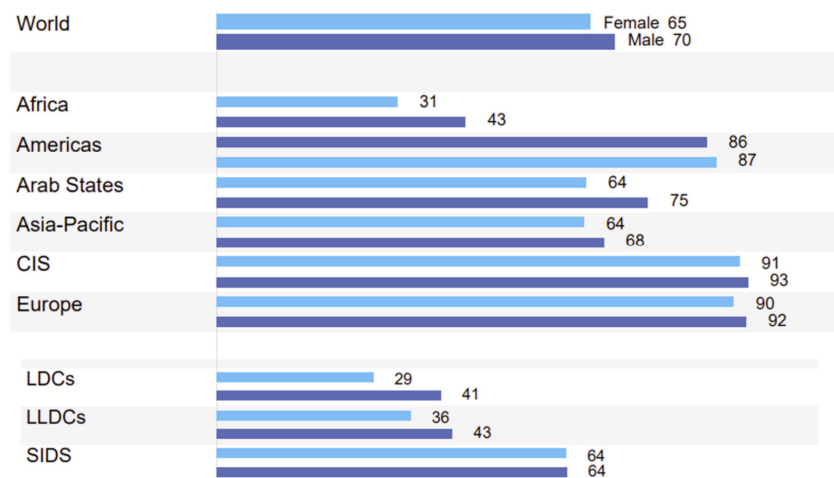


Figure 3. Percentage of female and male population using the Internet, 2024 [1]

Globally, 189 million more men than women used the Internet regularly in 2024 (compared with 244 million in 2023 and 277 million in 2021). The number of women online is therefore ‘catching up’ with the number of men online. Gender parity increased from 0.90 in 2019 to 0.92 in 2023, and 0.94 in 2024 indicating that the gender digital divide is narrowing overall. This improvement is also reflected at the level of regions and country groups, with one notable exception – in the group of LDCs, gender parity actually decreased from 0.74 in 2019 to 0.70 in 2024.

Generally, the regions and income groups with the highest Internet use also have the highest gender parity scores (Figure 4, left graph), including high-income countries, SIDS, the Americas, CIS countries and Upper Middle-Income Countries (UMICs). In contrast, in the group of Least Developing Countries (LDCs), gender parity has actually decreased, from 0.74 in 2019 to 0.70 in 2024 (shown as diverging gradient between the male and female increases in Figure 4, left graph). Meanwhile, LLDCs have shown only limited progress towards gender parity since 2019.

Gender parity scores are generally lower in terms of mobile phone ownership with larger and more persistent gender disparities in terms of ownership.

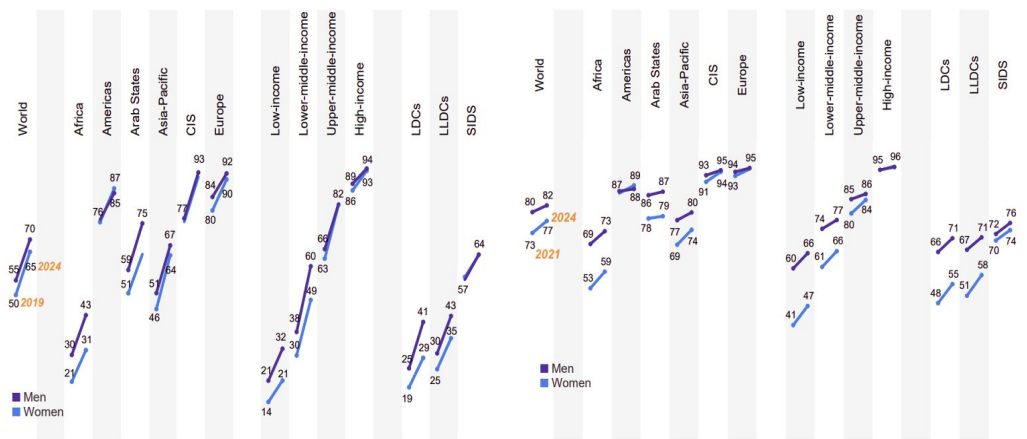


Figure 4. Percentage of individuals using the Internet by gender, 2019 and 2024, and percentage of individuals owning a mobile phone by gender, 2021 and 2024 [1]

Notable gender gaps in mobile Internet access persist in LMICs. The GSMA's Mobile Gender Gap Report 2024 [15] found more women in LMICs are using mobile Internet than ever before, but adoption is slowing and a significant gender gap remains. In 2024, women are 15% less likely than men to use mobile Internet (Figure 5, left graph), compared to 19% in 2023, which means there were 265 million fewer women than men using mobile Internet in these countries.

Mobile gender gaps are widest in Sub-Saharan Africa and South Asia, where over 60% of the 785 million unconnected women in LMICs live. Although the gender gap was widest in South Asia, this gender gap has been reducing fastest (Figure 5, right graph), from 41% to 31%, driven primarily by India where women's adoption increased while men's remained unchanged. The gender gap in mobile Internet narrowed slightly in Sub-Saharan Africa between 2022 and 2023 (from 36% to 32%), but Sub-Saharan Africa's gender gap is still stubbornly similar to what it was in 2017 (34%). The report offers detailed recommendations for operators, Internet companies, policy-makers and regulators and the development community, concluding that concerted action is needed by all stakeholders to close the mobile gender gap.

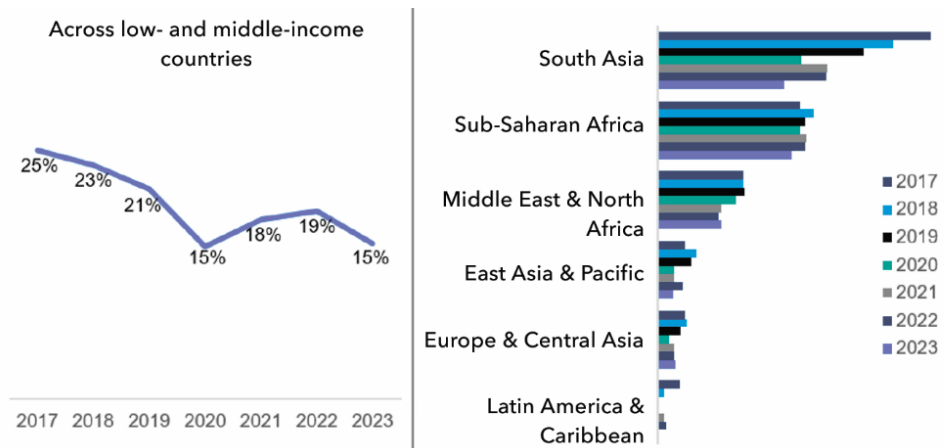


Figure 5. Gender gap in mobile internet adoption across LMICs, and by region, 2017-2023 [1]

Today, gender equality debates are becoming more nuanced and have moved far beyond device ownership and access and towards female participation in Science, Technology, Engineering, Arts and Mathematics (STEAM). Some argue that digital technologies may be less relevant, less functional and ultimately, less helpful for women and girls, unless women are actively involved in designing, developing and deploying technologies.

UNICEF's Game Changers Coalition programme specifically promotes digital skills development and bridging the gender digital divide in seven countries (Armenia, Brazil, Cambodia, India, Kazakhstan, Morocco and South Africa), reaching 100,000 girls and teachers to date.

Supported by the Ministry of Foreign Affairs in Sweden, and co-designed with leading gaming industry partners, the programme infuses innovation into traditional Science, Technology, Engineering, Arts, Maths (STEAM) programming through game development, with a specific purpose of closing gender gaps in STEAM learning and experiences. Adolescent girls participating in this programme learn how to design, code and present their own games, learning digital and tech skills that are essential in the 21st century economy, including high-growth and high-income jobs in gaming and wider tech industries. On average, a participant receives 100+ hours of hybrid instruction to learn coding, design, storytelling for game creation, she will work in a team of peers to develop a game using her imagination and creativity, and participate in a 2-day game creation hackathon "Game Jam."

In Cambodia, the Ministry of Education, Youth and Sport have scaled the teacher curriculum on the national teacher training platform; in Armenia, the regional government of Syunik opened three Innovation Labs, where game creation is taught along with other digital skills; in Kazakhstan, IT Hubs from all over the country are embedding some programme components to attract more females to STEAM careers and further grow the tech industry in the country.

In addition to skills building and experiences for girls, the Game Changers Coalition aims to convene a bold and transformative industry movement in alignment with like-minded companies in the gaming and tech industry, and other shared-purpose public and private partners. Partners who have been engaged in the process to date include the likes of Electronic Arts, Microsoft, Sony Entertainment, Roblox, Ubisoft and Lego Group. Activities include joint co-creation of policies and practices for the industry to enhance Diversity Equity and Inclusion (DEI) efforts and thought leadership demonstrating what the future of tech looks like, as an empowering, inclusive and safe space for all children and adolescents.

And gender-based discrimination may not just be about entry and access to STEM jobs. In September 2024, the IMF published a report about how women may lose out on STEM jobs, while the European Social Survey found that tech may create additional work for women, in addition to their jobs, as they take on more of the tasks involved in 'social connectedness', compared with male patents, guardians or care-givers.

The Vodacom Code Like a Girl Programme, initiated in South Africa in 2017, aims to bridge the gender gap in ICT by equipping underprivileged young girls with STEM skills through a structured ICT training. The programme fosters problem-solving, sequential thinking, creativity, and design skills via coding. Open to females aged 14-18, it requires no prior school subject knowledge. Offered in a hybrid format, the programme includes:

- A virtual self-paced learning environment for those with computer and Internet access, spanning a month with IT support.
- A weeklong boot-camp for those without such access, hosted at universities, Vodacom Foundation computer labs, and schools nationwide.

The curriculum spans Level 1 to Level 5, starting with basic ICT and programming skills, such as web-page design, and advancing to more complex topics. Accredited by the Sector Education and Training Authority, the programme has benefited over 6000 South African students in enhancing their coding and ICT skills. Internationally, the programme has been implemented across Vodacom's markets in Lesotho, Mozambique, DRC, Tanzania, Vodafone Egypt, and Safaricom's markets in Kenya and Ethiopia, with over 16,000 girls having now graduated from the programme.

Conclusions

Importance of broadband Internet for sustainable development remains clear, as our societies continue to grow and develop, and more and more key services either move online or embed digital services.

Targets can play a key role in informing, influencing and shaping policy priorities at the national, regional and global levels. Despite progress in some areas, the number of countries with national broadband plans has stabilized, but Plans continue to become more comprehensive and extend beyond broadband and connectivity issues into holistic Digital Agendas.

Promising new applications in digital financial services are being developed, but data at the global level are relatively outdated.

There has been some progress in digital skills and getting MSMEs online, but problems with data availability mean that progress at the global level is difficult to measure.

Target for gender equality in access to broadband has been achieved by a few individual countries, although this target has not been achieved at the global level.

Broadband stakeholders are well-positioned to deliver on the promise and opportunities of broadband for improving development outcomes.

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