WORLD BANK GROUP GENDER THEMATIC POLICY NOTES SERIES: **EVIDENCE AND PRACTICE NOTE**

INCREASING ACCESS TO TECHNOLOGY FOR INCLUSION

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OVERVIEW

Digital technology has introduced innovative business models and changed how society operates. Through digital technology, access to services can be increased and more people can be reached, particularly those from underserved groups, such as women, people in rural communities and persons with disabilities. Yet, gaps in access to digital technology deepen inequalities and have social costs and economic implications. Countries have lost out on $1 trillion in GDP due to the digital exclusion of women (Alliance for Affordable Internet, 2021). Grounded in examples extracted from research and World Bank Group operations with client countries and clients in the private sector, this policy note presents interventions that aim to close the gaps in digital inclusion. These examples demonstrate that the public and private sectors have significant roles to play in ensuring digital technology reaches women, aligns with their needs, and strengthens their economic empowerment. This policy note provides impetus for the World Bank Group to continue strengthening its work on the digital inclusion of women and underserved groups.

ACCELERATE EQUALITY | WORLD BANK GROUP Gender

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Digital technologies are the building blocks of a new, rapidly changing world. Over the past few decades, progress in basic internet services, automation, digital financial services and social media have changed fundamentally human interaction, including how women participate in the global economy.

The sharp increase in the uptake of digital technology during the COVID-19 pandemic provided a clear example of technology's potential and risks. With restrictions on movement and social interactions, governments and organizations accelerated technology adoption (Amankwah-Amoah, Khan, Wood, & Knight, 2021). Digitalization allowed for continuity in providing people access to work, education, and health care services. In some sectors, the acceleration in digitalization brought great benefits. E-commerce's share of global retail trade rose from 9.5 percent in 2019 to about 12.4 percent in 2020 and revenues increased by 50 percent in some regions, such as the Middle East and North Africa (Katz & Jung, 2021).

Connectivity and access to the internet became indispensable during the pandemic. The UN's International Telecommunication Union (ITU) estimates that internet traffic worldwide increased by approximately 30 percent during the pandemic and the global penetration of broadband increased by 10 percent, with a significant increase in households adopting fixed broadband in all regions of the world (Katz & Jung, 2021). Still, many had poor or no access to the internet, meaning digitalization excluded them further (Beaunoyer, Dupéré, & Guitton, 2020; ITU, 2022).

Digital technology has introduced innovative business models and changed how society operates. Digital technology has expanded access to economic opportunities and new ways to provide access to services such as education, healthcare, and information, particularly to those from underserved groups and who are harder to reach, such as women, people in rural communities, and persons with disabilities. As digital technology restructures the labor market and consumption patterns, technology helps break existing social norms and gender stereotypes

that often prevent women from entering the labor market (Lechman & Paradowki, 2021; Anwar, 2022). Many women join the digital economy as it provides opportunities to generate income, often in the formal economy, and to gain new productive skills, including digital and professional skills. Digital technology can also enable access to financial services, such as mobile money. In some emerging markets, where paid work is a critical solution to eliminate gender disparities, many women use digital platforms as a primary source of income (Anwar, 2022). There are barriers to the digital inclusion of women that limit their participation in the digital economy, as discussed later in this paper; yet, increasing women's participation in the labor market through digital technology contributes to more inclusive and equitable societies and to economic growth. Women's economic empowerment translates into their capacity to make their own choices and contributes the redistribution of economic power between genders (Lechman & Paradowki, 2021).

Digital technology is also generating large amounts of data. Digitally enabled forms of identification, for instance, can help those who lack an official identification to access services offered by governments and the private sector. It can also help service providers to access customer or user data to improve the delivery of services (Dahan & Sudan, 2015). Women in emerging markets are using digital IDs to open digital financial account and accessing government services. As the lack of sex-disaggregated data is a critical barrier to achieve progress towards gender equality, digital technology creates new avenues to generating data that can help identify where the gender gaps exist for public and private service providers. By generating better and more accurate data, policy and decision-makers can take informed actions to address gender inequalities.

Yet, as much as it can act as an equalizer, digital technology can exacerbate existing inequalities due to prevailing gaps in access and availability. Furthermore, it can also pose risks to the population, such as gender-based online violence and harassment[1] (Hinson, Mueller , O'Brien-Milne, & Wandera, 2018). The risks can undermine the expected positive effects of digitalization, particularly for underserved

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[1] Technology-facilitated gender-based violence is an action by one or more people to harm others based on their sexual or gender identity or enforcing harmful gender norms. Source: Hinson, L., 2018.

groups. Women are disproportionally and increasingly affected by online abuse, and those who experience online harassment may be pushed to leave their digital jobs or digital spaces (Hammond, Robinson, & Munoz, 2022; Wang & Affoun, 2021). In addition, accessing digital technologies can expose people to fraud and cybersecurity threats, and data breaches while also codifying existing biases through ostensibly 'neutral' algorithms (Noble, 2018). This is concerning as people's protected characteristics may be exposed and suffer discrimination as result. There is an urgent need for policy action to ensure that the future of digitalization does not continue to exclude underserved groups and that it does not cause more harm than good to society.

This policy note presents interventions that aim to close the gaps in digital inclusion. While the main focus is on digital technologies that enable connectivity and access and use of internet-enabled devices and digital platforms, the note also covers emerging topics on the implementation of frontier technologies, such as big data and artificial intelligence (AI). These emerging technologies are increasingly being used in the development sector and risk further excluding underrepresented and underserved groups.

This note is grounded in examples extracted from research and World Bank Group operations with client countries and clients in the private sector. The interventions are organized using the World Bank's pillars of the digital economy—including, digital infrastructures, digital skills, digital business, digital public platforms, digital public platforms and trust environment (such as online safety and security)—as well as other additional areas identified during the development of this note (such as social norms and the lack of sex-disaggregated data). Due to the early stage of most digital interventions, this brief does not evaluate their effectiveness and indeed measurement of effectiveness is an area where more work is needed. It is also important to note that, overall, the World Bank Group portfolio on digital development remains primarily focused on hard infrastructure with a growing, but still limited, portfolio of operations and investments in the digital economy and integrating digital solutions across the portfolio of WBG interventions. The pool of interventions that explicitly focus on inclusive digital technologies is relatively small, but there is a strategic opportunity to scale up the enabling role of digital technologies in World Bank Group analytics and operations, especially at the country and regional levels. The brief concludes with a list of key recommendations for Bank Group operational and analytical activities.

Defining digital inclusion and equity

The UN Office of the Secretary-General's Envoy on Technology defines digital inclusion as "equitable, meaningful, and safe access to use, lead, and design of digital technologies, services, and associated opportunities for everyone, everywhere" (United Nations, n.d.). Digital equity refers to the context in which all people have the capacity and opportunity for full participation in the digital economy. Digital equity is an equally important aspect of inclusion, and some of its key dimensions include the following (Digital Future Society, 2019):

- Access to quality and affordable infrastructure (i.e., electricity and internet) and digital devices

- Awareness and digital skills (basic and advanced), as well as literacy and entrepreneurship

- Availability of digital services, products, and relevant content provided by private and public organizations for work, social, and civic engagement

- Supportive ecosystems, including legal and policy frameworks, to address gaps in affordability, identification, and financial inclusion

- Trustworthy and safe digital environment that is free of harassment

Digital inclusion and equity vary greatly across regions and countries (see Figure 1). In Africa, for instance, the average cost of 1 gigabyte (GB) of mobile internet is 8.8 percent of income while in Latin America and the Caribbean this is 3.6 percent of income (Alliance for Affordable Internet, 2021).

FIGURE 1. AFFORDABILITY OF 1GB OF DATA AS A PERCENTAGE OF GROSS NATIONAL INCOME PER CAPITA

Affordability of 1GB of data (as a % of GNI p.c.)

- >0 ≤1
- >1 ≤2
- >2 ≤3
- >3 ≤10
- >10
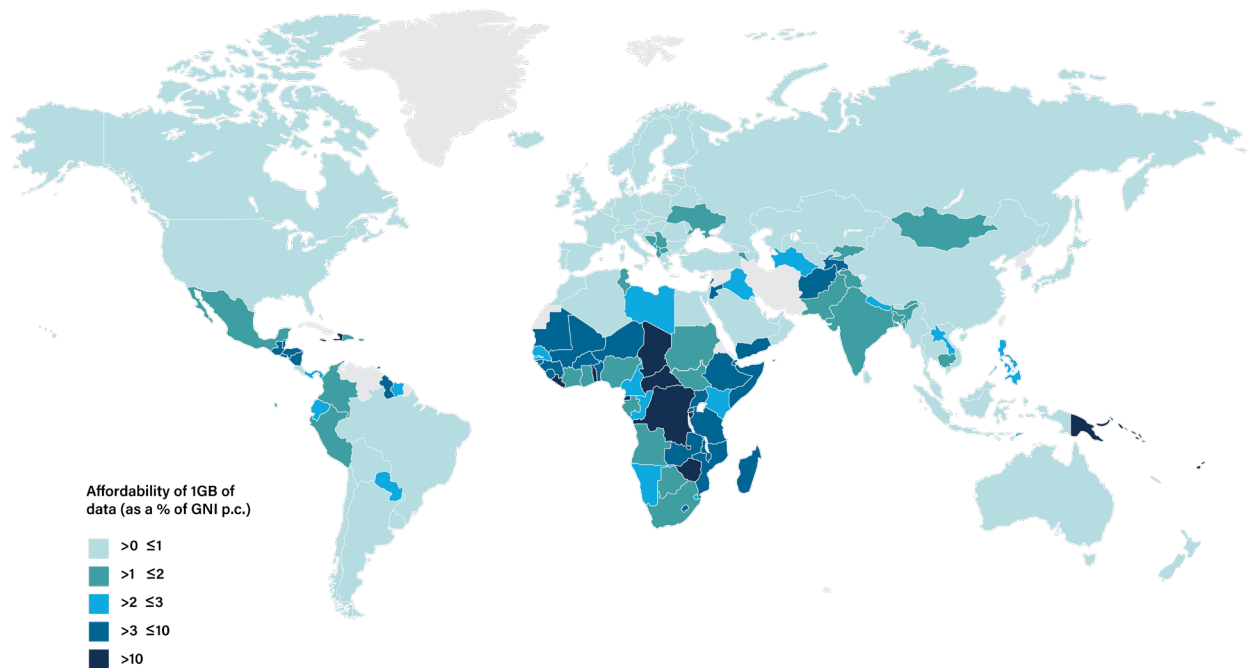
Source: Alliance for Affordable Internet

Although access to digital technology seems ubiquitous, more than a third of the global population was offline in 2021 (ITU, 2021). Gender, geographical location, income and education level, and disability seem to correlate to access and use of digital technologies. Globally, women are 21 percent less likely than men to access the internet (Iglesias, 2020). Regarding accessing the internet through mobile phones, women remain 7 percent less likely than men to own a mobile phone and are 16 percent less likely to use mobile internet (Shanahan, 2022). Furthermore, progress in addressing the mobile internet gender gap in emerging markets has stalled as a result of the COVID-19 pandemic, which disproportionately impacted women's incomes (Shanahan, 2022).

Other groups experience similar gaps. While data is limited, evidence from some low and middle-income countries indicates that people with disabilities are less likely to be owners of mobile phones and users of mobile internet (Aranda-Jan, 2021). Women with disabilities are particularly at a disadvantage (Aranda-Jan & Shanahan, 2020). People with low income and education levels and those living in rural areas are also often digitally excluded due to the costs of expanding rural connectivity, lack of digital literacy, and skill and affordability issues. For example, according to the GSMA, those in the bottom quintile in terms of income are 49 percent less likely to access mobile internet than those in the top quintile (Delaporte & Bahia, 2022).

Although mobile ownership is important, it is critical that phones enable access to the internet. Smartphones are important drivers of mobile internet use. For most people, they are the primary way to access the internet, but the access gaps in smartphone ownership are wider than that for basic or feature phones. For instance, globally, women are 18 percent less likely to own a smartphone than men (Shanahan, 2022). People with disabilities also have less access to smartphones. In Kenya, for instance, the mobile disability gap is 11 percent while in Bangladesh, it is as high as 55 percent (Aranda-Jan, 2021).

Furthermore, with increasing applications of frontier technologies, such as big data, artificial intelligence (AI) and machine learning, there are emerging risks that, if not addressed, could expose vulnerable communities and exclude underserved groups further. These technologies use algorithms to make decisions based on training data to support human decision making, reducing biases and subjectivity. Yet, biases can creep into the design of analytical algorithms. It has been well-documented how the use of AI for decision making can result in algorithm discrimination.

For example, a study of three commercial gender classification systems showed that the systems performed best for identifying lighter-skinned individuals and worst for darker women (Buolamwini & Gebru, 2018). This is a group often underrepresented in benchmark datasets. Some of the biases in data algorithms result from the lack of diversity and representation in the sector (Mateos-Garcia & John, 2019; Smith & Rustagi, 2021).

Finally, social norms constrain women's access to and usage of digital technologies. In Malawi, for example, schoolgirls are largely prevented from using smartphones due to a social perception that, in doing so, their reputation would be compromised. In India, a study found that even when women were allowed to use smartphones, they could only speak to family compared to men who were able to use them for work, entertainment, and socializing (Scott, et al., 2021). To address social norms that restrict women's access to digital technologies, customized approaches are needed to develop coalitions with local leaders and engage with household dynamics.

The need for gender-responsive digital policy and legal frameworks

In many regions, information and communications technology (ICT) and digital policies have not been developed to include the perspectives of women and underserved groups. These policies are meant to speed up digitalization as a value neutral concept, but they may exacerbate further digital exclusion (World Wide Web Foundation, 2022). Examples include limited investments in digital infrastructure that tend to be concentrated in urban areas, the lack of competitive digital services' markets, taxes on enabling digital services, and duties on the import of devices. These all constrain market development of the digital economy which disproportionately affects underserved groups and, in particular, women (Clifford, 2020).

In many countries in Sub-Saharan Africa, for example, taxes on mobile money withdrawals or digital services prohibit uptake of digital services, particularly for low-income women. In a situation where devices or services are expensive, women are often last in line for access and must rely on the men in the household to access services. These policy decisions on taxing mobile money withdrawals (where withdrawals from banks are not taxed) actively disincentivize the use of digital financial services. Achieving equal access to digital technology for men and women requires gender-responsive policies and frameworks for ICT and digital technologies that consider the needs of women and underserved groups (World Wide Web Foundation, 2022).

Data protection legislation is increasingly an area where additional policy support is needed to protect vulnerable populations. According to UNCTAD (2021), 71 percent of countries worldwide have some data protection legislation in place, although implementation and enforcement vary greatly. Uneven implementation, combined with gaps in cross-border alignment of legislation, reduces efficacy. Even in jurisdictions where legislation is being implemented, overall gender gaps in access to the justice system and gaps in its efficacy mean that ostensibly equitable legislation is not implemented equitably. For women, issues like reproductive privacy may be compromised by participation in the digital space. Even the Global Privacy Assembly, which first met as the International Conference of Data Protection and Privacy Commissioners (ICDPPC) and comprises representatives from 122 jurisdictions, does not have any dedicated research or resolutions relating to women (Coombs & McKee, 2019). More dedicated research is needed to understand the impact of existing legislation on women's digital safety and resolve issues.

The business value of addressing the digital inclusion gaps

It is imperative to close digital divides to deliver on the Sustainable Development Goals (SDGs) by 2030. Leaving no one behind means that everyone should be able to enjoy connectivity (ITU, 2022). The gaps in access deepen inequalities and have social costs and economic implications. Countries have lost out on $1 trillion in GDP due to the digital exclusion of women (Alliance for Affordable Internet, 2021).

There are also benefits of addressing the gaps in access for specific economic sectors. Closing the mobile gender gap could add $700 billion in GDP growth by 2023 (Rowntree, 2019). The International Finance Corporation (IFC) estimates that between 2025 and 2030, the market for e-commerce could increase by nearly $300 billion if the gaps in sales between men and women vendors are closed in Southeast Asia and Sub-Saharan Africa (IFC, 2021). IFC research also suggests that if participation gaps in online learning between women and men learners in emerging markets were closed, the global value of the online learning market could grow up to an additional $14 billion by 2026. This research also indicates that one job is created for every 30 people trained online in the four focus countries studied: Egypt, India, Mexico, and Nigeria.

CLOSING THE DIGITAL GENDER GAP: CHALLENGES AND OPPORTUNITIES

Emerging evidence and operational experience point to several challenges and opportunities in closing the digital gender gap. They lay in improving digital infrastructure and users' digital skills, enhancing digital business, public platforms and finance mechanisms, and strengthening online safety. It is also important to address overarching social norms, algorithmic biases in AI, and the lack of sex-disaggregated data. To follow is a brief description of these areas.

Digital infrastructure

Around the world, while 95 percent of the global population lives in areas covered by mobile broadband networks, nearly 400 million people have yet to be connected (Delaporte & Bahia, 2022). In 2021, 86 percent of the global population in rural areas had access to 4G or 3G coverage while in rural Africa almost 30 percent or people cannot access mobile internet (18 percent are not covered by mobile broadband and 11 percent only have 2G coverage. The lack of awareness and access to devices and the prohibitive costs of devices and services remain challenging. Tackling the barriers to internet adoption and usage can close the digital gender gaps, while bringing greater equality for women. It can increase economic opportunities for women and reduce the prevalence of gender-biased social norms, early marriage, and fertility (Viollaz & Winkler, 2020). For instance, mHealth use can improve women's health knowledge, attitudes, and practices (Meherali, Rahim, Campbell, & Lassi, 2021). Several interventions exist to facilitate the enabling ecosystem for digitalization, including expanding and increasing the resilience of connectivity infrastructure, and to address the barriers to internet usage, such as access to and affordability of digital technology.

Expanding connectivity can reduce poverty and increase consumer welfare and women's labor force participation. Evidence shows that increasing mobile broadband connectivity can help reduce poverty in the long term. Women, in particular, stand to benefit with greater economic opportunities. For instance, a study conducted in Nigeria shows that after a year or more of mobile broadband coverage the total consumption in households increased by more 6 percent and that two or three years of 3G/4G coverage increased labor force participation for women (Bahia, et al., 2020). Women's use of mobile phones and the internet can increase their participation in the labor market (Ngoaab & Song, 2021). Fixed broadband costs are often high and out of reach for many people and, while cheaper, mobile broadband can be prohibitively expensive for mobile operators (Alliance for Affordable Internet, 2020).

To expand connectivity, policies can be implemented to make infrastructure-sharing options available, with benefits clear to all players. Operators that rely on wholesale infrastructure can be given specific advantages. Through the Universal Service and Access Funds (USAFs), policymakers can also support the expansion of broadband networks and ensure reach to rural areas, with a priority focus on serving public institutions and complementary providers, such as community network operators, and subsidizing the costs of individual devices (Alliance for Affordable Internet, 2020).

Affordability of devices is still a critical barrier to adoption, only worsened by the reduction in income during the COVID-19 pandemic which affected people's capacity to buy a mobile phone (Delaporte A. , 2022). In most regions of the world, affordability of devices such as smartphones represents a significant cost in relation to an individual's monthly income (see Figure 2).

Several interventions have proven effective in ensuring that women and underserved groups can access and use the internet and internet-enabled devices. For example, offering women and underserved groups adequate financing mechanisms can help them access digital technology, such as smartphones (Delaporte A. , 2022). Outreach is important to ensure customers are aware and can take advantage of financing options. Partnerships for last-mile delivery of devices can also help get to those who are harder to reach in remote or rural areas. Device providers also need to ensure that devices available in the market meet people's needs and their willingness to pay (see Box 1). Public spaces, such as telecentres, community centers, libraries, and post offices, can also provide people with free or affordable access to computers, tablets, and other internet-enabled devices.

Digital technology and services need to integrate inclusive design principles to make sure that digital environments are accessible to all and no one is left behind. Inclusive design is a methodology that places at its core the understanding of the diversity of human experience around environments and use of technology (Microsoft, n.d.). Inclusive design recognizes those individuals who have been excluded, focusing on user-centered design to build better digital tools that address expectations from those who will use the technology. Inclusive design approaches help ensure that digital solutions meet the needs of women from underrepresented groups, persons with disabilities, and people in fragile and conflict settings. Involving these groups in the design and implementation of digital projects is fundamental to ensuring that their voices are heard and included, and operations deliver results according to their needs.

FIGURE 2. SMARTPHONE AFFORDABILITY BY REGION

Average Cost of a Smartphone, as % of Average Monthly Income
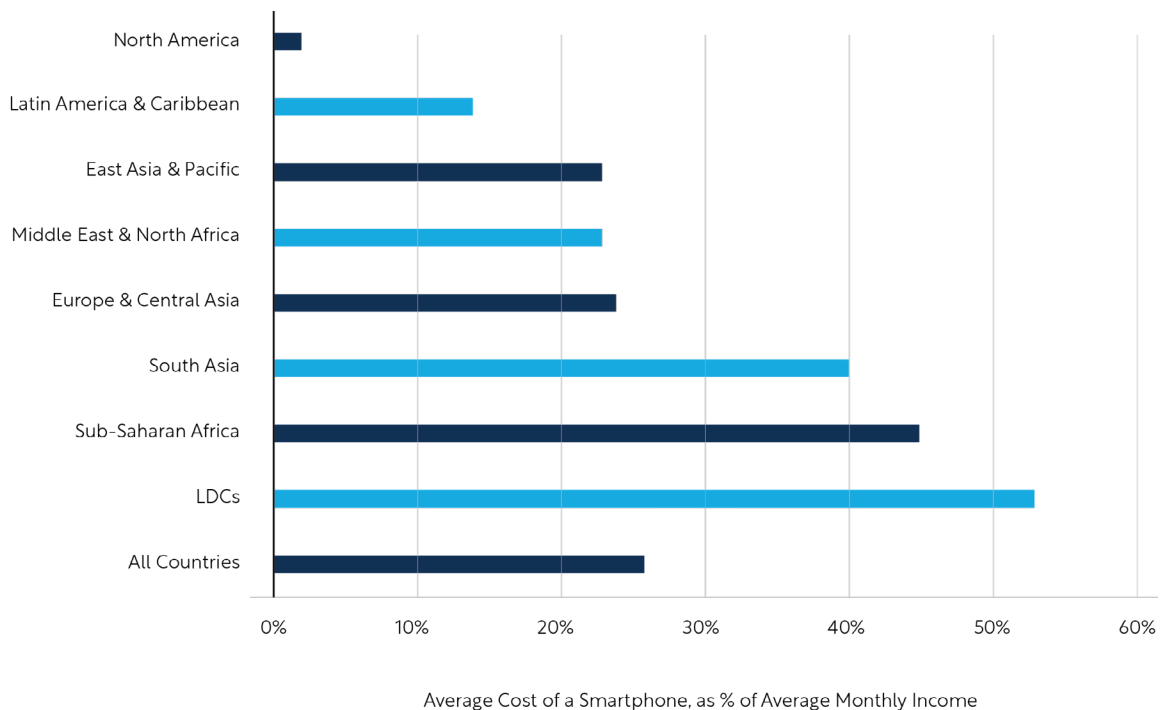
Source: Alliance for Affordable Internet

BOX 1. PROVIDING ACCESS TO AFFORDABLE SECOND-HAND SMARTPHONES

ATRenew is an IFC investee and China's second largest e-commerce platform selling second-hand electronics. ATRenew aims to tackle e-waste and introduce a viable business based on the circular economy model. Founded over a decade ago, ATRenew's initial operations were the procurement of used phones and electronics through a platform that had a proprietary pricing method leveraging artificial intelligence and machine learning to inspect and determine the value of each phone. By upcycling electronic devices, ATRenew is contributing to closing the digital gaps facing underserved groups in China. Almost 60 percent of its upcycling business is in smartphones and most are sold in low-income areas.

BOX 2. ACCELERATING DIGITAL INCLUSION IN RWANDA

The Digital Acceleration Project for Rwanda aims to increase access to broadband and select digital public services and strengthen the digital innovation ecosystem. Investments will address the needs of underserved areas and groups to ensure access to affordable smart devices. Focus is on improving digital literacy, increasing last mile connectivity, and strengthening legal, regulatory, and institutional frameworks for broadband market development.

With women's digital literacy at 7 percent in the country, compared to 11 percent for men, and only 4.6 percent for rural populations, compared to 26 percent for urban, the project will work to support wider digital inclusion and participation by introducing gender and disability sensitive interventions. This includes tailored and task-based digital literacy training targeting women and persons with disabilities to enable them as end-user to access and use digital services safely and effectively.

Digital skills

In addition to increasing access to connectivity and devices, closing gender gap in internet usage requires improving women's digital skills and literacy so they can better use and benefit from the internet and digital technologies. Digital skills range from the competences to use a mobile phone and navigate the internet, to more complex skills and knowledge for coding and software programming. At the high end, the digital skills continuum encompasses people's ability to deploy and develop digital technologies and innovations. Digital literacy involves competences to access, use, manage and create digital information and tools (World Bank, 2021). Closing the gaps in digital skills, literacy, and awareness is important for gender equality.

With challenges around access to literacy and education, women are limited by their digital skills knowledge. Worldwide, 35 percent of men can provide correct answers to financial literacy questions, compared with 30 percent of women (Klapper & Lusardi, 2020). In emerging markets, literacy and digital skills are the second most reported

barrier to owning a mobile phone by women and the topmost reported barrier by women mobile users who are aware of the mobile internet but are not using it (Shanahan, 2022).

Understanding the quality and level of skills required to enable women to adopt and use digital technology is a challenge. This is due to a lack of evidence and frameworks to allow countries to classify and evaluate these skills (World Bank, 2020). In addition, poor literacy and numeracy skills can prevent people from learning digital skills, thus reinforcing the need for universal access to education.

To ensure they have the required digital competencies for a sustainable and resilient future, countries need to identify shortages in digital skills and set goals on capacity building for its citizenry (World Bank, 2021). This will require actions to identify and address digital skills gaps facing women and underserved groups and actively implement solutions (see Boxes 2 and 3). This may include the provision of training for digital competencies in formal education or non-formal training programs or the creation of ICT labs or community centers where people can gain digital skills (UNICEF, 2019).

BOX 3. DIGITAL SKILLS TRAINING FOR WOMEN IN ETHIOPIA

IFC advisory services supported Gebeya, a pan-African education technology and online job placement company, in implementing the Digital Gender Ethiopia Program. It provides training scholarships to women and seed funding to women entrepreneurs to help increase the number of women software developers and reduce the gender disparity in the tech sector. More than 250 women graduated from the program and 20 women entrepreneurs received seed funding along with technical and strategic advice on business development.

Women need to opportunities to gain more advanced technical skills tiered to meaningful jobs (James, 2021). This means involving more women and girls in Science, Technology, Engineering and Mathematics (STEM). Gender disparities in STEM participation exist from early education but become more visible in higher education levels. Women represent only 35 percent of all students enrolled in STEM-related disciplines (UNESCO, 2017). IFC research shows that gender disparities also exist in tertiary level online education. Women represent only 37 percent of those enrolled in STEM courses in Coursera, a digital education platform provider (IFC, 2022).

The underrepresentation of girls and women in STEM disciplines not only undermines efforts to achieving digital equity but also negatively impacts progress toward the SDGs. Key actions to address the gaps also include addressing gender stereotypes in the classroom, giving girls opportunities to access top digital learning environments and engage with digital technology, developing digital skills programs toward employability, providing digital skills training for out-of-school girls, creating safe spaces that inspire participation and inclusion in digital and STEM education for girls and boys, and encouraging female role models in the digital and tech sectors (Adigun & Diamond, 2021; Hammond, Rubiano Matulevich, Beegle, & Kumaraswamy, 2020).

BOX 4. WOMEN USING HEPSIBURADA TO PARTICIPATE IN E-COMMERCE IN TURKEY

Hepsiburada is an IFC investee and one of the first e-commerce platforms in Turkey. It is a super-app that offers customers a wide range of products, from groceries to airline tickets to payment services. Founded by Doğan Boyner, one of only 23 women in history to have launched and led a startup to an IPO in the U.S., Hepsiburada has worked hard to increase women's participation on the platform and has almost achieved gender parity across the company. It increased women's participation on the platform from 7 percent in 2017 to 20 percent in 2020 through a program that enabled women vendors to open virtual stores at no cost while paying lower commissions and receiving free cargo shipping for six months and access to training.

BOX 5. INCREASING THE PARTICIPATION OF WOMEN IN SOCIAL COMMERCE IN INDONESIA

Evermos, an IFC investee, is a social commerce platform that enables entrepreneurs to become resellers by connecting them with reliable product suppliers and supporting them with training and a digital sales channel. Through digital literacy and entrepreneurship training, Evermos works to address the cultural and structural barriers that many Indonesian women face as they seek to become entrepreneurs and increase their income. Out of almost half a million Evermos resellers, 73 percent are women and 80 percent are from low-income situations, meaning the platform has enabled the economic empowerment of many women.

Digital businesses

Digitalization has led to the development of digital platforms by governments and the private sector, changing fundamentally the way in which services are provided and how platform users and service providers interact. Emerging economic sectors enabled by digital platforms, such as e-commerce and ride-hailing, are increasingly providing opportunities for women to generate income. The digitalization of government services is also helping to break down access barriers that women face in health care, education, and other types of government support, including cash transfers.

The growth in digital platforms in the private sector has increased income opportunities for women. The COVID-19 pandemic highlighted some of these opportunities. During the pandemic, women-led small and micro-enterprises were more likely to increase the use of digital platforms compared to men-led businesses (Iacovone, et al., 2021). However, women still benefit less than men when using digital platforms for income generation, even if they are active users.

Research by IFC has generated evidence on how women can gain access to employment in the digital economy. E-commerce offers pathway for women's economic inclusion driven by digital technologies (see Boxes 4 and 5).

Women-led businesses represent between 35–51 percent of all businesses on e-commerce platforms across five countries studied, and women are entering e-commerce at higher rates than the offline market (IFC, 2021). However, they are more likely than men to run micro-enterprises and less likely to participate in high-value sectors. Closing gender gaps on e-commerce platforms could bring $300 billion to the market in Africa and Southeast Asia (IFC, 2021).

Increasingly, private sector companies are moving their procurement online through the use of portals as the benefits of digitalization are becoming evident. In the coffee value chain for example, increased transparency offered by digitalization leads to higher premiums for value chain actors as traceability increases the prices consumers are willing to pay (ICO, 2018). This is a sector where 20–30 percent of farms are operated by women. In the trade of fast-moving consumer goods, the concentration of women-led firms varies depending on the market context, but it can also be high. In the Philippines, for example, women own 88 percent of the country's micro, small, and medium enterprises (MSMEs) in the retail and wholesale industry (Asia Pacific Foundation of Canada, 2018). Yet, many of them face barriers in accessing corporate procurement contracts.

BOX 6. FACILITATING ACCESS TO MARKETS FOR WOMEN RETAILERS AND DISTRIBUTORS

Business-to-business (B2B) platforms, financial intermediaries, and other supply chain actors can use digital transaction data to facilitate access to working capital for retailers and distributors. This is particularly beneficial for women as they often face larger gaps in accessing finance. Further, by streamlining and digitizing the ordering of fast-moving consumer goods, digital B2B distribution platforms can improve the procurement process for retailers. Digitalization and access to e-commerce platforms are empowering women to be more efficient, successful, and profitable with their businesses.

Supported by We-Fi, IFC investees MaxAB and Trade Depot are reporting on the number of women entrepreneurs that use their platforms and have established targets. E-supply chain actors are often uniquely placed to advance gender equality as many have a direct relationship and frequent interactions with retailers. Emerging evidence from MaxAB and TradeDepot suggests the following actions can help increase women's participation:

• Disaggregating retailer data by gender and tracking this data from the time of retailers' on-boarding

• Leveraging data and retailer relationships to identify and address the barriers that disproportionally impact women retailers' growth, as well as the factors that lead women retailers to stop using the platform

• Engaging stakeholders with data-driven insights about the inclusiveness of their distribution networks.

The digitalization of supply chains is opening WSMEs' access to markets and opportunities to improve their digital skills. In e-commerce in Kenya, for instance, more SMEs owned by women than by men (or jointly) use digital tools, such as online platforms and classified ads, to identify tenders and expressed the need to build their capacity through digital trainings in order to be able to access and deliver buyer contracts (IFC, 2021).

Digital business-to-business (B2B) distribution platforms, such as IFC investees TradeDepot in Nigeria, MaxAB in Egypt, and Growsari in the Philippines, are streamlining the procurement process for retailers. According to Unilever, in 2021, retailers enrolled on a digital B2B distribution platform grew by 4 percent more than retailers not enrolled on a platform (Unilever, 2022). These platforms provide insights into how products flow across the distribution network and, through data-driven insights, are increasing women's participation in the sector (see Box 6).

Digital platforms in the private sector can help address gender inequality by offering services that are more accessible and affordable for women than offline services. This is the case of online education and learning. Research from IFC on women's participation in online learning shows that 45 percent of women, and 60 percent of women caregivers, indicated that they would postpone studying or not study at all if online learning were not an option (IFC, 2022). Companies in sectors such as EdTech, with a market value that is set to pass $400 billion in 2025, can enable education and future employment opportunities for women (IFC, 2022). Yet, IFC's research also shows that women are not enrolling at the same rates as men. Women are at or nearly at parity in North and Latin America, but they represent just 32 percent of online learners in Africa, 34 percent in the Middle East, and 39 percent in Asia-Pacific (IFC, 2022).

While many women using online learning are still reliant on free or audited courses, online learning can have a positive effect in overall gender equality. Thirty-four percent of women and 40 percent of men learning online reported a positive career outcome. Platform providers have an opportunity to tap into the underserved women's market and support women's specific needs in accessing services (see Box 6). Closing gender gaps and allowing women to participate at the same rate as men could increase the size of the online learning market in developing countries by an additional 10 percent in the years between 2022 and 2026.

Digital public platforms

Digital public platforms provide another important pathway toward women's financial inclusion. Government-to-person payments (G2P) are used to distribute cash assistance to vulnerable and low-income populations. To respond to economic and social impacts of COVID-19, many governments digitalized payments (Rutkowski, Garcia Mora, Bull, Guermazi, & Brown, 2020). Using existing digital public infrastructure, including identification, payments, and trusted data-sharing processes, governments were able to implement response programs and reach more beneficiaries (World Economic Forum, 2022).

While governments have been able to reach many people through digital payments, gender gaps persist in financial inclusion. In developing economies, men with an account are, on average, 6 percentage points more likely than women with an account to use digital payments (Demirguc-Kunt, Klapper, Singer, & Ansar, 2022). This gender gap in the use of digital payments among account owners has remained virtually unchanged since 2014, despite the overall increase in digital payments. Furthermore, about one-third of mobile money account holders in Sub-Saharan Africa say they could not use their mobile money account without help from a family member or an agent. Women are 5 percentage points more likely than men to need help using their mobile accounts (Demirguc-Kunt, Klapper, Singer, & Ansar, 2022).

The digitalization of government payments can encourage people to set up digital accounts and increase digital inclusion. For instance, in emerging markets, 39 percent of adults—or 57 percent of those with a financial institution account (excluding mobile money)—opened their first account (excluding mobile money) at a financial institution, specifically to receive a wage payment or receive money from the government (Demirguc-Kunt, Klapper, Singer, & Ansar, 2022). Among adults in developing economies with an account at a financial institution, roughly 865 million opened their first account to receive money from the government, including 423 million women (Demirguc-Kunt, Klapper, Singer, & Ansar, 2022).

Digital payments can improve women's economic empowerment and financial inclusion (see Box 7). Women can access money more conveniently, they can get paid directly into their accounts, and their access to government program's benefits is improved (Rutkowski, Garcia Mora, Bull, Guermazi, & Brown, 2020). Evidence on digital payments for women's economic empowerment points to some key actions to ensure benefits reach women, including opening accounts in women's own names, governments depositing payments to women, and providing digital financial literacy and information (Hammond A. , n.d.).

BOX 7. LEVERAGING PLATFORM DATA TO IDENTIFY OPPORTUNITIES AND GAPS FOR WOMEN'S CAREERS

Given the limited analysis on women's usage and experience using online platforms, IFC has partnered with different online platforms to take advantage of user data that would otherwise not be publicly available to shed light on how disruptive technology impacts women. The goal is to ensure that women can use new technologies to close gaps in access to jobs and assets. Using this data, IFC develops business cases to motivate companies to gather sex-disaggregated data systematically and to consider opportunities to support women as customers, employers, entrepreneurs, and leaders as part of their core business strategy.

WOMEN AND ONLINE LEARNING

IFC partnered with Coursera and the European Commission to understand women's participation in online education and to present recommendations on how to improve life-long learning opportunities for women. The study reveals that women represent a minority of online learners in emerging markets, but their participation is growing, boosted further by the pandemic. While online learning can improve access to education for women and underrepresented groups, lower access to course funding, time constraints, and lack of representation affect women's participation. Increasing women's participation could bring $14 billion to the online learning market.

WOMEN AND E-COMMERCE

IFC partnered with Jumia and Lazada, two of the largest e-commerce companies in Africa and Southeast Asia, and the European Commission to understand for the first time whether women entrepreneurs have been able to leverage the digital economy to start and grow their businesses. Closing the earnings gap between men and women vendors by 2025 would yield $14.5 billion in additional market value in Africa and $280 billion in Southeast Asia by 2030. Women are active participants in e-commerce but require support to grow. Women own more than a third of companies in markets like Côte d'Ivoire and Indonesia and over two-thirds in the Philippines. In Africa, women are more likely than men to start a business with personal savings and are less likely to receive a loan from a financial institution. This suggests that targeted financing is an opportunity for e-commerce platforms to grow their seller base, while also closing gender gaps.

WOMEN AND RIDE-HAILING

IFC developed a case study with PickMe, a ride-hailing platform in Sri Lanka, to understand the impact ride-hailing platforms have on women's transport patterns. The research shows that women's mobility and opportunities increased as a result of access to reliable, traceable transport. For instance, 64 percent of women riders said that they can access more or better jobs thanks to ride-hailing, and 88 percent said ride-hailing gives them access to new places. At the same time, the study finds that women represent a minority of riders. Getting ridership to parity with men would increase annual revenues by 24 percent, creating a clear business case for companies to serve women riders.

BOX 8. ECONOMIC EMPOWERMENT OF WOMEN IN DIGITAL G2P PAYMENTS

G2Px is a World Bank Initiative, in partnership with the Bill and Melinda Gates Foundation, to improve government-to-person (G2P) payments through the use of digital tools to accelerate financial inclusion, women's economic empowerment, and government fiscal savings. The program will establish a framework, based on best practice examples, to provide technical assistance to governments. The program has a strong component on gender inclusion looking at how digital cash transfer can drive women's inclusion and economic empowerment. The goal is to radically improve G2P payments globally, ensuring that all G2P programs use digitalization as a powerful means to deliver life-improving services to women.

Five barriers can limit women's access digital payments, including gender gaps in financial inclusion, proof of identity, and mobile device ownership; inadequate gender recognition of gaps; and insufficient gender data (Rutkowski, Garcia Mora, Bull, Guermazi, & Brown, 2020). Some of these gaps have already been covered, so the rest of this section examines the challenges around identification, an area where digital technology can play an important role.

Access to digital public platforms, such as G2Ps, typically requires a form of identification (ID), which women often lack due to a variety of constraints. For instance, in some countries, women are required to be accompanied by male guardians to register themselves or children for IDs. Restrictive social norms can also limit women's independence, requiring them to seek permission to leave the house or limiting their time due to household and caring responsibilities. Some women are deterred by the costs of registration, including paying for transportation to reach registration points. Others may be less aware of the relevance of IDs and may also lack information about required documents (Klingen, Hammond, & Srinivasan, 2021; Hammond & ID4D, Forthcoming).

To close the gender gaps in digital identification services, governments need to work with women's groups, place registration centers close to communities (particularly where vulnerable groups are located), and prioritize policies that can help increase the registration of vulnerable groups, including women (see Box 8). Examples include women-only registration centers, mobile-enabled registration services, and targeted enrollment strategies (Klingen, Hammond, & Srinivasan, 2021).

Digital finance

Digital financial services can boost the financial inclusion of women, offering them greater privacy, security, and control over their money. While the COVID-19 pandemic had huge implications on economic development, the rapid adoption of technology for financial transactions, in response to mobility and social distancing restrictions, led to greater access to and use of formal financial services. For example, the digitalization of government transfer payments led many people to open an account for the first time to receive subsidies, pension funds, or public sector wage payments (World Bank, 2022). Global Findex data finds that 71 percent of people in developing countries have a financial account. This includes about 865 million account owners in developing countries (18 percent of adults), including 423 million women, who opened their first financial institution account for the purpose of receiving money from the government (Demirguc-Kunt, Klapper, Singer, & Ansar, 2022).

BOX 9. MAKING NIGERIA'S NATIONAL ID SYSTEM INCLUSIVE FOR ALL

Pioneering work in Nigeria presents a key opportunity to better understand the intersectionality of barriers faced by women and marginalized groups in accessing an ID. It will be used to develop evidence-based solutions that can be directly incorporated into the country's planned reforms to make the national ID system more inclusive for all. Through the Nigeria Identification for Development Project, the World Bank researched the needs of women regarding identification. The barriers they face in accessing an ID include lack of documents, costs of travel, getting permission to enroll, family and other care responsibilities, lack of awareness, and misinformation on the requirements for ID and difficulties getting documents. Policy recommendations to tackle these barriers include raising awareness with community leaders, bringing registration centers closer to the communities, improving the registration experience, partnering with private sector and non-profit sector to support enrollment activities, and establishing alternative models of proof of identity.

Expanding access to digital financial services for women requires addressing underlying causes of financial inequality. For example, mobile money has been a game changer in offering financial services to many people who lack access to traditional banking systems in Sub-Saharan African and other countries. This includes many women who benefit from the convenience and lower costs of transacting with local mobile money agents, rather than traveling to the nearest bank branch.

In some countries, however, financial and social gender biases leave women behind in mobile phone ownership. One barrier women face is a lack of national identification, which is necessary to register an account or purchase a SIM card in one's name (World Bank, 2022). Digital identification, such as biometric identification, can facilitate customer on-boarding by local agents and customer due diligence for transactions. Women also lag men in basic numeracy and literacy skills. As illustrated in Box 9, addressing the gender gap in financial literacy could help women use formal financial services more responsibly and effectively and improve their use of digital platforms, such as ride-hailing, e-commerce, and e-health applications (World Bank, 2022).

> **BOX 10. STRENGTHENING WOMEN'S FINANCIAL LITERACY AND A CCESS TO FINANCING IN ZAMBIA**
>
> According to financial institutions in Zambia, a lack of adequate financial management and documentation impacts the creditworthiness of women-led small and medium enterprises (WSMEs), in addition to the abiding constraint of limited collateral. The Women Entrepreneurs Finance Initiative (We-Fi) in Zambia is collaborating with select institutions to facilitate WSMEs' access to finance through a combination of in-person and online financial management training and pipeline development of new borrowers. The digital delivery channel offers the flexibility that women require and allows the program to reach outside the capital Lusaka.
>
> The financial management program emphasizes advanced skills, including identifying the right financial product or service for the business and developing and maintaining formal financial records that meet the criteria set by financial institutions. Loan officers from commercial financial institutions run dedicated credit application workshops. Graduates of the financial management program are then channeled to these institutions, which review their applications on a priority basis.

Online safety and security

As more women get online, safety and security concerns are increasingly an issue. In many cases, women are experiencing the same type of harassment they face offline but now magnified by technology. These risks limit women's participation online. For women who do not own a mobile phone and for those who are still not online, safety and security is the third-most reported barrier to mobile internet use (Shanahan, 2022). Many of these women may face fears of intimidation, harassment, violence, fraud, surveillance, identity theft, misuse of personal images and data, and privacy challenges. In some cases, male gatekeepers limit women's use of digital technology, citing safety concerns as a reason for women to not go online.

Abusive language or comments and sexist or misogynist comments directed at women are commonly reported as types of online aggression experienced by women (Amnesty International, 2017). These were intensified during the pandemic (Wang & Affoun, 2021). A few countries have established legal frameworks to protect individuals from online harassment and bullying, such as in the Marshall Islands (see Box 10), but implementation varies significantly across and within regions (Wang & Affoun, 2021). Without adequate protection, women may limit their access and participation in digital services and environments, contributing to their digital exclusion.

Combating online gender-based violence (GBV) and creating safe online environments are essential for gender equality. Countries can take actions to define and penalize cyber aggressions and use these definitions to collect data that can inform the development of programs and policies to counter digitally-enabled GBV. Similarly, tech companies can play an important role by adapting solutions, or creating new tools, to address the pervasiveness of GVB online and provide better support to users (Hinson, Mueller , O'Brien-Milne, & Wandera, 2018). Digital skills training can also help women learn how to keep themselves safe while online.

Social norms

Closing the digital gaps means going beyond the technical components required to build digital infrastructure and connectivity. Equally important is addressing restrictive gender norms, role expectations, stereotypes, and patriarchal systems that can limit women's and girls' access to digital technology, as well as their participation and contribution in the tech sector.

Gender norms can determine women's digital inclusion, as they are often embedded in formal and informal institutions. In some countries, the historically patriarchal norms mean that women can have restricted access, ownership, and use of digital technology. For mobile phone and internet usage, for instance, lack of family approval is a major reason preventing women from using mobile internet. It ranks as one of the top three barriers for women in Nigeria, Bangladesh, and Pakistan (Shanahan, 2022). In Pakistan, over 30 percent of women (compared to only 3 percent of men) who do not own a phone cite family disapproval as the main reason for the lack of ownership.

Gender stereotypes may also limit women's participation in the tech sector. Gender disparities in STEM education perpetuate existing gender disparities in income and employment (UNESCO, 2017). Socialization processes and stereotyped ideas of gender roles heavily contribute to girls' self-selection bias, leading them to opt out of

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BOX 11. TACKLING ONLINE VIOLENCE IN THE MARSHALL ISLANDS

The Digital Republic of the Marshall Islands Project's development objective is to promote private sector investment in climate-resilient digital services, and establish the critical foundations for digital government services and the digital economy. It aims to increase the number of people with access to the internet, including women, and address risk related to unequal access to digitalization based on gender, age and disability. In addition, the project is one of the first examples of the World Bank's operations to tackle online violence. The project facilitated the development of a legal framework to criminalize harmful digital communications as part of the cybersecurity policy framework. While activities have a focus on youth and are not specifically targeting online GBV, women are an underserved groups that will benefit from these policies.

STEM. Interventions to get more girls and women in STEM include creating awareness to counter misconceptions about STEM, promoting safe and inclusive learning environments, removing biases in learning materials, recruiting more women STEM educators, strengthening teaching capabilities and STEM curricula, and creating mentorship opportunities for girls in STEM (UNESCO, 2017; Hammond, Rubiano Matulevich, Beegle, & Kumaraswamy, 2020). Digital tools can be used to implement several of these interventions, as long as the gender gaps to digital and online education are also tackled.

Additionally, women are underrepresented in tech sector leadership. As of 2022, only 24 percent of leadership in the technology industry are held by women (World Economic Forum, 2022). With fewer women in tech and management roles, it is less likely that solutions generated in the tech sector are inclusive. IFC's research shows that companies with more than 30 percent women on their boards demonstrated better financial performance than those with less than 30 percent (IFC, 2019). Women make up only around 11 percent of senior investment professionals in private equity and venture capital in emerging markets, and only 7 percent of the total funding in emerging markets goes to women-led business (IFC, 2019).

Access to finance for women-led tech firms also continues to be a challenge. According to a 2021 World Bank report, only 3 percent of the USD 1.7 billion in startup funding in Africa went to all-women teams while 76 percent of funding went to all-men teams (World Bank, 2021). Globally, only 11 percent of seed funding capital in emerging markets is given to women-founded companies, and the proportion of funding reduces significantly for later stages (IFC, 2020). The lack of funding to women-led companies has spillover effects for women's employment in tech, as women-founded firms employ more women as staff and in management. Gender-lens investing solutions and more diversity in investment decision making can help address some of these gaps.

Algorithmic biases amid the rise of AI

There is a risk of frontier technologies exacerbating digital gender gaps. The acceleration in the development and adoption of digital technologies and platforms, as well as the increasing computing power, have brought an unprecedented opportunity for large sets of digital data and complex analysis to inform solutions embedded with big data, AI, and machine learning (ML). These frontier technologies can bring great benefits to people and are increasingly being used to address complex development challenges, from health care to agriculture, weather and climate, and education (United Nations, 2018). AI/ML, software as a service (SaaS) applications, and robotics, digital manufacturing, and other automation have improved efficiency and transparency and have shorten the time for organizations to make informed decisions (United Nations, 2018). Yet, these technologies are still in their infancy and their long-term impact is not known. Some risks have started to emerge.

Unintended consequences of AI/ML can exacerbate inequalities and discrimination against certain groups. For example, advancing AI/ML may shift the demand for labor and skills, benefitting those who have these skills and reducing opportunities for those who do not (often women and underserved groups). Automated decision making will also displace people by replacing jobs (often done by women) and, consequently, will increase inequalities between people, within countries, and may even widen gaps between high-income countries and emerging markets (Strusani & Vivien Houngbonon, 2019; Huttson, 2017).

Furthermore, AI/ML pose significant social challenges, including issues with data privacy and security, algorithmic biases around gender and race, and the ethical use of AI. Reasons for these challenges include the lack of policy and regulatory frameworks for data privacy and protection, as well as the lack of diversity in the technology sector and AI fields. For instance, most AI pilot studies in health care have been conducted in higher economies by men researchers (Leo Anthony Celi, et al., 2022).

Addressing the risks of AI and frontier technologies will require interventions at different levels. Actions are needed to recruit more women and underrepresented groups in AI and other tech sectors, to ensure that technologies are inclusive throughout their lifecycle (Khan, 2021). This will require that more women and underserved groups have the skills needed for AI. This points to interventions that increase the participation of women and underrepresented groups in STEM and training programs to learn to code and other skills needed for AI (Khan, 2021).

Lack of sex-disaggregated data

Understanding the gaps in digital inclusion requires data to capture their character and magnitude, including why these gaps exist and how different people experience the use of digital technologies. In the private and public sectors, sex-disaggregated data is often not available and, when available, is rarely updated. At a minimum, data should allow the measure of access and use of digital technologies for men and women (World Bank, 2018). Possible data sources include sex-disaggregated nationally representative consumer surveys, national labor force surveys, nationally representative demand size survey on ICT access, and use data from digital platform providers. To understand women's experiences around digital technologies, it would also be valuable to conduct qualitative studies on barriers and inequalities and how they impact women's use of digital technologies.

Digitalization is part of everyday life, so any strategy to reduce gender inequalities must address disparities in access, affordability, and usage of digital technologies. The public and private sector have a significant role to play in ensuring digital technology reaches women, aligns to their needs, and strengthen their economic empowerment. This thematic policy note has gathered evidence of operational implementation and investments in the area of digital development where projects address one or more barriers to the digital and financial inclusion of women. While many projects are in early stages and impact evaluations are not yet available, this review provides impetus for the World Bank Group to continue strengthening work on the digital inclusion of women and underserved groups. Specific recommendations for the World Bank Group and its partners include the following.

Include gender gaps in digital inclusion in new and existing analytics

Given the cross-cutting nature of digital inclusion, there is an opportunity to integrate digital inclusion analysis into the World Bank Group's core analytics, like Country Economic Memorandum, Country Economic Update, poverty assessments, and job diagnostics. Analytics like the Public Expenditure Review and the Program Expenditure Review offer a platform to analyze how much of public funding goes to a specific area of interest. It would be important to analyze existing ICT and digital investments through a gender lens to ascertain the impact on digital inclusion. With the support from the Gender Innovation Labs and the Development Economics Vice-presidency, research can help generate much needed sex-disaggregated data to inform digital interventions.

The Financial Sector Assessment Program (FSAP) could focus on more targeted policy recommendations to reduce gender gaps in digital financial services (DFS). While DFS gender gap analysis is part of the program, the menu of gender-specific actions is limited. Most recommended actions are broadly targeted with the expectation that an overall increase in DFS adoption would also extend to women. The World Bank supports national financial inclusion strategies (NFIS) across the globe, and this would be a strong platform to further invest in reducing digital inclusion gaps through the development of more targeted activities.

The Digital Economy for Africa program undertook country-level diagnostics to generate insights into five key themes: digital infrastructure, digital businesses, digital skills, digital financial services, and digital public platforms. These analytics offer a starting point to develop a more holistic approach toward women's digital inclusion through projects spanning multiple Global Practices.

Instruments like the Enterprise Survey also offer an opportunity to integrate digital inclusion at the firm level, thereby engaging the private sector as a major player to reduce gender digital gaps. Currently the framework of the survey incudes questions on the usage of basic digital technologies, like internet and email. There may be opportunities to include questions on whether the firms engage in online sales, marketing, e-commerce platforms, and the like. Digital platforms are in a particularly advantageous place as they can capture sex-disaggregated data and use it to improve women's user experiences and, at the same, design solutions tailored to them.

New analytics are needed to focus on the multidimensional factors that influence digital inclusion for women. For example, in advocating for broader digitalization of public services, there is a need to take a more nuanced approach toward the implications for women's privacy and security. While national IDs yield tremendous benefits for citizens, legal protections are necessary to protect against discriminatory legislations based on identity, especially for women. Important building blocks for a more inclusive digital economy include transparency in how data provided to governments is used and built-in measures for citizens to control who has access to their data and how it is used.

Similarly, more policy work is needed to support governments in regulating how private platforms and digital services use data. One of the main reasons why women may also opt out of the digital economy is the lack of effective regulation of how data is used by private platforms and digital services (Keck, Gillani, Dermish, & Grossman, 2021). The World Bank Group has a role in providing technical assistance on the regulation of the private tech sector and public data safety to facilitate competitive markets and ensure consumer protection, similar to support provided for regulation of other sectors. Emerging new analytics like the Country Climate and Development Reports (CCDRs) offer an additional pathway to bring in digital inclusion for women and understand the
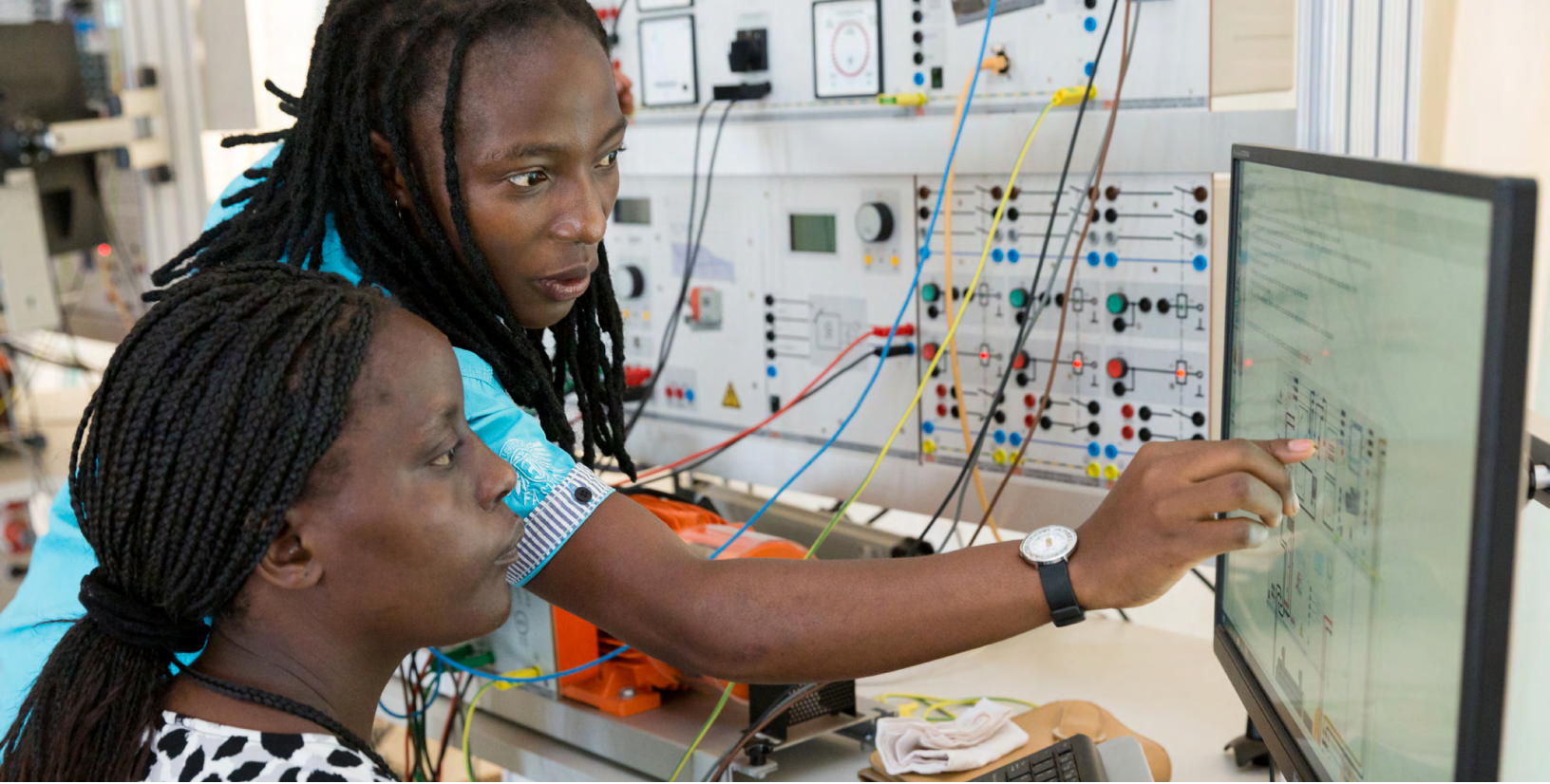
intersectional vulnerabilities that women face across the spectrum of development challenges. Mainly the focus should be on enriching existing analytical tools to more concretely and explicitly and developing new approaches towards identifying, quantifying and analyzing gender gaps in digital inclusion, the applicability of these gaps across WBG operations and investments, and dedicated, measurable actions to reduce these gaps.

Strengthen the holistic nature of projects to reduce gender gaps in digital inclusion

The primary requirement for women's participation in the digital and digitalized economy is ownership and affordability of digital devices and services. In addition to directing investments toward digital networks and backbone infrastructure, there is opportunity to prioritize investments in initiatives that facilitate access to low-cost devices, like smartphones, tablets, and laptops, as well as digital skills training programs for women. Many governments levy import duties on basic digital devices and, in the absence of locally manufactured, affordable devices, these taxes make it difficult for low-income women and other segments to access devices. There may be opportunities to develop a set of policy recommendations around tiered duties that subsidize import of devices. A combination of analytics, technical assistance, and operational support offers a viable path for World Bank Group activities to broaden and deepen support for an inclusive digital economy.

There is also a need to expand beyond physical infrastructure and address affordability and wider provision of services. High prices of internet and data services lead to reduced uptake among low-income populations. Within countries, there tend to be regional differences in access, and providers of digital services can be incentivized to reduce connectivity gaps for women consumers and other underserved segments. Even in countries where prices may not come down in the short term, there may be opportunities to invest in public access to the internet. In Uganda, for example, the government offers subsidized internet access to business incubators (although these tend to be located in larger urban areas and available only to startups). The expansion of such a network across underserved regions may offer a viable path for underserved populations, including women, to gain access to digital technologies.

In designing new projects, it is important to go beyond the framework of gender tagging and support task teams in undertaking more creative approaches to addressing digital inclusion across sectors. It is also important to take into account the data protection and privacy implications of the growing portfolio of projects focused on digital infrastructure and services. This would require working across Global Practices within the World Bank and developing projects that address the multidimensional constraints of digital equity and inclusion for women. As the IFC portfolio of investments in the tech sector grows, there is an opportunity to support investees in identifying gender gaps in their operations and offerings.

Finally, it is important that inclusive design approaches are integrated into operations and investments to ensure that the voices of women and underserved group are heard, and the outcomes of the project address their need for technology and digital inclusion. Inclusive approaches increase the likelihood that outputs of the implementation are adopted by women.

Address social norms that restrict women's digital inclusion

Dedicated activities that focus on addressing social norms around women's access to and usage of digital services need to be better integrated into World Bank Group operations that focus on the digital economy. Important social norms to consider include economic mobility, physical mobility, interactions between people of different sexes, perceived need for identification, social constraints against women's use of digital technologies, gender biases in STEM education and employment, and discriminatory laws and procedures (World Bank, 2018). Where operations support expanded digital infrastructure and access, there is a need to add activities that identify local dynamics around gender gaps in digital inclusion and work with local communities to develop customized programs that can scale up women's usage of digital technologies. Activities focused on enhancing women's voice and agency would also benefit from leveraging digital technologies.

Support women's participation and leadership in the tech sector

It is also essential that women are recognized as more than passive recipients of technology. Their full participation in designing and implementing tech solutions for pressing global problems must be supported through World Bank Group activities.

Gender discrimination and harassment in the workplace are also persistent in the tech sector. While data from emerging markets is limited, nearly 50 percent of women working in STEM jobs report gender-related discrimination at work, compared to 19 percent of men working in the sector (Funk & Parker, 2018). This in turn constrains women's entry into and success in the tech sector. More needs to be done to ensure that respectful workplace policies are set in place in the tech sector so that more women can be active participants in the development of technologies.

To increase women in the tech sector, more girls and women need to enroll in STEM education, complete educational programs and be gainfully employed in the tech sector. Addressing the gender norms in learning requires engagement with parents and educators to reshape attitudes toward the participation of girls in STEM, and encouraging the participation of girls and women in extracurricular activities related to STEM, such as coding and robotics camps, to increase their interest in the field (World Bank, 2020). Women role models as examples of what success means for women in the sector and mentorship programs can encourage more women to pursue STEM-related careers. The private sector can also play a role by providing financial support to STEM initiatives for women, facilitating exposure of women role models and providing opportunities for women and girls, such as internships programs (World Bank, 2020). At the same time, broader inclusive workplace policies that provide access to childcare, maternity leave, anti-harassment initiatives would also benefit women in tech.

In many countries, government-led support programs for the private sector include financial incentives, like risk sharing facilities, credit lines, and guarantees, and are enhanced by World Bank operational investments. To support more women-led firms, these instruments can be better targeted to support women-founded and managed firms. For example, credit guarantee schemes can be designed to offer dedicated windows for women-led firms and include women-led tech firms and/or digitalization of women-dominated sectors as specific segments of focus. IFC works with venture capital funds to increase the percentage of capital that funds allocate to women-led companies. Programs focused on diversifying boardrooms could also focus on diversifying tech company boards which remain primarily male dominated.

Invest in digitalization of women-dominated value chains and sectors

Digital platforms need to consider the needs of women-owned small and medium enterprises, as well as other women users. In sectors such as e-commerce, evidence shows that women can leverage technology to enter more profitable sectors and pursue great value-added opportunities as the platforms can address challenges of market access and in some cases logistics handling. To better support all women, digital platforms need to collect sex-disaggregated data to inform solutions (see Boxes 4 and 5). These may include leveraging platform financing, helping women to take advantage of paid promotions to boost their sales, increasing training offerings for women, and encouraging women entrepreneurs to enter high-value sectors (IFC, 2021).

Investing in the digitalization in value chains where women have an increased presence—agribusiness, hospitality, trading, and services, for example—offers a pathway to leverage digital technologies for women's greater economic and digital inclusion. Digital technology can provide greater visibility for companies and help them to identify gender inequalities in distribution networks, such as gaps in the participation of women distributors and retailers and differences in sales performance. Working to build firm capacity to access these platforms and addressing the logistical challenges of cross-border e-commerce through World Bank operations offers an opportunity to realize the potential economic benefits of an inclusive digital economy. In countries like Uganda, where women farmers in the coffee sector face significant income gaps, digitalization of the coffee value chain offers an avenue to increase transparency and link women farmers directly to processors and buyers thereby increasing the likelihood of higher income generation.

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