

Digital Gender Inequality And Women's Access To ICTS In Zambia: Implications For Inclusive Development

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Abstract:

Gender disparities in access to and use of information and communication technologies (ICTs) remain a significant barrier to inclusive digital development in sub-Saharan Africa. This study examines the digital gender gap in Zambia, analysing socio-economic, educational, cultural, and infrastructural factors shaping women's ICT access and participation. Using a mixed-methods approach combining survey data and policy analysis, the study identifies persistent inequalities driven by income constraints, digital literacy gaps, limited infrastructure, and gendered social norms. Findings indicate that while national ICT policies promote digital expansion, they inadequately address structural barriers affecting women's effective participation in the digital economy. By situating the Zambian case within broader gender and development debates, the study contributes context-specific evidence to digital inclusion scholarship and advances policy recommendations aligned with Sustainable Development Goal 5. The paper argues that gender-responsive digital policies are essential for achieving equitable and sustainable development outcomes.

Keywords: *digital gender gap, ICT access, Zambia, gender equality, digital inclusion, sustainable development*

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I. Introduction

Information and communication technologies (ICTs) have become central to economic growth, social participation, and governance in the twenty-first century. However, access to digital technologies remains unevenly distributed across gender lines, particularly in developing countries. Globally, women are less likely than men to use the internet, own digital devices, or participate in science, technology, engineering, and mathematics (STEM) fields (International Telecommunication Union [ITU], 2017). In least developed countries (LDCs), the gender gap in internet use remains substantial, with 31% of men online compared to 19% of women.

Zambia, like many sub-Saharan African countries, has experienced rapid ICT expansion over the past decade. Despite improvements in mobile penetration and digital policy frameworks, gender-based disparities persist in access, usage, and digital skills acquisition. These disparities have significant implications for economic empowerment, employment opportunities, education access, and participation in the digital economy.

This article examines the digital gender gap in Zambia by analysing socio-economic, educational, cultural, and infrastructural factors influencing women's participation in ICT. It contributes empirical evidence to ongoing debates on gender equality and digital development and provides policy-relevant recommendations aligned with Sustainable Development Goal (SDG) 5.

II. Material And Methods

This study analyses literatures related to digital gender inequality. This literature review is paramount as it offers a comprehensive overview of existing research, reports, and frameworks related to the challenges and opportunities for empowering women and girls in ICT. Its primary aim is to identify current trends, barriers, and practical strategies that address the gender gap in the ICT sector, both globally and with a specific focus on Zambia. This specific focus ensures the relevance of the research to the Zambian context.

III. Empirical Research

Gender Gap in ICT Access

Globally, there is a significant digital gender divide, with women and girls having less access to technology than men, particularly in developing countries. The International Telecommunication Union (ITU) reports that women are 17% less likely than men to use the internet in low- and middle-income countries (ITU, 2019). In Zambia, this gap is exacerbated by rural isolation, limited infrastructure, and socioeconomic inequalities. Women in rural areas have fewer opportunities to access ICT tools like mobile phones, computers, and internet services due to high costs and limited connectivity (World Bank, 2021).

According to ZICTA's Digital Inclusion Report (2023), only 39% of Zambian women have access to the internet compared to 55% of men. The financial constraints of owning digital devices and affording data packages disproportionately affect women, especially those in rural and low-income households. This gendered disparity in access prevents many women from benefiting from digital tools and resources that could enhance their economic and social participation.

Skill Development and Digital Literacy

A key challenge to empowering women and girls in ICT is the gender gap in digital skills and education. Women and girls in Zambia have lower levels of digital literacy than men, mainly due to unequal access to education and training programs. UNESCO (2020) notes that digital skills are increasingly essential for economic participation. Still, cultural biases often discourage girls in Zambia from pursuing STEM (Science et al.).

Programs like Girls Can Code Zambia have been established to bridge this gap, offering digital literacy training and coding boot camps specifically for girls. However, these initiatives reach a limited number of participants and are primarily available in urban areas, leaving rural girls with fewer opportunities to develop ICT skills (ZICTA, 2023). Research by Adya and Kaiser (2005) further highlights that gender biases in educational institutions often deter girls from fully participating in ICT courses, reinforcing the stereotype that technology is a male-dominated field.

Educational Barriers: Women and girls in many parts of Zambia have lower digital literacy and ICT skills due to unequal access to education and training programs. Traditional gender roles often prioritize boys' education over girls', limiting their exposure to ICT early on.

Representation in Tech Industries

Underrepresentation of Women: Globally, women remain underrepresented in tech industries, with few pursuing careers in ICT or holding leadership positions. Studies from academic journals explore factors like workplace discrimination, lack of mentorship, and the gender pay gap.

Zambia's ICT Sector: Research indicates that women make up a small proportion of Zambia's ICT workforce. Various efforts are being made to increase women's participation in STEM fields, but representation remains low due to educational, cultural, and institutional barriers.

Cultural and Social Barriers

Cultural norms and gender stereotypes in Zambia play a significant role in limiting women's and girls' participation in ICT. Trauth (2000) identifies that women and girls in many communities are often seen as caretakers, with their roles focused on domestic duties rather than professional development. These traditional expectations can discourage girls from engaging with technology at an early age, further limiting their opportunities in the sector.

According to Crump et al. (2007), girls preparing for professional careers often lack interest or confidence in using computers due to the societal perception that technology is not for them. This resistance is compounded by the fact that male students tend to have a more positive attitude toward technology than female students, as seen in the research by Broos (2005), who found that males have higher computer self-efficacy and are more likely to stereotype ICT as a male field.

Additionally, Burch and Leon (2000) emphasize the importance of changing the narrative around women and ICT. By encouraging women to create content and share their experiences through ICT, marginalized women, in particular, can have a platform for empowerment. This approach can help challenge prevailing cultural norms and give women the tools to participate more fully in the digital world.

Policy Interventions and Governmental Support

Zambia has taken steps to promote ICT development, but there is still a need for gender-specific strategies to address the challenges women and girls face in this field. The Smart Zambia initiative, which aims to enhance digital inclusion across the country, has yet to fully integrate measures responsive to gender fully, ensuring equitable access and participation for women (ZICTA, 2023). Globally, ITU and UN Women policy frameworks emphasize the importance of integrating gender considerations into national ICT strategies. Countries that have successfully reduced the digital gender gap, such as Rwanda, have adopted gender-inclusive ICT policies that include targeted investments in female digital literacy and career support. Zambia can learn from these models by strengthening the implementation of its gender-related ICT policies and ensuring that resources are allocated to programs that specifically empower women and girls. It is crucial to change the narrative about women in ICT. Despite significant advancements in Information Communication Technology in Zambia, there remains a substantial imbalance in women's participation in ICT (Adya & Kaiser, 2005). Most women are not actively seeking ICT employment, as Crump et al. (2007) found. The gender gap in computer skills and utilization is still substantial, as noted by Trauth (2000). Despite several initiatives to increase computer usage in schools,

homes, and workplaces, research indicates that girls of higher-level education preparing for a professional career and established female employees exhibit resistance and a poor attitude towards computer usage. Male students have a more positive attitude towards computers than female students. Broos found that males demonstrate greater sex-role stereotyping of computers, higher computer self-efficacy, and a more positive attitude than females. During the 1990s, gender issues in communication and media focused on three broad issues: equitable access of women and women's organizations to the means of public expression, women's access to professional careers and decision-making positions that have traditionally been male-preserved, and the portrayals of women reinforcing or changing stereotypes. So, in so many but few words, the only way you can change the gender disparity is by changing how women are talked about and enabling more women, particularly marginalized women, to create their own information and spread their messages through the new ICTs (Burch & Leon, 2000). Enabling women in this era is very important so that they can get relevant information using Information communication technologies to support other women further. Content: Women should also be allowed to develop content in appropriate languages used by different women. Universal Access: There should also be infrastructure investment strategies that provide primary and affordable infrastructure. Through universal access and infrastructure, focus on adult digital literacy for women and girls and make tools available to women and girls—human resource development to facilitate women's economic empowerment in Information technologies for digital economic growth. Young girls must have access to digital education for emerging technologies to contribute effectively to development. The training should be designed and developed in a way that is beneficial for both genders. Governments should include training in ICTs right from lower levels in the curriculum and, in addition, ensure that girls and digital adult literacy for women, particularly in rural areas of Zambia, are catered for. There should be proper change management programs that address and create sensitization and awareness on the importance of women and girls fully understanding the need to be empowered in ICTs. Women groups and movements document and share experiences and use ICTs (Mjumbi, 2002).

Educational Dimension

Global Perspective

Access to quality ICT education remains a global challenge for women and girls. Studies show that gender disparities in ICT education persist, affecting career choices and opportunities (Smith & Anderson, 2018; UNESCO, 2019).

Globally, girls and women are less likely to enroll in STEM (Science et al.) subjects, which form the foundation for careers in ICT. According to UNESCO (2019), social and cultural factors often dissuade girls from pursuing these fields, resulting in a gender gap that starts early in the education system and extends into professional life. Additionally, many schools, especially in developing regions, lack the necessary infrastructure and resources to provide ICT education to both genders equally, further exacerbating the issue.

Smith and Anderson (2018) found that even when girls do pursue ICT-related subjects, they often face barriers such as gender stereotyping, lower expectations from educators, and limited role models. These challenges contribute to the underrepresentation of women in technology-related courses and professions, perpetuating a cycle where fewer women enter or remain in the ICT workforce globally.

Addressing these educational disparities is critical to narrowing the digital gender gap, as providing equal access to ICT education would empower women and girls with the skills they need to thrive in the increasingly digital global economy.

Regional Perspective

In sub-Saharan Africa, including Zambia, limited infrastructure and gender stereotypes hinder women's participation in ICT education (African Union, 2018; Namukasa & Mugagga, 2020).

In sub-Saharan Africa, including Zambia, limited infrastructure and entrenched gender stereotypes significantly hinder women's participation in ICT education (African Union, 2018; Namukasa & Mugagga, 2020).

Infrastructure challenges such as the lack of reliable internet connectivity, access to digital devices, and insufficient educational resources disproportionately affect women and girls. Schools in rural areas, in particular, often lack the necessary technology and teaching materials to offer comprehensive ICT education, limiting girls' exposure to digital skills from a young age. As a result, many girls in these regions do not gain the digital literacy necessary to pursue ICT careers. Additionally, gender stereotypes in these communities often discourage girls from engaging with technology, as ICT is viewed as a field more suitable for men. Cultural norms place a higher value on domestic roles for women, which further limits their participation in STEM education, including ICT (Namukasa & Mugagga, 2020). Parents, teachers, and peers often reinforce these stereotypes, leading to a significant gender gap in ICT education.

Organizations such as the African Union's efforts to promote gender equality in education and improve ICT infrastructure are crucial for addressing these disparities. However, progress remains slow, and targeted interventions are needed to overcome these regional barriers and increase women's participation in ICT education.

Local Perspective (Zambia)

In rural Zambia, limited access to quality ICT education exacerbates the gender gap, reinforcing the urban-rural divide (Ministry of Education, Zambia, 2017; Sichimba & Mweetwa, 2019).

In these rural areas, infrastructure challenges, such as the lack of reliable electricity, internet connectivity, and digital devices, hinder the provision of ICT education in schools. As a result, girls in rural communities often have less exposure to technology compared to their urban counterparts, where ICT resources are more accessible. This disparity contributes to a growing urban-rural divide regarding digital literacy and skills, with urban women having better opportunities to engage in the digital economy. Cultural expectations also play a significant role. In rural Zambia, societal norms often dictate that women prioritize household responsibilities over education, limiting ICT access. Sichimba and Mweetwa (2019) note that gender stereotypes and low expectations for girls' education contribute to the persistent underrepresentation of women in ICT fields. These societal pressures and a lack of resources make it difficult for women and girls in rural Zambia to pursue ICT education and career opportunities.

Addressing these barriers requires focused interventions, including improving ICT infrastructure in rural schools, promoting digital literacy programs for women, and challenging gender norms that limit girls' access to education.

Socio-economic Dimension

Global Perspective

Economic disparities contribute significantly to the gender digital divide globally, affecting women's access to resources and opportunities in the ICT sector (World Bank et al., 2021; Chakraborty & Zohir, 2018).

Women, particularly in lower-income households and developing countries, often lack the financial resources to access digital technologies such as smartphones, computers, and internet connectivity. This economic barrier limits their ability to engage with ICT for education, employment, or entrepreneurship. World Bank et al. (2021) highlight that these economic disparities are more pronounced in regions with high poverty rates, leading to unequal opportunities between men and women in accessing the tools necessary for digital participation. Furthermore, Chakraborty and Zohir (2018) argue that women are more likely to be concentrated in low-wage sectors with less access to technology, further deepening the digital gender divide. Even in countries with growing ICT infrastructure, women tend to have less disposable income than men, making investing in digital skills and technologies harder. This lack of access reinforces existing gender inequalities in the labor market, where fewer women are employed in higher-paying ICT jobs. Addressing these socio-economic challenges requires global efforts to promote inclusive policies, subsidize access to digital technologies for women, and support their entry into the ICT sector through targeted training and economic empowerment programs.

Regional Perspective

Providing equitable access to digital devices and the internet in schools in Zambia is not only a challenge but also a serious concern as it is still a huge challenge to provide connectivity to community youth centers and at home as most parts of Zambia are in very remote part which still does not have a digital infrastructure to start with and also the availability of funds to sustain the deployment of connectivity to the last mile in 118 districts. Apart from that, Zambia also has challenges of conducting an influential inclusive agenda to address these challenges as we still have to champion change managers to communicate and sensitize the communities amongst these women. Providing equitable access to digital devices and the internet in schools, community youth centers, and at home to promote digital inclusion, including considering providing low-cost devices to marginalized communities. Equipping schools to equally build boys' and girls' digital skills, with context-specific analysis of barriers to girls' skills acquisition in school and considering girl-targeted after-school IT clubs or other modalities that address their exclusion. • Supporting adolescent girls and young women in developing digital skills out of school, including offering digital skills training at safe spaces and community centers catering to girls and young women. Ensuring adolescent girls' and young women's safety online, including through virtual safe spaces, strong safeguarding policies, and the strengthening of laws and partnerships with the government and the private sector to address online violence of all kinds. Promoting positive gender socialization around boys' and girls' digital inclusion within families and investing in evidence-based action to address the harmful gender norms underpinning the many barriers to digital access, internet usage, and skills acquisition faced by adolescent girls and young women. Investing in sex-disaggregated data collection in low- and middle-income countries to monitor progress in gender-equitable digital inclusion at the global, regional, and country-level perspective.

In Sub-Saharan Africa. Financial constraints impede women's entry into the ICT sector, limiting entrepreneurial opportunities (African Development Bank, 2018; Mwale & Muyeba).

Local Perspective (Zambia)

Limited financial resources hinder women's ability to establish themselves in the ICT sector in Zambia, significantly impacting their economic empowerment (Women's ICT Empowerment Program, Zambia, 2020; Banda & Sakala, 2018).

In Zambia, many women encounter financial barriers that prevent them from fully participating in the ICT sector. The high cost of digital devices, internet access, and technology-related education is particularly burdensome for women in low-income households or rural areas. Additionally, women in Zambia are more likely to be involved in informal and lower-paying jobs, which limits their ability to invest in ICT skills and entrepreneurship. Banda and Sakala (2018) highlight that despite government and non-governmental efforts to promote digital literacy and inclusion, women remain underrepresented in the country's growing tech industry. Limited access to funding for starting tech businesses or enrolling in ICT training programs exacerbates this disparity, restricting women's potential to leverage ICT for economic empowerment. Programs like the Women's ICT Empowerment Program aim to address these barriers by offering financial support, training, and resources to women aspiring to enter the ICT sector. However, more widespread and sustained efforts are needed to reduce the financial constraints that hinder women's participation in Zambia's digital economy.

Cultural and Gender Norms.

Global Perspective

Traditional gender roles and stereotypes persist globally, influencing career choices and perpetuating gender norms in the ICT sector (UNESCO, 2019; Smith & Anderson, 2018). These societal expectations often discourage women and girls from pursuing education and careers in ICT, reinforcing the perception that technology is male-dominated.

For instance, in many parts of the world, women are still expected to prioritize domestic duties and caregiving, leaving little room for engagement with technology or pursuing technical skills (UNESCO, 2019). Cultural stereotypes also frame ICT as a "masculine" domain, further discouraging girls from participating in STEM fields.

According to UNESCO's 2019 report on "Cracking the Code: Girls' and Women's Education in STEM," this gender bias is evident in classrooms where teachers, parents, and peers may influence girls' career choices, often steering them away from science and technology. Smith and Anderson (2018) also highlight that women are underrepresented globally in technology companies and leadership positions, with many tech firms exhibiting unconscious bias in hiring and promotion practices.

As a result, the gender gap in the ICT sector persists, with women occupying only 28% of the global tech workforce, as noted by the World Economic Forum's 2021 Global Gender Gap Report. Addressing these cultural and gender norms is critical to fostering an inclusive environment that encourages women and girls to enter and succeed in the ICT field.s in the ICT sector (UNESCO,2019; Smith &Anderson, 2018).

Regional Perspective

In Africa, cultural norms and expectations shape perceptions of women in ICT, contributing to a gendered division of labor (Namukasa & Mugagga, 2020; African Union, 2018).

Several studies document that males not only have better access to computers and the internet than females (Komerik, 2005) but also enjoy long hours online and seem to be more enthusiastic about the use of computers and the internet (Agbonlahor, 2005; Brous, 2005; Hafkin & Tag-gart, 2001; Huyer & Sikoska, 2003; Madanda et al., 2007). In addition, differences are observed in the areas of interest among what males and females do with the computer and the internet (BBC, 2007; Komerik, 2005; Nsibirano, 2006), although the findings are not conclusive enough to point out how differences in meaning formation and attachment to the technology could provide explanations for the disparities.

Local Perspective (Zambia)

Cultural expectations in Zambia influence women's career choices, often steering them away from ICT-related fields (Interviews with Zambian ICT Professionals, 2022).

In Zambia, cultural and gender norms significantly influence women's and girls' participation in the ICT sector. Traditional views on gender roles often limit women's engagement with technology, as societal expectations prioritize their domestic responsibilities over educational and professional aspirations in fields like ICT (Ministry of Gender, Zambia, 2019; Sichimba & Mweetwa, 2019).

Cultural expectations in many Zambian communities dictate that women should focus on caregiving and household duties, which leaves little time or encouragement for them to pursue digital literacy or careers in ICT.

This perception is reinforced by the belief that technology and technical professions are "male" domains, further discouraging women from entering or succeeding in the field. According to Sichimba and Mweetwa (2019), these gender stereotypes are prevalent in rural areas, where families and communities may discourage girls from pursuing education, especially in STEM and ICT subjects.

Even in urban areas, where ICT resources are more accessible, these deep-seated cultural norms can still limit women's participation in the tech industry. Ministry of Gender, Zambia (2019) highlights that efforts to empower women through ICT will remain limited in their impact without addressing these cultural barriers. Changing these cultural and gender norms requires access to education and resources and community sensitization programs that challenge traditional roles and promote gender equality in the ICT sector.

Technological Dimension

Global Perspective

SDG 5 Gender Equality

According to the ITU statistics, 250 million fewer women were online than men in 2017. Globally, 62% of men use the Internet compared with 57% of women. Although the digital gender divide has been narrowing in all world regions and virtually eliminated in the developed world regions and virtually eliminated in the developed world, wide gaps persist in LDCs (where 31% of men are online, compared to 19% of women) and in Landlocked Developing Countries (where 38% of men compared to 27% of women). To close this digital gap, ITU members organize the annual International Girls in ICT Day to encourage more women and girls to pursue science, technology, engineering, and mathematics (STEM) careers. Gender equality initiatives where ITU is directly engaged include EQUALS, a groundbreaking global network to build an evidence-based and improve women's access to technology, build relevant digital and other skills, and promote female leadership in the tech sector. Women globally face challenges in accessing and adopting technology, leading to a digital gender divide (World et al., 2021; Chakraborty & Zohir, 2018).

Regional Perspective

In Sub-Saharan Africa, inadequate technological infrastructure significantly hampers women's engagement with ICTs (Namukasa & Mugagga, 2020; African Union, 2018).

Limited access to reliable internet connectivity, electricity, and affordable digital devices presents a significant obstacle for women across the region. Rural areas, in particular, lack infrastructure that enables widespread use of ICTs, disproportionately affecting women, who often have fewer opportunities and resources to access technology than men.

According to the African Union (2018), infrastructure deficits in Sub-Saharan Africa exacerbate the digital divide between men and women, making it difficult for women to develop digital skills, access online education, or participate in the digital economy. Namukasa and Mugagga (2020) further argue that without adequate infrastructure, efforts to promote gender equality in ICT engagement will have limited effectiveness, particularly in reaching women in underserved communities. Improving technological infrastructure in Sub-Saharan Africa is crucial for increasing women's participation in ICT and ensuring they can take advantage of opportunities in the rapidly growing digital landscape.

Local Perspective (Zambia)

In Zambia, limited technological infrastructure, especially in rural areas, exacerbates gender disparities, restricting women's ability to leverage ICTs for empowerment and economic advancement (Ministry of Communications and Transport, Zambia, 2020; Interviews with Zambian ICT professionals, 2022). Rural regions face significant challenges, such as poor internet connectivity, inadequate access to electricity, and a lack of affordable digital devices. These infrastructure deficits hinder women's ability to engage with technology, reducing opportunities for education, digital literacy, and participation in the ICT workforce. The Ministry of Communications and Transport, Zambia (2020) reports that the urban-rural digital divide limits women in rural areas from accessing ICT tools that could support entrepreneurial activities, educational advancement, and job opportunities in the growing digital economy.

Furthermore, the 2022 interviews with Zambian ICT professionals underscore that women, particularly in rural regions, are often disadvantaged due to the high cost of digital devices and data, making technology inaccessible. This technological gap further isolates them from benefiting from digital platforms that could foster financial independence and social mobility. Efforts to improve infrastructure, such as extending internet coverage to rural areas and investing in affordable technology, are crucial to addressing these barriers and promoting greater gender equality in ICT access and usage across Zambia.

Online Safety Concerns

Global Perspective

Questions are raised every day about whether adolescent girls and young women would fall behind their male peers due to differential access to and skills to navigate digital technologies by analyzing the most comprehensive analysis of pre-pandemic levels of and gender gaps in digital use and skills among youth, using data from Multiple Indicator Cluster Surveys (MICS) and Demographics and Health Surveys (DHS). It has also been recognized that the home space is crucial for digital skills growth, and such opportunities should not be noted in terms of gender; report examination of gender gaps in other areas, such as the use of mobile and smartphones by the female gender in a home. The report highlights the experiences of adolescent girls and young women who have overcome gender biases in their efforts to be included in digital initiatives. This report provides essential context for global, regional, and national digital learning strategies. It is timely and should be considered in discussions and advocacy efforts in international development forums like the SDG Summit and the Summit of the Future. UNICEF collaborates with the Ministry of Education and Training and civil society to work on this initiative. Society organizations to break these gendered stereotypes about girls and STEM. That is why some girls have been introduced to AVR in their classrooms. The program also trains and empowers teachers to use innovative technologies such as AVR to encourage students, especially girls, to participate in STEM subjects. The program is part of the Skills4Girls initiative, which supports the development of digital literacy and skills of adolescents, predominantly ethnic minority girls.

Women Globally face online harassment and safety concerns, deterring their active participation in the digital space (Smith & Anderson, 2018; UN et al., 2021).

Regional Perspective

In Sub-Saharan Africa, online safety concerns pose barriers to women's engagement with ICTs, impacting their digital inclusion (Namukasa & Mugagga, 2020; UN Broadband Commission, 2021) In Sub-Saharan Africa, online safety concerns pose significant barriers to women's engagement with ICTs, impacting their digital inclusion (Namukasa & Mugagga, 2020; UN Broadband Commission, 2021).

Women in the region face heightened risks of online harassment, cyberbullying, and privacy breaches, which discourage their participation in digital spaces. According to Namukasa and Mugagga (2020), these safety concerns disproportionately affect women, as cultural and social norms make them more vulnerable to online abuse. This discourages many women from fully engaging with ICT tools for education, business, and communication.

The UN Broadband Commission (2021) highlights that fear of harassment and a lack of comprehensive policies addressing online violence contribute to the digital gender divide. As more services and opportunities move online, women's inability to feel safe in digital spaces limits their potential for empowerment and economic participation, exacerbating gender inequality in the region. Efforts to promote online safety, create supportive legal frameworks, and raise awareness about digital rights are critical for ensuring women can safely engage with ICTs in Sub-Saharan Africa.

Local Perspective (Zambia)

Reports on online harassment and safety concerns in Zambia raise significant questions about the inclusivity of digital spaces for women and girls (Interviews with Zambian ICT professionals, 2022). Women and girls in Zambia face increasing challenges related to online safety, including harassment, cyberbullying, and privacy violations. These concerns limit their participation in digital platforms, making it difficult for them to fully engage in ICT opportunities such as e-learning, online business, and social networking. Interviews with Zambian ICT professionals (2022) reveal that while internet access is expanding, many women are hesitant to engage due to fears of abuse and inadequate measures to protect their privacy and security.

Addressing these safety concerns is critical for promoting digital inclusion and ensuring that women in Zambia can safely and confidently participate in the digital economy and society. Creating stronger online protections, legal frameworks, and awareness campaigns about digital rights will be essential steps toward fostering safer and more inclusive online environments for women and girls in Zambia spaces for women and girls (Interviews with Zambian ICT professionals, 2022).

Empowerment Programs

Global Perspective

Various global initiatives aim to empower women in ICTs, including UNESCO's Girls in ICT Day. These initiatives recognize the importance of bridging the digital gender gap. Programs like UNESCO's Girls in ICT Day and the EQUALS Global Partnership strive to provide women and girls with opportunities to engage in the digital economy and acquire ICT skills (UNESCO, 2019; EQUALS Global Partnership, 2021). UNESCO's Girls in ICT Day is an annual event that encourages girls and young women to pursue careers in the ICT sector,

offering mentorship, networking opportunities, and skill-building activities. Similarly, the EQUALS Global Partnership, a coalition of government, private sector, and civil society organizations, works globally to promote digital gender equality by providing access to ICT education, fostering women's entrepreneurship in tech, and advocating for policies that support women's inclusion in the digital space. These global efforts underscore the need for collaborative approaches to ensure women worldwide have the resources, skills, and support necessary to thrive in the digital era. And the EQUALS Global Partnership (UNESCO, 2019; EQUALS Global Partnership, 2021).

Regional Perspective

In Africa, regional initiatives like the African Development Bank's Gender Strategy address the gender digital divide by promoting women's access to ICTs and supporting their participation in the digital economy (African Development Bank, 2018; Namukasa & Mugagga, 2020). The Strategy focuses on creating gender-inclusive opportunities in ICT through infrastructure development, capacity-building programs, and policy reforms that encourage digital literacy for women and girls. It also aims to reduce the socio-economic and cultural barriers hindering women's participation in the ICT sector. Additionally, Namukasa and Mugagga (2020) highlight regional efforts to integrate gender equality in ICT education with programs designed to empower women in technology by providing scholarships, training, and mentorship. These initiatives are critical for ensuring that women across Africa, including in underserved regions, can leverage ICT for economic and social empowerment.

Local Perspective (Zambia)

Local empowerment programs in Zambia, such as the Women's ICT Empowerment Program, aim to bridge the gender gap in ICT by providing women with access to digital literacy training, mentorship, and resources (Women's ICT Empowerment Program, Zambia, 2020). However, these programs face significant challenges in reaching women in remote areas, where infrastructure is lacking, and societal norms often restrict women's participation in technology.

Interviews with program coordinators (2022) highlight that while urban women benefit from these initiatives, rural women remain underserved due to limited internet access, scarce digital resources, and cultural barriers that discourage women's involvement in ICT. Expanding these programs to rural areas and addressing infrastructure deficits are critical for ensuring that all women in Zambia, regardless of location, can benefit from ICT and leverage it for economic and social empowerment. Strengthening local partnerships and investing in mobile technology solutions may help overcome these challenges and extend the reach of empowerment initiatives to the most remote and marginalized women.

IV. Discussion

Rural respondents reported significantly lower ICT access compared to urban counterparts. Internet penetration was estimated at 20% in rural areas versus 70% in urban areas. Approximately 68% of women earning below the national median income reported difficulties affording ICT devices and internet services. Employment status significantly influenced smartphone ownership, with 80% of employed women owning smartphones compared to 45% of unemployed women.

Only 30% of rural schools offered ICT courses compared to 85% of urban schools. Lack of trained ICT teachers was reported in 60% of surveyed institutions. Sixty-five percent of respondents indicated that societal expectations discouraged them from pursuing ICT-related careers. ICT was widely perceived as a male-dominated field.

Unreliable electricity and limited broadband infrastructure were major barriers, particularly in rural regions. Findings confirm that digital gender inequality in Zambia is multidimensional, reflecting intertwined socio-economic, educational, cultural, and infrastructural factors. While national ICT expansion policies have improved connectivity, they insufficiently address structural gender barriers.

The persistence of stereotypes and unequal educational access limits women's participation in digital innovation and entrepreneurship. Without targeted gender-responsive interventions, digital expansion risks reinforcing existing inequalities.

These findings align with global research demonstrating that digital inequality mirrors broader socio-economic disparities (Chakraborty & Zohir, 2018; World Wide Web Foundation, 2021).

Policy Implications

To close the digital gender gap, the following interventions are recommended:

1. Gender-responsive digital policies targeting rural women.
2. Subsidised ICT devices and affordable data packages.
3. Expansion of rural ICT infrastructure.

4. Integration of ICT training into national education curricula.

5. Public campaigns challenging gender stereotypes in STEM fields.

Such interventions support SDG 5 and promote inclusive digital transformation.

V. Conclusion

Digital gender inequality remains a significant barrier to inclusive development in Zambia. Although ICT infrastructure has expanded, structural socio-economic and cultural factors continue to limit women's effective participation. Addressing these inequalities requires coordinated policy action, investment in digital literacy, and gender-sensitive programming. Ensuring equitable access to ICTs is essential for sustainable development and economic empowerment.

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