

Global Gender Differences in Access to Technology Support

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Abstract: Women in low- and middle-income countries remain less likely than men to own mobile phones and use mobile internet. Further, when they do have access to devices, enabling factors such as training, affordability, safety, and social support remain limited. As a result, this gender imbalance can cost the Global South over 500 billion dollars in GDP over the next five years. Our study moves beyond the common first-level access metrics (e.g. access to technology) and also focuses on examining second-level digital divides (e.g. access to technology support). We investigate gender differences in: (1) internet access and, (2) satisfaction with local technology support, across 27 countries. We analysed survey data from 2,740 respondents, collected through the 2023 C20 Grassroots Survey. We examined whether the gender disparities in technology access and support exist across national contexts and global regions, and how these patterns vary by demographic factors. We used mixed-effects regression models which control for country-level baseline differences, age, and educational attainment. The findings showed variations at the country level, wherein some countries had men reporting better internet access, and some the exact opposite. Although at the global level, with all countries combined, gender differences arose neither in internet access nor in technology support, but on disaggregating by region, we uncovered few divergences. In the Global South, women reported lower satisfaction with technology support than men, despite having similar levels of internet access. No gender differences in satisfaction with technology support were observed in the Global North, with women even reporting slightly better internet access than men. However, our strictest analyses found no gender differences in neither internet access nor satisfaction with technology support. Our findings support that the gender digital divide is not a homogenous phenomenon, that it appears differently in different places. Ground reality of women includes many intersecting constraints such as unpaid care burdens, mobility restrictions, and social norms that restrict their technology use. Without giving corresponding technology support, women would remain disadvantaged, preserving the gender gap. Access to technology should come along with culturally responsive training and support systems considering women's real-life challenges. Policymakers must recognize that bridging the second-level digital divide would require investments in social infrastructure along with the digital infrastructure.

Keywords: Gender digital divide, Technology support, Global South, Digital inclusion, Development policy

1. Introduction

Despite sustained global investments and policy efforts to close the gender digital divide, gender gaps in technology access and support persist in low- and middle-income countries. Women remain 8% less likely than men to own mobile phones, with only 83% having access to one (GSMA, 2024). This issue is exacerbated by the fact that device ownership alone does not guarantee equitable use. Even when women gain access to devices, enabling conditions, such as tailored training, affordability, safety, and social support, remain insufficient (Antonio and Tuffley, 2014; Acilar and Sæbø, 2023; UNESCO, 2024). Consequently, women remain 15% less likely than men to use mobile internet, leaving 265 million fewer women online. Among those who do use it, women engage with narrower ranges of activities than men, even among daily users (GSMA, 2024). Beyond access, gender disparities also emerge in how individuals mobilize technological support. Empirical studies from both high- and low-income contexts show that women are more likely to rely on intimate social connections for technical advice, whereas men more frequently draw on impersonal online resources such as forums or specialist pages (Coopamootoo et al., 2023; Wei et al., 2023). These gendered help-seeking patterns shape the quality, scope, and sustainability of digital engagement (Leach & Turner, 2015). The cumulative impact of these access and usage gaps is substantial: low- and middle-income countries are projected to lose over \$500 billion in GDP over the next five years (Global Digital Inclusion Partnership, 2024).

This gap reveals a critical flaw in how digital equality has been pursued: investments have prioritized infrastructure over the supportive conditions necessary for usage. The deficiency has been pointed out by recent theoretical work, which distinguishes between first-level and second-level digital divides. First-level divides concern physical access to devices and networks, while second-level divides involve digital skills, usage patterns, and outcomes (Hargittai, 2002; Van Deursen and Van Dijk, 2019). Research shows that bridging first-level gaps does not eliminate second-level disparities. Importantly, these gender disparities persist even after accounting for socioeconomic status, education, and geography, suggesting that gender operates as an independent axis of digital inequality rather than merely reflecting broader structural disadvantage (David et al., 2022; Joshi et al., 2019). Intersectional analyses further reveal that standard access metrics can mask deep capability gaps, particularly among women of lower socioeconomic status who face compounded vulnerabilities (Zheng and Walsham, 2021).

What accounts for the second-level digital divide? The literature focuses on capacity development, economic and cultural barriers. Existing training programs often fail to account for women's real-life constraints, such as unpaid care burdens, lower baseline literacy, and mobility limitations (World Bank, 2024). Empirical studies further document lower ICT self-confidence among female learners and teachers across diverse educational settings, even when objective skill levels do not substantially differ (Seng et al., 2014), reinforcing the importance of psychological and contextual factors in shaping second-level divides. Social and economic inequalities – education, income, urban residence – explain much of this gap across diverse contexts, including in Bangladesh, Brazil, Chile, Ghana, and the Philippines (Rashid, 2016; Hilbert, 2011). Cultural barriers also remain important. Women may technically have access to shared household devices but face restrictions on when and how they use devices, and experience technology as shared rather than personal resources (UN Women, 2024). Ethnographic evidence from Bangladesh shows that empowerment emerges not from access alone, but from peer networks and deliberate framing of women as technology users (Sarker et al., 2021). Confidence gaps, time poverty, safety concerns, and age-related differences in engagement with formal support systems further inhibit meaningful use (Acilar and Sæbø, 2023; Clifton et al., 2020; OECD, 2024).

Empirical research increasingly confirms that second-level divides persist even when basic access is achieved. Cross-national evidence shows that girls report lower levels of computer access at home across countries, even when controlling for socioeconomic background (Ercikan et al., 2018). Across seven low- and middle-income countries, women were 12–14% less likely than men to use mobile phones for internet access, finance, or entertainment, even after accounting for income, education, and geography (David et al., 2022). Moreover, as overall connectivity increases, gender disparities shift toward differences in digital proficiency and usage breadth. Women engage in narrower online activities and remain underrepresented in advanced digital skills and content creation (Damiani et al., 2023; Kashyap et al., 2020). Emerging evidence further suggests that gender differences extend beyond access and skills to the structure of technological support itself. Women are more likely to rely on intimate social connections for technical advice, while men more frequently draw on impersonal online resources (Coopamootoo et al., 2023; Wei et al., 2023). Female learners consistently report lower ICT self-confidence in training environments (Seng et al., 2014), and older women in particular demonstrate reluctance to engage with formal digital support systems (Clifton et al., 2020). These patterns indicate that the gender digital divide is embedded not only in infrastructure and skills, but also in the social ecology of support.

The present study advances the literature in two key ways. First, it provides an examination of gender disparities in technology access as a multidimensional construct, integrating material access with intersecting social constraints. While existing research often focuses on single-country analyses or isolated indicators, comparative evidence – particularly from underrepresented Global South contexts – remains limited. Second, the study extends prior work by examining disparities in access to local technology support. Whereas much of the literature emphasizes training programs or structural barriers, less attention has been paid to how individuals experience and evaluate the availability of support. By conceptualizing technology support as a broad metric capturing both availability and perceived adequacy, this study offers a novel lens on the social ecology of the second-level digital divide. Using data from 27 countries, we conduct a comparative analysis of gender differences in access to technology and technology support. Specifically, we ask: (RQ1) to what extent do gender disparities in technology access persist across national and regional contexts?; (RQ2) to what extent do gender differences in satisfaction with technology support persist across contexts?; and how do these disparities vary by (RQ3a) age and (RQ3b) education?

2. Methods

2.1 Participants and Procedure

The data used for the analysis were obtained from the C20 Grassroots Survey (Ustenko et al., 2025; Fakkela et al., 2026). The survey was commissioned by the G20 in 2023 and conducted between February and March. It was carried out by an international consortium of university-based researchers using self-report questionnaires and semi-structured interviews. Participants were recruited through non-random, network-based snowballing, with the help of local academic partners in each country. For example, through university, community, and professional networks, as well as personal and social media channels. Our design prioritized inclusiveness and cross-national coverage over perfect probabilistic representativeness, which seemed appropriate for our research question(s). The full study consisted of 3,066 respondents from 51 countries. Due to the non-centralized nature of this research project, comparable to the European Social Survey and the Gallup World Poll, no official ethics approval could be obtained from an Institutional Human Ethics Committee (IHEC). However, all international ethics guidelines were adhered to, including obtaining informed consent, providing personal contact details, and a debriefing.

The final sample consisted of participants from 27 countries ($n = 2,740$), which were further categorized as either part of the 'Global North' or the 'Global South.' The 'Global North' included Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Slovenia, South Korea, Spain, Sweden, Switzerland, the UK, and the US. The 'Global South' included Brazil, Bulgaria, China, Hungary, Mauritius, Mexico, and Russia.

The original demographics comprised participants who identified as females (68.3%), males (31.1%), or with a non-disclosed gender identity (0.7%). Due to power limitations, the study was restricted to participants who identified as either male or female. The participants were restricted to 18 years and above to compare results across countries. The youngest respondents were from China (38.7 years) while the oldest participants came from Sweden (61.4 years). More than half of the respondents held a university degree (56.6%), while others had a vocational education degree (22.9%) had completed secondary education (16.5%) or had only primary education (2.5%).

2.2 Measures

Internet Access. Participants were asked "Do you have access to the Internet?", answering on a Likert-scale ranging from 1 ("Never") to 5 ("Always"). For our analyses, internet access was used as a continuous variable.

Technology Support. Participants were asked to rate the service of computer/digital/technology assistance available in their community, on a 4-point Likert-scale from 1 ("Poor") to 4 ("Excellent"). For our analyses, access and satisfaction with local technology support was used as a continuous variable.

Gender. Participants were asked to indicate their gender as female, male, or other/prefer not to answer.

Age. Participants provided their age in response to the question "How old are you?".

Country. Participants reported their country of residence in an open-ended answer field.

Level of Education. Participants were asked "What is the level of your education?", to which they selected the most appropriate answer from 11 options (e.g., "secondary school graduate" or "trade certificate" or "Master's degree"). For power purposes, answers were clustered into "university degree" or "non-university degree" to be used as a dichotomous variable in our analyses.

2.3 Strategy of Analysis

The study adopted a quantitative methodology to investigate global gender differences in access to technology and satisfaction with technology support. Analyses were conducted in R. Respondents who were under 18 years of age, from countries that did not meet the sample size criterion, or who had non-binary or missing gender responses were excluded from the analyses.

Overall means and standard deviations were calculated for internet access and technology support. To address RQ1 and RQ2, independent samples *t*-tests were used to compare mean scores between men and women. Gender differences were first examined at the overall sample level and then explored across individual countries. An initial *t*-test assessed gender differences across the full sample of 27 countries, followed by separate *t*-tests for the Global North and Global South to examine regional variation. Country-level

comparisons were also conducted to assess gender differences in internet access and technology support for each country.

For a more comprehensive analysis, mixed-effects regression models were employed to examine the effects of gender, region, age, and education on global gender differences in internet access and technology support (RQ3a & RQ3b). Model diagnostics included checks for convergence, singularity, and random-effects stability; assessment of residuals and residual-versus-fitted plots; QQ-plots and Shapiro-Wilk tests, evaluation of intraclass correlations (ICCs) and marginal and conditional R^2 statistics; and assessment of multicollinearity using fixed-effect correlations and LM-based variance inflation factors (VIFs). This study was reported in accordance with the AXIS guidelines for cross-sectional studies (Downes et al., 2016).

3. Results

3.1 Descriptive Gender Differences by Country

In our sample as a whole, participants reported having almost always access to internet (M = 4.78, SD = 0.62), but only fair satisfaction with local technology support (M = 2.95, SD = 1.35). In the sample as a whole, no gender differences are observed in access to internet nor in access to technology support.

Across countries, considerable variation was observed. For example, men in Canada report having better internet access than women, whereas in Hungary and Spain women report having better access to internet than men. In Mexico and South Korea, men report higher satisfaction with technology support than women – while all other countries report similar satisfaction between the two genders. On the country-level, there appears to be considerable variation between countries with no clear patterns in gender differences.

Table 1: Gender differences in access to internet and access to tech support per country

Country	N_{male}	N_{female}	Gender differences in Access to Internet ^a	Gender differences in Access to Tech Support ^a
Australia	34	98	-0.08	0.06
Austria	28	36	0.08	0.26
Belgium	27	65	-0.23	0.30
Brazil	30	31	0.00	0.33
Bulgaria	34	55	-0.06	0.39
Canada	15	59	0.10	-0.11
China	31	86	0.01	0.39
Denmark	17	32	0.06	0.05
Finland	8	26	0.00	-0.96
France	64	155	-0.06	0.35
Germany	43	88	-0.10	-0.05
Greece	35	133	0.04	-0.02
Hungary	15	28	-0.73	0.08
Ireland	39	71	0.14	-0.19
Israel	30	73	0.00	-0.25
Italy	32	63	-0.18	-0.04

Country	N _{male}	N _{female}	Gender differences in Access to Internet ^a	Gender differences in Access to Tech Support ^a
Japan	28	69	-0.16	0.26
Mauritius	42	39	-0.08	-0.17
Mexico	71	97	-0.14	0.36*
Netherlands	19	75	0.04	-0.33
Slovenia	8	22	0.00	0.27
South Korea	37	61	-0.10	0.84**
Spain	21	51	-0.78	-0.11
Sweden	18	34	-0.08	-0.18
Switzerland	12	41	-0.08	0.35
United Kingdom	44	60	0.06	0.12
United States	51	179	0.04	-0.34

^aCalculated as mean score of men minus mean score of women, with a positive score indicating that men > women and a negative score indicating that women > men.

Note. Countries categorized as Global South are highlighted in grey. Countries with significant gender differences are highlighted in bold.

3.2 Descriptive Gender Differences by Region

When separating by region (i.e., Global North vs. Global South), some findings seem to emerge. In both the Global North and Global South, women no longer lag behind men in internet access (RQ1). In fact, women in the Global North report better access to internet than men – though the effect is small. Regarding access to technology support (RQ2), we find that women report poorer satisfaction than men in the Global South – but not in the Global North.

Table 2: In the Global South, women report poorer access to technology support than men – despite similar access to internet

Region	Gender	N	Access to Internet	t-value	Access to Tech Support	t-value
Global North	female	1574	4.85		2.98	
	male	659	4.78	2.43*	3.04	1.01
Global South	female	311	4.61		2.73	
	male	196	4.56	0.60	3.02	2.92**

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

3.3 Mixed-effects Estimates of Gender Differences by Region

In our final, most comprehensive analysis, we (1) controlled for country-level baseline differences in internet access and technology support, (2) included age as a covariate, and (3) controlled for educational attainment. The mixed-effects models revealed several consistent main effects (Table 3).

For internet access, participants in the Global North reported substantially better access than those in the Global South, and individuals with higher educational attainment and younger age reported better access. No overall gender difference emerged once covariates and country-level variation were accounted for.

For technology support, men reported slightly higher satisfaction than women on average, and respondents in the Global North again reported higher satisfaction than those in the Global South. Education showed a small positive association, whereas age was not a meaningful predictor.

Importantly, the interaction between gender and region was non-significant for both outcomes. This indicates that, after controlling for country, age, and education, gender differences in internet access and technology support do not differ reliably between the Global North and Global South, even though descriptive patterns suggested some regional contrasts.

As a sensitivity analysis, we reran our analyses including 41 participants from the African continent – who were originally excluded due to lack of power and lack of theoretical clustering – as members of the Global South ($n = 548$). Findings were identical, but slightly stronger regional differences (e.g., the trend significant regional differences in tech support were now significant). It thus appears that among our African participants, gender differences in internet access and tech support may be more pronounced, though this conclusion would be limited due to the small, heterogenous nature of the African subsample.

Table 3: Parameter estimates and standard errors for all predictors, including the interaction effect of gender and region, on internet access and tech support

Predictor	Internet Access	Tech Support
Intercept	4.80 (0.07) ***	2.68 (0.19) ***
Gender [male]	-0.03 (0.05)	0.26 (0.12) *
Region [Global North]	0.23 (0.06) ***	0.35 (0.19) †
Age	-0.01 (0.00) ***	-0.00 (0.00)
Educational attainment [university]	0.15 (0.02) ***	0.08 (0.05)
Gender*Region	-0.05 (0.06)	-0.20 (0.14)

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

A comprehensive set of diagnostics was conducted for both mixed-effects models, including checks for convergence, singularity, and random-effects stability; inspection of residual distributions and residual-versus-fitted plots; QQ-plots and Shapiro–Wilk tests on subsampled residuals; evaluation of intraclass correlations (ICCs) and variance components; marginal and conditional R^2 statistics; and approximate assessments of multicollinearity using fixed-effect correlations and LM-based VIFs. Both models converged cleanly, showed no signs of singularity, and demonstrated modest but meaningful between-country variance. Residual diagnostics indicated acceptable model fit given the ordinal nature of the outcomes, with no evidence of problematic heteroscedasticity or influential outliers. Fixed-effect correlations and parameter standard errors suggested no concerning multicollinearity. Overall, all diagnostics indicated that the models were well-specified and that the reported estimates can be interpreted with confidence.

4. Discussion

4.1 Theoretical Implications

This study contributes to the growing literature challenging the traditional, access-centred conception of the digital divide. Early definitions treated the divide primarily as a binary – who had access to devices and internet infrastructure versus who did not (OECD, 2001). This framing catalysed significant investments in infrastructure and device distribution globally. However, our findings reaffirm that connectivity alone does not guarantee meaningful digital participation. This aligns with theoretical critiques of access-based metrics that obscure deeper inequalities in support, skills, and agency (Van Deursen and Van Dijk, 2019; Zheng and Walsham, 2021).

At the same time, we expand the body of knowledge by showing that lack of access to technology support is one of the ways the second-level digital divide is manifested in the Global South. While overall gender gaps are not significant at the global level, disaggregating by region suggests some disparities. National and regional policies, sociocultural norms, and institutional capacity fundamentally shape the extent to which digital access translates into meaningful use.

4.2 Practical Implications

Our findings reinforce the value of gender-intentional design in digital inclusion policies. As shown in prior work, countries like Indonesia and India have implemented successful multi-dimensional interventions such as community-based digital literacy programs that directly address the constraints faced by women (Gattorno et al., 2022; Gogoi et al., 2025). These policies focus not only on physical access but also on tailoring support to women's schedules, mobility, and safety needs, while positioning them as digital leaders within their communities. These interventions reflect a key insight confirmed by our data: access to ethnological support is an important dimension of digital inequality in the Global South. Policymakers must therefore invest in social infrastructure alongside digital infrastructure, recognizing that empowerment depends on the surrounding ecosystem as much as on the device or network.

4.3 Strengths, Limitations, and Directions for Future Research

A major strength of this study lies in its comparative scope. By including 27 countries and explicitly separating Global North and Global South contexts, we are able to detect patterns that would remain invisible in aggregate data. The distinction between access and support, often blurred in digital divide research, is made analytically clear and empirically salient. Additionally, our dual focus on access and technology support aligns with calls for better disaggregation, distinguishing not only between who has access but how meaningfully they can use it (Global Digital Inclusion Partnership, 2024; GSMA, 2024).

However, the study also has limitations. The reliance on self-reported measures of technology access and satisfaction with tech support may introduce bias, particularly across cultural contexts where norms about expressing dissatisfaction differ. Another limitation relates to the educational composition of the sample. Slightly more than half of respondents reported having a university-level education, which may reflect the tendency of digitally administered surveys to reach relatively more educated participants. This limitation is in line with larger international studies, especially those that also incorporate countries where comprehensive research structures are still lacking in some ways (e.g., Global South countries), or those studies that exclusively recruit undergraduate students. Because higher educational attainment is often associated with greater digital access and confidence, this may lead to conservative estimates of gender disparities in the broader population. The presence of gender differences in technology support even in a relatively higher educated sample suggests that such gender differences may be even larger among less advantaged groups, who lack such an attenuating buffer. Future studies could aim to replicate these findings using nationally representative samples or targeted recruitment among lower-education groups. It is also recommended to systematically track non-response (and attrition for longitudinal designs).

Furthermore, future research should explore causal pathways. While our cross-sectional data highlights disparities, it does not allow us to test how access to support affects outcomes such as income, employment, or empowerment. Longitudinal or experimental designs could help establish these links and identify which kinds of technology support most effectively close gender gaps in technology use.

This study reaffirms that digital gender equality requires more than access: it requires support, safety, skills, and sociocultural legitimacy. In the Global North, access gaps are closing, but in the Global South, gaps in support continue to marginalize women from the digital economy. As global actors pursue inclusive digital transformation, nuanced, regionally grounded, and gender-intentional strategies will be critical. Bridging the second-level digital divide is not only a matter of equity but of unlocking transformative potential for half the world's population.

5. Conclusion

Throughout our research we have found that gender gaps are neither universal nor consistent across contexts; instead, structural inequalities ranging from the household to national level are main influences and predictors of digital access and support in regard to gender. This suggests that universal narratives of a "global gender divide" oversimplify a far more complex digital landscape.

These findings carry important implications for gender equality and development policy. Efforts should move beyond device distribution and prioritize the enabling conditions that make access meaningful such as affordable connectivity, culturally responsive training, and readily available technological support.

Future research should advance this work by examining causal pathways between structural inequalities, gender norms, and digital capability. Finally, there is a lack of longitudinal studies, especially those that explore

intersectional factors such as class, rurality, and age and how these influence the patterns of digital inequality that remain hidden in aggregate analyses.

Ethics Declaration: Due to the non-centralized nature of this research project, no official ethics approval could be obtained from an IHEC. However, all international ethics guidelines were adhered to, including obtaining informed consent, providing personal contact details, and a debriefing.

AI Declaration: AI tools were used to support drafting, restructuring, and editing of sections of this manuscript. All analyses, interpretations, and final decisions were made by the authors.

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