

## BRIDGING THE GAP: EXPLORING THE DIGITAL DIVIDE AND WOMEN'S ACCESS TO TECHNOLOGY IN RURAL PAKISTAN

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### Abstract

The rapid growth of information and communication technologies (ICTs) has created new opportunities for education, health, and economic participation. Yet, gendered barriers to digital access remain acute in low- and middle-income countries. This study examined the digital divide among rural women in Khyber Pakhtunkhwa, Pakistan, with a focus on levels of access and use, socio-cultural and economic barriers, enabling factors, and strategies for inclusion. A qualitative exploratory design was adopted. Data were collected from 50 participants: 32 women in four focus group discussions (FGDs), 12 women with partial digital access through in-depth interviews (IDIs), and six key informants (KIIs) including teachers, Lady Health Workers (LHWs), and community elders. Data were transcribed, translated, and analyzed thematically using Braun and Clarke's framework. Findings revealed that women's engagement with technology was constrained by limited device ownership, male-controlled access, low literacy, affordability challenges, and weak infrastructure. Usage was typically confined to basic communication and occasional health information. Socio-cultural norms often stigmatized phone use, particularly among younger or newly married women. Despite these challenges, participants expressed motivation to learn and use technology. Supportive family members, peers, and trusted intermediaries emerged as critical enablers. The study concluded that rural women's digital exclusion is driven by intersecting structural and cultural barriers, but opportunities exist for change. Feasible strategies include affordable device access, low-cost connectivity, community-based training, male engagement, and safe digital hubs. Policy interventions should integrate infrastructure, skills, and social norm change to promote gender-equitable digital inclusion.

## INTRODUCTION

The rapid expansion of information and communication technologies (ICTs) has transformed the social and economic landscape worldwide, offering new avenues for education, healthcare, livelihoods, and civic participation (Antonio & Tuffley, 2014; Norris, 2001). Yet, access to and use of these technologies remains highly uneven, particularly in low- and middle-income countries, where gender, geography, and socioeconomic status strongly influence digital engagement (Hilbert, 2016; Pal & De', 2021). In Pakistan, this digital divide is most evident among rural women, whose opportunities to benefit from ICTs are constrained by intersecting structural and cultural barriers (Siegmann, 2009; Jamil, 2021).

Recent data highlights some progress. According to GSMA's *Mobile Gender Gap Report 2025*, the gender gap in mobile internet use in Pakistan narrowed from 38 percentage points in 2023 to 25 in 2024, driven by an unprecedented rise in women's adoption of mobile internet services (GSMA, 2025). Despite these gains, women remain 38% less likely than men to own a mobile phone and significantly less likely to use mobile internet, particularly in rural areas where device access is often mediated by male household members (GSMA, 2025; CDPR, 2024). These patterns reflect a combination of affordability constraints, low digital literacy, inadequate infrastructure, and restrictive gender norms (NCSW/UNDP, 2023; Siegmann, 2010).

The implications of such exclusion are far-reaching. Digital tools can improve rural women's access to health information, online education, market opportunities, and social networks, enabling greater autonomy and economic participation (Dayanand et al., 2024; Amber, 2023). However, their benefits remain largely unrealized in contexts where patriarchal norms, low literacy, and economic marginalization intersect to restrict women's use of technology (Jamil, 2021; Naveed, 2025). Rural women are often confined to secondary or mediated access, rely on shared devices, and face stigma when attempting to engage with digital platforms (Siegmann, 2009). Even motivated women encounter systemic challenges: limited network coverage, intermittent electricity, and scarce training programs

are common in rural Pakistan (Ahmed, 2021; Dayanand et al., 2024).

Community attitudes and gender norms play a central role in shaping women's digital participation. Household decision-making, community perceptions, and male-dominated control of resources often dictate who can own or use ICT devices (CDPR, 2024; Siegmann, 2010). These dynamics not only limit women's access but also reinforce unequal power relations, with significant implications for education, health, and livelihoods. Policymakers and development practitioners increasingly recognize that interventions must address these socio-cultural constraints alongside structural and economic barriers (NCSW/UNDP, 2023; Villaronga & Tanner, 2025). Given this context, there is a critical need to generate evidence that captures rural women's lived realities of digital access and engagement. This study is therefore guided by four objectives: (1) to assess the current level of digital access and technology use among women in rural Pakistan; (2) to examine socio-cultural, economic, and infrastructural barriers to digital inclusion and explore their impact on women's access to education, health, and livelihoods; (3) to analyze community attitudes and gender norms affecting women's engagement with digital tools; and (4) to provide evidence-based recommendations to promote equitable and gender-inclusive digital access in rural Pakistan. By addressing these objectives, this study seeks to contribute to a deeper understanding of the gendered digital divide and inform contextually relevant strategies for rural development and women's empowerment.

## Methodology

### Study Design and Setting

This study adopted a qualitative exploratory design to investigate the barriers, experiences, and enabling factors influencing rural women's access to digital technology in Pakistan. Qualitative exploratory design has been largely used in literature (Riaz et al., 2024a; Riaz et al., 2024b; Naz et al., 2024a; Naz et al., 2024b; Naz et al., 2023a; Naz et al., 2023b), therefore providing ample justification to be used in this study. Given the study's focus on the lived realities of women and the socio-cultural context shaping their engagement with digital tools, a qualitative approach

was deemed appropriate to capture nuanced insights. The research was conducted across selected rural districts in Khyber Pakhtunkhwa (KP), a region marked by traditional gender norms, lower female literacy, and infrastructural limitations that intensify the digital divide.

**Sampling and Participants**

Purposive sampling was employed to recruit participants with direct experience or contextual knowledge of women’s access to digital technology. Three primary participant groups were targeted:

Participant Group	Method	Number of Participants	Description
Rural Women	Focus Group Discussions (FGDs)	4 FGDs (n = 32)	Women aged 18–45 from low-income rural households, varying in digital exposure
Key Stakeholders	Community Key Informant Interviews (KIIs)	6 KIIs	Including teachers, Lady Health Workers (LHWs), and community elders
Technology-Using Rural Women	In-depth Interviews (IDIs)	12 IDIs	Women with at least partial access to smartphones or digital platforms

Eligibility criteria included: being female, aged 18 or above, residing in the rural area for at least five years, and willingness to provide informed consent. For KIIs, participants were selected based on their professional engagement with rural development, health, education, or community welfare initiatives.

**Data Collection**

Data were collected between April and July 2025 using a triangulated qualitative approach:

- **Focus Group Discussions (FGDs)** captured collective perceptions around digital exclusion, community norms, and shared experiences.
- **In-depth Interviews (IDIs)** with women users of digital tools explored individual pathways to access, personal motivations, and usage patterns.
- **Key Informant Interviews (KIIs)** provided professional and contextual perspectives on structural barriers and possible enablers for digital access among women.

A semi-structured guide was developed for each group, informed by previous literature on digital gender divides in South Asia and tailored to the socio-cultural realities of rural KP. All interviews and FGDs were conducted in Pashto, audio-recorded with participants’ consent, and supplemented by field

notes. Transcriptions were later translated into English for analysis.

**Data Analysis**

Thematic analysis was employed using Braun and Clarke’s (2006) framework. Transcripts were coded inductively, and emerging patterns were organized into themes reflecting both the structural and experiential dimensions of digital access. NVivo 12 software supported the coding process, facilitating systematic organization and retrieval of coded data. Codes were compared across participant groups to ensure analytical depth and triangulation.

**Trustworthiness and Rigor**

To ensure credibility, member checks were conducted with selected participants to validate emerging themes. Triangulation across data sources (FGDs, IDIs, KIIs) enhanced confirmability. A reflexive journal was maintained throughout the research to minimize researcher bias. Thick descriptions were used to improve transferability, and audit trails were maintained for dependability.

**Ethical Considerations**

The research was conducted in line with the ethical protocols (Naz et al., 2022a; Naz et al., 2022b). All participants provided informed written or verbal

consent prior to participation. Anonymity and confidentiality were assured, and participants were informed of their right to withdraw at any stage. Given the sensitivity of discussing gender and access in traditional settings, all interviews were conducted in safe, private environments, with female data collectors trained in ethical qualitative research methods.

**Limitations**

This study, while insightful, has certain limitations. It was confined to select rural areas of Khyber

Pakhtunkhwa, which may limit generalizability to other regions. The purposive sampling approach could have introduced selection bias, and participants may have withheld critical views due to social desirability pressures. Additionally, translation from Pashto to English may have resulted in minor loss of nuance. Lastly, the exclusion of male perspectives limits understanding of intra-household dynamics affecting women's access to technology.

**Results**

**Participant Profile and Context**

The study engaged 50 participants across rural districts of Khyber Pakhtunkhwa (KP), including 32 rural women in four focus group discussions (FGDs), 12 women with partial digital access through in-depth interviews (IDIs), and six key informants (KIIs) comprising teachers, Lady Health Workers (LHWs), and community elders. Participants ranged in age from 18 to 45 years and represented low-income households with limited formal education. Their daily

routines were largely dominated by household responsibilities, caregiving, and subsistence activities, with only a few engaged in small-scale income-generating work. This demographic profile reflects the socio-economic vulnerabilities that often intersect with digital exclusion in rural Pakistan.

Table 1: Barriers, Enablers, and Recommendations for Women’s Digital Access in Rural Pakistan

Theme	Barriers / Challenges	Enablers / Factors	Positive Recommendations
Digital Access and Technology Use	Limited device ownership; shared devices; low digital literacy	Partial smartphone access; peer learning	Female-focused digital literacy programs; hands-on training; mentoring
Socio-Cultural and Gender Norms	Restrictive gender norms; male-controlled access; fear of social disapproval	Supportive family members; peer encouragement	Community sensitization campaigns targeting men and community leaders
Economic and Infrastructural Barriers	High cost of devices and internet; poor network coverage; intermittent electricity	NGO/government support initiatives	Subsidize devices/data; improve rural connectivity and infrastructure
Education and Health Access via Technology	Limited access to online education, health, and government services	Motivated women; guidance from LHWs	Integrate digital literacy with health/education programs through local intermediaries
Personal Motivation and Aspirations	Low confidence in independent use of digital tools	Desire for self-improvement; interest in livelihoods	Encourage women-led micro-enterprises; provide safe community spaces for skill development

Community Engagement Support	and Limited digital centers and public facilities	Peer networks; support from teachers and LHWs	Establish community digital hubs; leverage local institutions for training and access
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**Theme 1: Digital Access and Technology Use**

The study revealed that rural women’s engagement with digital tools in Khyber Pakhtunkhwa is characterized by limited access, fragmented exposure, and low autonomy, which collectively restrict meaningful use. This theme comprises three sub-themes that unpack device ownership, usage patterns, and informal learning.

**Limited Device Ownership and Shared Access**

A recurring and dominant pattern was the scarcity of personal devices. Across all FGDs and IDIs, participants reported that mobile phones, particularly smartphones, were rare in female hands. In most households, devices were owned and controlled by male family members, and women’s access was mediated through these gatekeepers. This meant that women often waited for the device to be available, sought permission to use it, or relied on brief moments when male users were absent.

As one woman explained, *“We have only one phone at home; my husband mostly uses it, and I can only use it when he allows.”*

Such dependence not only reduced the time and frequency of use but also limited privacy and **decision-making power**. Young married women and daughters-in-law appeared to be most restricted, often citing cultural expectations of modesty and obedience. Others described hesitance to even ask for the device, fearing criticism or misunderstanding. This gendered control of resources reinforces women’s marginalization and reduces opportunities for independent exploration or learning.

**Nature and Extent of Use**

For those with at least partial access, the range of digital activities was narrow and functional. Use was mostly restricted to basic communication—voice calls and SMS—and occasionally messaging apps such as WhatsApp. The next most common use involved seeking or receiving health information, particularly through Lady Health Workers (LHWs) who shared maternal and child health advice.

Educational or livelihood-related use was rare. Few participants mentioned using phones for online learning, income generation, or market access. Those who did were exceptions—often younger, more educated, or living in slightly better-off households. One participant described using the phone to coordinate tailoring orders with clients, while another said she followed cooking videos when she had the chance. Yet, these examples were isolated, indicating latent but largely untapped potential for technology to support economic and educational advancement. Notably, fear of misuse and social scrutiny also shaped behavior. Some participants avoided using social media or declined to create profiles due to privacy concerns, potential gossip, or fear of judgment. Others were simply unaware of what technology could offer beyond communication.

**Informal Learning and Peer Support**

Despite low ownership, women demonstrated curiosity, adaptability, and an eagerness to learn when opportunities arose. Several mentioned observing younger siblings, children, or friends to learn basic skills such as saving contacts, using cameras, or navigating messaging apps. Informal peer support was particularly important: women sought help from neighbors or relatives when faced with technical difficulties, sometimes paying small amounts for assistance or learning by watching others.

Such stories illustrate untapped capacity. Even without formal training, women showed the ability to learn quickly when technology was demystified. These accounts point to a powerful opportunity: community-based training and peer-to-peer learning models could significantly expand skills and confidence.

**Theme 2: Socio-Cultural and Gender Norms Restrictive Gender Norms and Social Stigma**

The study revealed that socio-cultural norms remain a dominant barrier to women’s digital engagement. Community attitudes often equated women’s phone use with impropriety or negligence of domestic duties.

Several participants mentioned that excessive use of technology by women could invite criticism, suspicion, or even conflict within families.

One participant noted: *“People think that if a woman uses the phone too much, it is not good for her reputation.”*

### Household Decision-Making and Power Dynamics

Most households operated under male control of resources and decision-making, including who could use digital devices. Women frequently had to seek permission to access a phone, limiting spontaneity and autonomy. This dynamic was especially evident among younger women and daughters-in-law, who faced greater restrictions. However, families with more progressive male members or educated elders demonstrated greater openness, allowing women to explore digital tools for education or household management.

### Potential for Change Through Awareness

Some participants highlighted positive experiences in households where husbands or mothers-in-law encouraged women’s digital engagement. In these cases, technology was perceived as a tool for family benefit rather than a threat. These examples underscore the importance of community sensitization and involving men and elders in interventions aimed at improving women’s digital literacy and acceptance.

### Theme 3: Economic and Infrastructure Barriers

#### Affordability and Financial Constraints

Economic limitations were a recurring theme across FGDs and KIIs. Many households were unable to prioritize technology expenditures given competing needs such as food, health, and education. The cost of smartphones, data packages, and device maintenance was cited as prohibitive. A participant explained: *“Even if I want to use the phone, we cannot afford the internet every month.”* Such constraints not only limited access but reinforced dependency on male earners.

#### Infrastructure and Connectivity Issues

Infrastructure emerged as a critical barrier to sustained digital use. Participants reported poor mobile network coverage, especially in remote villages, frequent electricity outages, and the absence of public

internet facilities. These technical challenges often disrupted learning, communication, and potential economic activities. LHWs and teachers also highlighted how these deficits impeded efforts to deliver health or educational messages via digital platforms.

### Opportunities Through Support Programs

Key informants suggested that targeted support—such as subsidized devices, community internet hubs, or NGO-led initiatives—could improve access. However, they emphasized that without concurrent literacy and awareness campaigns, infrastructure alone would not ensure meaningful inclusion.

### Theme 4: Access to Education and Health Services Education and Learning Gaps

Few participants had direct experience with online education or e-learning platforms. Literacy barriers and lack of training often meant that even when devices were available, they were underused for educational purposes. Some women expressed a desire to access videos or tutorials, particularly for children’s education, but cited language and interface challenges as limiting factors.

### Health Information and Service Delivery

LHWs played a pivotal role in bridging information gaps by using mobile phones to share health advice, maternal and child health updates, and emergency contacts. Women trusted these intermediaries and valued timely health messages. A few who had smartphone access mentioned using YouTube or WhatsApp groups for health-related knowledge. These findings highlight the potential of leveraging trusted community actors to promote digital uptake.

### Theme 5: Motivation and Aspirations

#### Latent Demand and Personal Goals

Despite barriers, rural women expressed strong motivation to learn and use technology. Aspirations included accessing educational content, running home-based businesses, and connecting with larger markets. Many participants viewed technology as a way to gain knowledge, improve children’s education, or increase family income. Such aspirations signal readiness for change and the need for capacity-building programs.

### Peer Influence and Role Models

Women mentioned learning from peers, teachers, or children in the family, suggesting that social networks can play a critical role in skill transfer. Exposure to other women successfully using technology inspired interest and confidence, reinforcing the need for visible role models and safe learning spaces.

### Theme 6: Community Engagement and Support Lack of Digital Hubs and Public Facilities

Participants unanimously pointed to the absence of community-level resources such as digital learning centers or internet cafés accessible to women. Where such spaces existed, they were often male-dominated, discouraging female participation. Teachers and elders recommended leveraging schools and health centers to create safe, female-friendly digital hubs.

### Role of Institutions and Local Actors

Key informants emphasized the importance of partnerships between NGOs, government, and community-based organizations to facilitate access and provide culturally sensitive training. Programs anchored in local institutions were seen as more acceptable and sustainable, aligning with community trust structures.

### Discussion

The findings illuminate the multifaceted nature of digital exclusion faced by rural women in Khyber Pakhtunkhwa, rooted in structural inequities, socio-cultural norms, economic constraints, and infrastructural shortcomings. However, the results also underscore latent capacity and community-based enablers, suggesting pathways for inclusive and gender-sensitive interventions.

The pervasive control of mobile devices by male family members echoes findings by Siegmann (2009), who documented similar permission-based dynamics in rural Pakistan that limit women's autonomy in technology use. These norms reinforce gendered disparities despite increasing mobile penetration (Siegmann, 2009). Importantly, mobile ownership has significant real-world implications: Amber and Chichaibelu (2023) found that mobile phone ownership is positively correlated with female labor force participation, suggesting that digital access can translate into economic empowerment (Amber &

Chichaibelu, 2023). Complementary evidence from Caribou Global (2022) indicates that smartphone access can lead to substantial increases in household consumption and labor participation in multiple developing-country contexts (Caribou Global, 2022). The influence of Lady Health Workers (LHWs), teachers, and peer networks as trusted conduits for digital literacy aligns with broader literature on the power of intermediated learning models. World Bank findings emphasize that such localized, trust-based programs can significantly advance digital inclusion among women (Melake et al., 2024). Indeed, peer support and role modeling help women overcome confidence barriers and normalize technology use.

Digital access remains limited by structural shortcomings. The GSMA's 2025 Mobile Gender Gap Report emphasizes that despite modest gains, affordability and network infrastructure in rural areas remain substantial hurdles (GSMA, 2025). National studies confirm continued gender inequities in mobile ownership and usage (CDPR, 2024). Collectively, these constraints necessitate a dual focus on both supply-side infrastructure (e.g., connectivity, energy) and demand-side affordability. The powerful role of socio-cultural barriers is reinforced by the NCSW/UNDP (2023) report, which highlights how gender norms and limited mobility continue to restrict women's digital engagement. Naveed (2025) further argues that policy frameworks are often shaped by prevailing ideational biases, underlining the need for normative change interventions. These insights affirm that digital programs must address cultural dimensions as actively as technical ones.

The socioeconomic backdrop contextualizes these findings: Khalil and Warner (2025) report stubbornly low female participation rates in rural Pakistan—28%, compared to 69% for rural men—largely within unpaid or informal work sectors (Khalil & Warner, 2025). Given this environment, enhancing women's digital access through supportive policies could be a transformative lever for rural and household economic resilience.

South Asia leads global regions in mobile gender disparity. Recent estimates suggest women in South Asia are still 15% less likely than men to own a mobile phone, despite gradual improvements (Frost & Sullivan Institute, 2025). Such disparities inhibit access to crucial services including health, education,

and financial inclusion. Addressing this gap requires both systemic and culturally grounded approaches.

### Conclusion

This study examined rural women’s access to digital technology in Khyber Pakhtunkhwa and found that their participation remained highly constrained. Women generally lacked personal device ownership and depended on shared phones controlled by male household members. Use was mainly limited to basic communication and occasional health information. Socio-cultural norms, household power dynamics, affordability issues, low literacy, and infrastructural weaknesses further restricted meaningful engagement. Despite these challenges, the study showed that women expressed clear motivation to learn and use technology. Trusted intermediaries such as Lady Health Workers, teachers, and peers supported technology uptake where possible. Families with supportive men or elders were more open to women’s digital use, particularly for health, education, and income generation. These findings indicated that while structural and cultural barriers persisted, there were also opportunities for progress if policies addressed access, affordability, literacy, and social norms simultaneously.

### Policy Recommendations

Following policy recommendations are made in the light of the findings of the study.

#### 1. Affordable and Accessible Devices

Provide low-cost or refurbished smartphones to rural women through local NGOs, cooperatives, or government-led schemes.

Encourage mobile operators to offer women-focused, low-data packages that fit household budgets.

#### 2. Community-Based Digital Literacy

Use existing institutions such as schools, health centers, and women’s vocational programs to deliver short, practical training sessions.

Develop audio-visual content in local languages for low-literate users and encourage peer-to-peer learning.

#### 3. Engage Men and Community Leaders

Conduct small-scale awareness sessions with husbands, elders, and religious leaders to reduce stigma and emphasize family benefits of women’s digital use.

Highlight success stories of women using technology to improve household welfare or income.

#### 4. Strengthen Rural Infrastructure

Work with telecom companies and local governments to improve network coverage in underserved areas.

Pilot solar-powered charging stations at community centers to overcome electricity issues.

#### 5. Support Women’s Livelihoods

Link digital literacy to income opportunities by training women to use phones for marketing home-based products or accessing mobile banking.

Partner with microfinance institutions to provide small loans tied to digital tools and training.

#### 6. Leverage Trusted Intermediaries

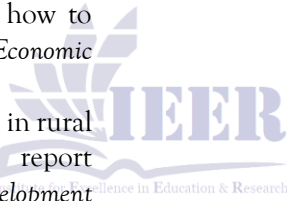
Expand the role of Lady Health Workers, teachers, and community volunteers as trainers and digital guides.

Provide them with basic incentives and resources (e.g., data packages, training kits) to sustain engagement.

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