

FACTORS AFFECTING ACCESS TO INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTS): A CASE STUDY ON RURAL WOMEN IN DISTRICT KOHAT, PAKISTAN

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ABSTRACT

In the digital era, Information and Communication Technologies (ICTs) have emerged as transformative tools with the potential to bridge development gaps, especially in underdeveloped and rural contexts. This study focuses on rural women in District Kohat, Pakistan, to understand the dynamics that influence their access to and utilization of ICT. The paper applies both descriptive statistics and binary logistic regression models on data collected from 198 women respondents in two villages—Ustarzai Bala and Ustarzai Payan. The findings reveal that variables such as age, education, and household income significantly determine ICT usage. Younger, educated, and economically stable women are more inclined to adopt digital tools. The study also explores the broader implications of ICT adoption for women's empowerment, digital inclusion, and socioeconomic development. Detailed policy recommendations are proposed, emphasizing the need for gender-responsive ICT strategies, literacy initiatives, and infrastructural development. The paper concludes by highlighting the limitations and future directions for deeper, inclusive research.

Keywords: ICTs, Women, Socioeconomic Factors, Kohat, Pakistan.

INTRODUCTION

Technological advancement has become a significant driver of development, reshaping how people communicate, learn, work, and participate in societal processes. In the 21st century, Information and Communication Technologies (ICTs) are integral to this transformation. Defined as a set of technological tools and resources used to transmit, store, create, share or exchange information, ICTs include the internet, wireless networks, cell phones, computers, social media, and other communication mediums (Bollier, 2000). The benefits of ICT are particularly

promising for vulnerable and marginalized populations such as rural women, who historically face numerous social, cultural, and economic barriers to empowerment.

In countries like Pakistan, especially in regions such as Khyber Pakhtunkhwa, ICT has the potential to address the gender divide and catalyse change in women's lives. However, the uptake and access to ICT among rural women remain limited due to a variety of structural and socio-economic challenges. According to the Pakistan Telecommunication Authority and ITU (2022),

there is a significant gender gap in mobile phone ownership and internet usage, with women in rural areas having significantly lower access to ICT compared to their male counterparts. This study seeks to explore these issues through a case study of rural women in District Kohat.

Research Questions:

1. What are the socio-demographic determinants of ICT access among rural women in District Kohat?
2. How does ICT access influence the empowerment and lifestyle of rural women?
3. What policy interventions can improve digital inclusion for rural women?

Assumptions:

- Increased access to ICT leads to improved socioeconomic conditions.
- Variables such as education, age, income, and family size influence ICT usage.

Significance of the Study:

This study contributes to the discourse on digital inclusion by highlighting the intersection of gender, technology, and rural development. It emphasizes the role of ICT in empowering rural women and identifies key barriers to its effective utilization. The insights derived from this research aim to guide policymakers, development agencies, and civil society in formulating targeted interventions for digital literacy and infrastructure development in rural areas.

2. Literature Review and Hypothesis Development

The role of ICT in development has been widely documented. Numerous studies demonstrate how ICT enables marginalized communities to overcome traditional barriers in accessing information, education, health services, and economic opportunities (Venkatesh et al., 2020; Salem, 2020). For women, especially those in rural and conservative societies, ICT offers a new realm of possibilities—whether it be learning from online platforms, starting home-based digital businesses, or participating in community decision-making. Agarwal (2021) highlights how digital media platforms have amplified women's voices globally, citing movements like #MeToo and online entrepreneurship as examples. Similarly, Hafeez et al. (2020) argue that ICT contributes to women's empowerment by providing access to employment,

education, and digital finance. Chatterjee et al. (2020) propose a multidimensional framework encompassing psychological, material, skill, and usage factors that influence ICT adoption among women.

In the South Asian context, Islam et al. (2016) and Mainuddin et al. (2015) emphasize the correlation between mobile phone ownership and women's autonomy. Studies from Bangladesh and India reveal that ICT interventions significantly improve access to health and education services and increase participation in income-generating activities.

Theoretical Framework: This study is grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT), which posits that performance expectancy, effort expectancy, social influence, and facilitating conditions are key predictors of ICT adoption (Venkatesh et al., 2003).

Hypotheses: H0: ICT access significantly influences the lifestyle and empowerment of rural women. H1: ICT access does not significantly influence the lifestyle and empowerment of rural women.

3. Methodology

Study Area: Kohat District, located in the Khyber Pakhtunkhwa province of Pakistan, represents a diverse demographic profile with urban and rural dichotomies. The study focuses on two villages, Ustarzai Bala and Ustarzai Payan, with a combined female population of 3,918 as per the 2017-18 census.

Sampling Design: A proportional stratified random sampling technique was used to select a sample of 198 respondents (5% of the population). The sample included 65 women from Ustarzai Bala and 133 from Ustarzai Payan.

Data Collection: Primary data were collected using structured questionnaires with both closed and semi-open-ended questions. Enumerators were trained to conduct face-to-face interviews, ensuring ethical compliance and cultural sensitivity.

Variables Description:

- **Dependent Variable:** Access to ICT (binary: 1 = Yes, 0 = No)

• **Independent Variables:**

- Age (continuous)
- Education (years of schooling)
- Household Size (number of members)
- Monthly Household Income (PKR)
- Physical Access to Technology (Yes/No)

Econometric Model:

Binary Logistic Regression Model:

$$\text{Logit}(P) = \beta_0 + \beta_1(\text{Age}) + \beta_2(\text{Education}) + \beta_3(\text{Family Size}) + \beta_4(\text{Income}) + \beta_5(\text{Access})$$

The model predicts the likelihood of ICT access based on explanatory variables. It allows assessment

of the marginal effects and statistical significance of each determinant.

4. Results and Discussion

This section presents and interprets the findings obtained through descriptive statistics and econometric analysis. The goal is to understand how demographic and socio-economic variables impact rural women's access to ICT in District Kohat.

4.1 Descriptive Statistics

The descriptive statistics provide a profile of the sampled respondents across variables such as age, education, family size, and household income.

Table 1: Distribution of Respondents by Age Group

Age Group (years)	Ustarzai Bala	Ustarzai Payan	Total Respondents	Percentage (%)
≤ 27	20	52	72	36.4
28–34	22	36	58	29.3
35–41	26	28	54	27.3
42–48	0	6	6	3.0
49+	4	4	8	4.0

The majority of respondents (36.4%) were aged 27 years or younger. This age group exhibited the highest engagement with ICT. Conversely, only 3% of respondents were aged 42–48, and their ICT usage was minimal, suggesting that younger women

are more adaptable to new technologies. This supports the general trend observed in prior studies (Islam et al., 2016) that age inversely correlates with digital adoption.

Table 2: Educational Attainment of Respondents

Education Level	Ustarzai Bala	Ustarzai Payan	Total	Percentage (%)
Primary	14	20	34	17.2
High	2	7	9	4.5
Higher Secondary	32	29	61	30.8
Undergraduate	11	33	44	22.2
Graduate and above	13	37	50	25.3

Over 78% of the respondents had attained at least higher secondary education. The largest cohort (30.8%) had completed higher secondary schooling. Notably, 25.3% held a university degree,

indicating a relatively literate population capable of engaging with digital technologies. As observed in the literature (Hafeez et al., 2020), education significantly enhances ICT adoption.

Table 3: Family Size of Respondents

Family Size	Ustarzai Bala	Ustarzai Payan	Total	Percentage (%)
≤ 6	17	40	57	28.8
7–12	54	86	140	70.7
13+	1	0	1	0.5

The majority of households (70.7%) had between 7–12 members. Larger family sizes imply higher dependency ratios, which could lead to lower per

capita access to ICT devices and internet subscriptions. This is consistent with earlier findings (Tijjani et al., 2017).

Table 4: Monthly Household Income

Income Bracket (PKR)	Ustarzai Bala	Ustarzai Payan	total	Percentage (%)
≤ 140,000	68	121	189	95.5
140,001–305,000	4	2	6	3.0
305,001–470,000	0	1	1	0.5
≥ 470,001	0	2	2	1.0

An overwhelming proportion of respondents (95.5%) earned less than PKR 140,000 monthly. This underscores the financial constraints rural women face in acquiring ICT tools. Still, a notable subset with relatively higher incomes showed greater ICT usage, suggesting a positive correlation between income and access.

4.2 Econometric Results

To understand the relationship between the socio-demographic variables and access to ICT, a binary logistic regression model was applied. The dependent variable was ICT access (1 = Yes, 0 = No).

Table 5: Binary Logistic Regression Results

Variable	Coefficient (B)	Std. Error	z-value	p-value	Significance
Age	-0.1888	0.7406	-2.55	0.011	Significant (-ve)
Education	0.9330	0.1984	4.70	0.000	Highly Significant (+ve)
Family Size	-0.5303	0.2918	-1.82	0.069	Marginally Significant (-ve)
Income Cat.1	2.6663	1.2566	2.12	0.034	Significant (+ve)
Income Cat.2	1.4398	1.2395	1.16	0.245	Not Significant
Constant	3.3457	3.7385	0.89	0.371	-

Model Summary and Interpretation

The binary logistic regression model employed in this study was statistically significant, as indicated by the likelihood ratio Chi-square (LR Chi2) value of 149.16 and a p-value of less than 0.001. This demonstrates that the model as a whole reliably predicts the likelihood of ICT access among rural women in Kohat District. The model included five predictor variables—age, education, family size, and two income categories. The model's goodness-of-fit is further evidenced by a high Pseudo R-squared value of 0.8213, suggesting that approximately 82.13% of the variation in ICT access is explained by the variables in the model.

The negative coefficient for age (-0.1888, $p = 0.011$) suggests that as age increases, the probability of ICT access decreases. This inverse relationship implies that younger women are more inclined to use digital technologies than older women, which is consistent with the findings of Islam, Mahmud, and Akter (2016), who emphasized generational differences in digital literacy and openness to technology adoption.

Education had a highly significant positive effect (coefficient = 0.9330, $p < 0.001$), reinforcing the view that educational attainment is a strong enabler of ICT use. This aligns with Hafeez et al.

(2020) and Venkatesh et al. (2020), who argue that higher education not only enhances awareness and confidence in using technology but also facilitates greater opportunities for economic and social participation through digital means.

Family size showed a negative coefficient (-0.5303), which, although marginally significant ($p = 0.069$), indicates that women from larger households are slightly less likely to access ICT. This could be due to financial and resource-sharing constraints prevalent in extended family systems, as suggested by Tijjani et al. (2017), who noted similar challenges in rural Nigerian communities.

Income level, particularly in the first category (≤ PKR 305,000), had a significant and positive effect (coefficient = 2.6663, $p = 0.034$), indicating that modest increases in income are associated with higher ICT usage. This supports the premise discussed by Lwoga et al. (2019) and Salem (2020) that economic empowerment enhances access to digital resources, even among relatively low-income households.

Interestingly, the second income category (≥ PKR 305,001) did not have a statistically significant effect ($p = 0.245$). This might be attributed to the very small number of respondents in this income group, which limits the statistical power to detect

differences. Similar concerns about sample representation affecting higher income brackets were noted in regional studies by Chatterjee et al. (2020).

In summary, the model not only validates key determinants of ICT access among rural women but also resonates with regional and global literature. The significance of age, education, and income underscores the multifaceted nature of digital inclusion, requiring holistic policy interventions that address structural barriers and promote inclusive technological empowerment.

5. Conclusion:

ICT access significantly contributes to the empowerment of rural women in Kohat by enabling economic independence, educational advancement, and enhanced communication. Women with access to ICT tools such as mobile phones, computers, and the internet reported improved participation in household decision-making, enhanced learning opportunities, and increased avenues for income generation. These technologies bridge information gaps and provide platforms for social and economic engagement, which are especially vital in conservative rural contexts.

However, the findings of this study highlight persistent barriers to equitable access. Age remains a significant factor, with younger women demonstrating higher ICT usage, indicating a generational divide in technology acceptance and literacy. Education emerges as a strong predictor, underlining the importance of formal schooling in fostering digital competence. Likewise, income disparities play a crucial role, with economically better-off households more likely to afford devices, internet connections, and associated digital tools. The study underscores that while ICT can be a catalyst for women's empowerment, the benefits are not uniformly distributed. To harness the full potential of ICT for rural development, it is essential to address these disparities through targeted, inclusive policy measures. Future development strategies must integrate gender-sensitive approaches and invest in community-level digital infrastructure, literacy, and support systems. Only through such holistic efforts can digital transformation be made inclusive and sustainable.

6. Policy Recommendations

To bridge the digital divide and promote ICT-enabled empowerment among rural women, the following comprehensive strategies are proposed:

1. Digital Literacy Programs: Establish structured digital education initiatives specifically targeted at rural women. These programs should include basic ICT skills such as operating smartphones, using the internet, engaging with social media responsibly, and accessing e-services (e.g., e-banking, e-learning). Mobile training units and community-based training workshops facilitated in local languages can help overcome literacy barriers. Partnering with educational institutions and civil society organizations can ensure the programs are culturally sensitive and locally relevant.

2. Subsidized ICT Infrastructure: Introduce government-backed schemes or public-private partnerships to subsidize smartphones, tablets, and internet connectivity in rural areas. Financial assistance in the form of vouchers or microloans can empower low-income households to invest in ICT. Investment in broadband infrastructure should prioritize underserved areas, ensuring that even remote villages are connected. Ensuring 24/7 electricity and affordable internet service is also key to usability.

3. Community ICT Centers: Establish rural information hubs or digital kiosks where women can access ICT resources, receive training, and engage with services such as telemedicine, online marketplaces, and educational platforms. These centers should be staffed with trained female facilitators to create a safe and supportive environment. The centers can also serve as platforms for digital entrepreneurship and skill development, such as coding, graphic design, or digital marketing for small-scale businesses.

4. NGO Involvement and Community Outreach: Non-governmental organizations (NGOs) play a vital role in community mobilization and awareness building. Collaborating with local NGOs can facilitate grassroots engagement, particularly in culturally sensitive environments. NGOs can conduct needs assessments, design tailored programs, and monitor impact more effectively at the local level. Moreover, they can act as intermediaries between communities and

government agencies, ensuring policy implementation is inclusive and responsive.

Collectively, these recommendations aim to create a conducive ecosystem where rural women are not merely passive recipients of technology but active agents of digital change. The success of such initiatives requires coordinated efforts across government sectors, civil society, and the private sector to ensure that the transformative potential of ICT reaches all segments of society.

7. Limitations and Future Directions

- Limited to two villages; findings not generalizable to all rural Pakistan.
- Cross-sectional data limits causal inference.
- Future research should consider longitudinal and qualitative approaches.

7. Ethical Declaration

The authors declare that the research conducted for this study adhered strictly to ethical principles. Informed consent was obtained from all participants prior to data collection. Respondents were assured of the confidentiality and anonymity of their responses. Participation was voluntary, and no personal identifiers were recorded. The study complied with the ethical standards set by the research ethics committee of The University of Agriculture, Peshawar, Pakistan.

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