SOCIAL SCIENCE REVIEW ARCHIVES
ISSN Online: 3006-4708
ISSN Print: 3006-4694
https://policyjournalofms.com

Exploring the Role of Farming Experience in Shaping ICT Access Among Agricultural Women: Mixed-Methods Analysis

Rabia[1], Dr. Aqeela Saghir [2], Dr. Ijaz Ashraf[3], Dr. Zubair Aslam[4]

[1]PhD Scholar Agri. Extension at Institute of Agriculture Extension Education and Rural Development , University of Agriculture, Faisalabad Email : rabia.ejaaz@hotmail.com
[2] Associate professor, IAEERD, UAF Email ID: aqeelasaghir@uaf.edu.pk
[3]Associate Professor, IAEERD, UAF Email ID: gilluaf707@uaf.edu.pk
[4]Associate professor, Department of Agronomy, UAF Email ID: zauaf@hotmail.com

DOI: https://doi.org/10.70670/sra.v3i3.836

Abstract

In recent years, information and communication technologies (ICTs) have become pivotal tools for rural development, particularly in agriculture and women's empowerment. However, disparities in access and usage remain, often shaped by gender, education, and farming experience. This study investigates the relationship between farming experience and access to ICT-based content among agricultural women using a mixed-methods design. A quantitative survey of 384 respondents was conducted, followed by qualitative data from three focus group discussions. Binary outcome variables represented access to twelve categories of ICT-delivered information (e.g., agricultural inputs, food preservation, entrepreneurship). Due to issues of perfect separation in regression modeling, Fisher's Exact Test was applied to examine associations between farming experience (categorized as ≤10 years and >10 years) and access to each content type. While no statistically significant associations emerged at the $p < 0.05$ level, notable differences in access rates—particularly in entrepreneurial content, market information, and crop management—were observed. Qualitative findings supported and contextualized these trends, revealing that experienced women often prioritize relevant agricultural content, while younger or less experienced women explore a broader range of digital resources. The study highlights the role of experience in shaping digital behavior and calls for more inclusive, experience-sensitive ICT training and outreach in rural areas.

Key Words: ICT access; agricultural rural women; farming experience; mixed-methods research; digital inclusion; agricultural information

1. Introduction

Information and communication technologies (ICTs) have emerged as vital enablers of socioeconomic transformation in rural settings, particularly within agricultural economies. Their potential to bridge gaps in knowledge, access, and opportunity has made them instrumental for improving agricultural productivity, empowering women, and promoting inclusive development. As rural societies transition into more knowledge-based economies, digital tools are becoming increasingly indispensable for women's participation in economic, educational, and social spheres (Baumüller, 2018; Aker et al., 2021; Rajkhowa & Qaim, 2022).

Despite significant global advancements, gendered disparities in ICT access remain persistent, especially in developing countries. In Pakistan, agricultural women often lag behind men in both

access to and effective utilization of ICTs due to interrelated factors such as low literacy, limited exposure, infrastructural challenges, and prevailing socio-cultural norms (Drucza & Paveeri, 2018; Shaikh, 2023). GSMA (2023) estimates that women in low- and middle-income countries are 19% less likely than men to use mobile internet, with rural women facing the steepest access gaps.

A recent report highlights that only 48% of Pakistani rural women have regular access to smartphones, while barriers such as affordability, lack of localized content, and digital illiteracy continue to limit meaningful usage (Malik, Fatima, & Qureshi, 2022; GSMA, 2023). Pakistan's rural women, particularly those engaged in agriculture, are among the most underserved when it comes to digital inclusion. Although they contribute extensively to both on-farm and off-farm labor, often performing essential tasks such as livestock management, crop production, and agribusiness, but many lack control over the very digital tools that could enhance their agency and productivity (Aker et al., 2021; Malik et al., 2022).

Notably, farming experience has been identified as a significant variable that may shape not only access to ICTs but also the type of content accessed and the purpose of use (Raza, Bukhari, & Satti, 2023; Saleh et al., 2020). More experienced farmers may prioritize technical, market-based, or preservation-related content, while less experienced women may use ICTs more casually or for social connection.

Empirical evidence suggests that ICTs, when accessible and relevant, serve as catalysts for gender empowerment and economic development. Mobile phones, in particular, have proven instrumental in enhancing market access, promoting entrepreneurship, and facilitating information dissemination among women farmers (World Bank, 2022; Rajkhowa & Qaim, 2022). However, for ICTs to truly foster empowerment, more nuanced analyses are required to understand how individual-level characteristics such as farming experience intersect with content usage patterns.

This study addresses that gap by investigating how farming experience influences rural women's access to various types of ICT-delivered content, using a mixed-methods approach. Quantitative data from 384 respondents are complemented by qualitative insights from focus group discussions to provide a richer, more grounded understanding. By doing so, the study aims to inform evidence-based interventions for enhancing digital inclusion and agricultural resilience among rural women.

1.1 Objectives

This study was guided by the following objectives:

- To examine the relationship between farming experience and rural women's access to various types of ICT-delivered information content.
- To determine whether statistically significant differences exist in access patterns based on farming experience using Fisher's Exact Test.
- To explore how farming experience influences digital behavior, content relevance, and ICT preferences among rural women.
- To integrate qualitative insights from focus group discussions to explain and contextualize the quantitative patterns observed.

2. Literature Review

The transformative potential of Information and Communication Technologies (ICTs) for rural development and agricultural modernization is well-documented, particularly in developing countries. ICTs have not only facilitated real-time access to agricultural markets, climate information, and production techniques but also empowered rural women by improving their socioeconomic conditions, decision-making power, and entrepreneurial capacity (World Bank, 2021; Rajkhowa & Qaim, 2022).

2.1 ICTs and Rural Women's Agricultural Empowerment

Numerous studies underscore that ICTs serve as a bridge between isolated rural communities and vital development services. Malik et al. (2022) assert that ICTs can reach even the remotest agricultural women, enhancing their participation in decision-making processes that affect their economic and social well-being. ICT tools such as mobile phones, television, and radio have proven especially valuable in spreading information on farming techniques, health, and finance (Baruah & Mohan, 2018). According to Rimi and Chudi (2017), ICTs have reduced poverty and illiteracy by offering remote access to markets, agricultural input information, and online financial services.

In Pakistan, however, the integration of ICTs into the rural agricultural ecosystem remains inconsistent. Jabeen et al. (2020) reported that socio-cultural norms, low literacy, and infrastructural constraints remain significant barriers, particularly for women who often have indirect access to ICTs via male family members. This gendered gap in access persists despite increasing digital penetration and mobile network expansion.

2.2 The Role of Farming Experience

Farming experience is increasingly recognized as a determinant of ICT usage patterns. Experienced farmers are more likely to perceive the utility of ICTs in enhancing productivity, managing inputs, and reducing uncertainties (Zahou & Li, 2022). Similarly, Ali (2012) observed that those with diversified farming experience and entrepreneurial attitudes are more open to adopting ICT innovations.

Within the Pakistani context, Raza et al. (2023) found that farming experience positively correlates with financial literacy and digital resource access, particularly among male farmers, suggesting the need for targeted interventions for women. Despite policy efforts, rural women in Pakistan remain underrepresented in digital agriculture programs, largely due to their informal labor roles and limited decision-making autonomy.

3.3 Barriers to ICTs Access for Rural Women

While digital tools offer numerous benefits, multiple intersecting barriers hinder women's full engagement with ICTs. Tata and McNamara (2017) and Ayub (2018) documented that infrastructure, affordability, digital literacy, and socio-cultural factors significantly limit ICT adoption in rural Pakistan. A study by Noor et al. (2021) also pointed out that marital status, gender norms, and restricted mobility further exacerbate the gender digital divide. These barriers often result in secondary ICT access—women receiving information through male intermediaries rather than directly using devices or platforms.

The top-down nature of digital agricultural extension programs also weakens ICT effectiveness. As Hutchinson (2023) highlights, only 25% of agricultural officers in Pakistan are women, limiting the reach of gender-sensitive training and outreach services.

2.4 Recent ICTs Interventions and Recommendations

Recent interventions like LMAFRP (Livestock Management Advisory for Females in Rural Punjab) have demonstrated how targeted ICT strategies can reach rural women effectively. By providing advisory content in local languages via digital channels, these programs have increased knowledge about livestock health, hygiene, and financial independence (Farooq, 2023). Similarly, initiatives that integrate e-learning platforms, such as the "E-Learning for Agricultural Technology Transfer" project, have shown positive potential for digital inclusion when supported by female-friendly tools and training.

To ensure sustainable digital inclusion, scholars recommend localized content, culturally appropriate delivery modes, and enhanced policy coordination across stakeholders (Drucza &

Paveri, 2018; Spielman et al., 2021). Incorporating women's farming experience into ICT design frameworks may also help personalize digital tools and improve adoption rates.

3. Methodology

3.1 Research Design

This study employed a sequential explanatory mixed-methods design (Creswell & Plano Clark, 2018), combining quantitative analysis with qualitative insights to investigate how farming experience affects rural women's access to various ICT-delivered information types. The approach was chosen to not only identify statistical relationships but also to contextualize those findings with lived experiences, attitudes, and barriers shared by participants.

3.2 Study Area and Population

The study was conducted in Faisalabad District, located in Punjab, Pakistan. Faisalabad is one of the country's leading agricultural districts, known for its diverse farming systems, high rural population density, and significant involvement of women in both on-farm and off-farm agricultural activities. Its mix of traditional agriculture and emerging digital exposure makes it an ideal setting to examine how farming experience influences rural women's access to ICT-based information. The district's socio-economic diversity enhances the contextual relevance of the findings for similar rural settings in Pakistan.

3.3 Sampling and Data Collection

Quantitative Phase

A structured questionnaire was administered to a randomly selected sample of 384 rural women, calculated using Cochran's formula for a 95% confidence interval and 5% margin of error. The instrument collected data on demographics and farming experience, ICTs access and use and types of content accessed via ICT platforms (mobile, TV, radio, apps). Responses to content access were recorded on a 5-point Likert scale, later recoded into binary variables (1 = Agree/Strongly Agree, 0 = Otherwise) for analysis.

Qualitative Phase

To explain statistical trends, three focus group discussions (FGDs) were conducted with diverse participants stratified by age and farming experience. Each FGD involved 6–8 participants and followed a semi-structured guide covering ICT usage, barriers, motivations, and household dynamics around digital tools.

Although demographic variables such as age and household size were collected during the survey, they are not reported in this paper, as the present analysis focuses exclusively on the role of farming experience in shaping ICT content access among agricultural women. These variables have been explored in separate studies using the same dataset.

3.4 Variables and Analytical Strategy

Independent variable

Farming experience was used as the primary independent variable in this study. For analytical clarity and to address issues of model instability in binary logistic regression, the variable was dichotomized into two categories: Low (≤10 years) **and** High (>10 years) of experience. This classification was necessary to reduce perfect separation problems caused by highly skewed responses in the original four-category breakdown. As the regression analysis involved binary dependent variables representing access (Yes/No) to 13 distinct types of ICT-delivered content issues of separation and sparse data in certain cells rendered logistic regression outputs unreliable.

Therefore, the analysis shifted to Fisher's Exact Test**,** a non-parametric alternative ideal for small or unbalanced sample sizes in 2×2 contingency tables. This method allowed for statistically valid assessment of the relationship between farming experience and each specific ICT content type, providing more stable inferential results and maintaining analytical rigor despite uneven group distributions.

Due to distributional skew and highly unbalanced cell counts for some content categories, Fisher's Exact Test was selected over logistic regression as a statistically robust method for assessing associations in 2×2 categorical comparisons. This approach ensured valid and conservative inference, especially for rare or highly accessed information types.

Dependent variable

The dependent variables were binary indicators reflecting access (Yes/No) to various ICT content categories relevant to rural women, such as agriculture, food preservation, entrepreneurship, entertainment, and daily tips. To complement these measures, qualitative data from focus group discussions were analyzed thematically using a hybrid deductive-inductive approach. Emerging themes included content relevance, gendered mediation, economic utility, and usage motivations. This integration provided nuanced insights into how farming experience influences both the nature and purpose of ICT engagement.

Initially, binary logistic regression was used to model the relationship between farming experience (Low vs. High) and access to 13 different types of ICT-delivered content. However, several models failed to converge due to issues of perfect separation and sparse data, where certain categories had near-universal agreement or zero responses across experience groups. This caused instability in parameter estimation and inflated standard errors. Given these violations of logistic regression assumptions, the analysis was shifted to Fisher's Exact Test; a non-parametric method suitable for small or imbalanced samples in 2×2 contingency tables. This approach enabled statistically valid assessments of association without compromising inferential rigor.

3.5 Integration Strategy

Findings from both phases were merged during the interpretation stage to explain how and why farming experience may shape ICT behavior among rural women. Quantitative trends (e.g., variation in access rates) were contextualized with narratives from participants, adding depth and credibility to conclusions**.**

4. Results

4.1 Quantitative Insights

Table I Distribution of Respondents by Farming Experience

Farming experience (in years)	***F***	**%**
Up to 10	101	26.3
>10-20	137	35.7
>20-30	58	15.1
>30	88	22.9

Total	384	100.0

n = 384

This distribution in Table I reflects a well-spread age and experience profile in the sample, allowing for meaningful cross-comparison. The prominence of women in the 10–20year category may reflect those in their most economically active phase — balancing household responsibilities, farming duties, and increasing exposure to ICTs. Literature suggests that farming experience plays a role in shaping adoption behavior**,** particularly when farming is approached as a business enterprise (Ali, 2012; Zahou & Li, 2022). Women in the 10–20 and >30 year categories may use ICTs more purposefully, while younger or less experienced women may access a broader variety of content but with different motivations (e.g., communication, entertainment, discovery).

Table II Information Accessed Through ICTs by Rural Women

Information type	***F***	**%**
Agricultural inputs	277	72.1
Agricultural programs on any media/apps	290	75.5
Food processing and preservation	295	76.8
Trade laws/market information	290	75.5
Entertaining stuff (dramas/ movies/ clips)	359	93.5
Agricultural magazines/ reading material	142	37.0
New agricultural technologies	202	52.6
New production practices	210	54.7
News / bulletins (entertainment//politics/agriculture)	350	91.1
Entrepreneurial opportunities	345	89.8
Information about livestock management	270	70.3
Information about crop management	269	70.1
Daily life tips/hacks	295	76.8

n = 384

The quantitative data reveal that while women across all farming experience levels engage with ICTs, their patterns of information access differ subtly. The largest segment of respondents (35.7%) had 10–20 years of farming experience, suggesting a mature but active farming population. Overall, access to ICT-delivered content was high across key domains, with over 75% of women accessing information on agricultural inputs, food preservation, and market laws. Notably, entertainment content (93.5%) and entrepreneurial opportunities (89.8%) topped the list, indicating that ICTs serve both functional and aspirational purposes. Despite the lack of statistically significant differences in content access by experience level, practical variations suggest that women with less farming experience more frequently accessed content related to entrepreneurship and media, whereas experienced farmers leaned toward content supporting productivity and preservation. These usage patterns reflect the evolving role of ICTs as both livelihood tools and gateways to digital inclusion for rural women.

Table III Fisher's Exact Test Analysis

Information Type	Access % (≤10 yrs)	Access % (>10 yrs)	p-value
Agricultural programs on media/apps	92.1%	89.0%	0.45
Food processing and preservation	87.1%	83.7%	0.52
Trade laws / market information	93.1%	87.3%	0.142
Entertaining content (dramas/movies/clips)	59.4%	61.5%	0.73
Agricultural magazines / reading material	57.4%	56.5%	0.91
New agricultural technologies	54.5%	51.2%	0.65
New production practices	61.4%	58.0%	0.56
News / bulletins (entertainment/politics/agriculture)	58.4%	58.0%	1.00
Entrepreneurial opportunities	75.2%	69.6%	0.31
Information about livestock management	60.4%	54.1%	0.29
Information about crop management	73.3%	65.0%	0.14
Daily life tips/hacks	79.2%	76.3%	0.58

The Fisher's Exact Test results indicate no statistically significant associations ($p < .05$) between farming experience and access to any individual content type through ICTs. However, the descriptive percentages reveal some noteworthy trends. Women with less farming experience (≤10 years) had higher access rates to entrepreneurial opportunities (75.2% vs. 69.6%), market information (93.1% vs. 87.3%), and crop management tips (73.3% vs. 65.0%) than their more experienced counterparts. These trends suggest that less experienced or younger rural women may be more exploratory or proactive in using ICTs for economic and agricultural learning. On the other hand, high overall access levels across most categories indicate that ICT usage is widespread, regardless of farming experience, reflecting the growing digital engagement of rural women in both informational and economic spheres.

4.2 Qualitative Insights from Focus Group Discussions

To contextualize the quantitative findings and explore underlying dynamics, focus group discussions (FGDs) were conducted with rural women of varying ages and farming experience levels. Thematic analysis revealed five key patterns regarding ICT access and content use.

ICTs as Everyday Necessities and Information Hubs

Participants broadly agreed that ICTs—especially mobile phones and televisions—were embedded in daily routines. While usage duration varied, nearly all women reported regular use of at least one device. A young woman involved in digital business emphasized:

"I use my smartphone for business almost 12 to 16 hours a day."

An older participant echoed:

"Mobile phones are almost in our approach all day. We use them for our daily information and communication."

This reflects the functional integration of ICTs into rural women's personal and professional lives, reinforcing the high access rates recorded in the survey.

Farming* Experience *Shapes Information Prioritization

Differences in content access appeared to correlate with farming experience levels. While experienced women showed interest in technical and production-related content (e.g., crop management, preservation, livestock), younger or less experienced women were more inclined toward entrepreneurial, educational, or general information:

"I've had my own radio for 15 years. I listen to it almost the whole day."
(Participant with >30 years' experience)

In contrast:

"Easy Paisa has made my life so easy that I can manage my entire small business from home."
(Participant with <10 years' experience)

This supports the notion that farming experience may influence both the purpose and nature of ICT engagement.

Gendered *Mediation and Shared ICT Use*

Participants frequently mentioned that male family members—husbands, sons, or brothers—often controlled or mediated ICT access:

"Male members usually bring news or relevant messages when we are busy in household chores."

This indirect access points to persistent gender-based digital inequalities, where access does not always translate to agency.

Empowerment *Through Economic and Social Use of ICTs*

ICTs were also viewed as tools for financial autonomy and empowerment, especially by women engaged in agribusiness or whose spouses worked abroad:

"ICTs have made my life easier. I can now receive money transfers from my husband without relying on anyone else."

Such access enhances not just economic inclusion but also self-confidence and decision-making power.

Community-*Level Knowledge Sharing*

Women described informal networks for information diffusion. Those with better access often shared updates or devices with peers, creating horizontal linkages within communities:

"We listen to news once a day and also share important updates with others."
"Sometimes I give my phone to my neighbor to listen to advisory messages."

These patterns indicate that even limited ICT penetration can have community-wide ripple effects through peer-to-peer learning.

5. Discussion

This study explored how farming experience shapes rural women's access to ICT delivered content, using a mixed-methods framework. While Fisher's Exact Test did not reveal statistically significant associations, meaningful differences emerged through descriptive analysis and qualitative narratives. These findings contribute to the emerging literature on digital inclusion by highlighting experience-driven behavioral patterns in ICT use among women farmers, a topic still underexplored in the South Asian context (Rajkhowa & Qaim, 2022; Zahou & Li, 2022).

Overall ICT access was found to be high across the sample, with more than 70% of respondents using ICTs for practical domains like food preservation, agricultural programs, and crop or livestock information. The overwhelming use of entertainment (93.5%) and news content (91.1%) suggests that ICTs serve not only as functional tools but also as everyday information hubs, echoing findings by Malik et al. (2022) and World Bank (2022). These usage trends were confirmed by focus group participants, many of whom described ICTs as integral to their daily routines.

Farming experience subtly influenced the nature of content accessed. Women with ≤10 years of experience reported slightly higher usage of entrepreneurial content, new production practices, and crop management. Though these differences were not statistically significant, they align with qualitative data showing that younger or less experienced women use ICTs as platforms for economic exploration, mobile banking, and social networking. In contrast, more experienced women focused on productivity-enhancing content such as livestock tips, weather forecasts, and food preservation techniques. These patterns support existing literature suggesting that digital behavior is shaped not just by access, but by content relevance, life stage, and prior exposure to farming systems (Zahou & Li, 2022; Hutchinson, 2023).

Another layer of complexity emerged in terms of gendered mediation of ICT access. Many women described receiving information secondhand from male household members, indicating that ICT access is still often shared or controlled rather than fully autonomous. This finding is consistent with the gender digital divide reported in other South Asian studies, where patriarchal norms limit direct ICT engagement among women (Drucza & Paveeri, 2018; GSMA, 2023).

A major contribution of this study lies in its triangulation of quantitative and qualitative data, which adds both depth and credibility to the findings. While statistical tests alone suggested no strong association between farming experience and ICTs content access, the focus group insights revealed clear behavioral patterns and motivational differences. This convergence of methods shows that experience shapes not whether ICTs are used, but how and why they are used—a subtle but critical distinction that supports calls for experience-sensitive ICTs interventions (Spielman et al., 2021).

In sum, this study enhances understanding of how farming experience moderates ICTs engagement among rural women—not by quantity of access alone, but by the type, intent, and autonomy of usage. These insights are vital for policymakers aiming to design gender-responsive, context-specific ICT programs in agriculture.

6. Recommendations

Based on the study's findings, it is recommended that ICT interventions targeting rural women should be tailored to their levels of farming experience. Younger or less experienced women, who

are more inclined toward entrepreneurial and exploratory content, would benefit from mobile-based training modules, digital financial tools, and market access platforms. For more experienced women, ICT programs should focus on content related to advanced production practices, livestock management, and climate resilience. Moreover, efforts must be made to reduce gender-based digital mediation by increasing women's direct access to ICT devices, coupled with community-based digital literacy programs. Policymakers and extension services should prioritize localized, language-appropriate content and promote female participation in the design and delivery of ICT-driven agricultural services. Lastly, partnerships between the public sector, NGOs, and telecom providers could help scale up inclusive digital models that reflect women's diverse roles and experience levels in agriculture.

7. Conclusion

Farming experience plays an important role in shaping how rural women engage with ICTs—not merely in terms of access, but in the type and purpose of content utilization. Women with limited farming experience more often turn to ICTs for entrepreneurial learning, market trends, and digital communication, while those with extensive experience prioritize content related to food preservation, livestock, and agricultural practices. Despite the lack of statistically significant associations, these behavioral distinctions reflect deeper patterns linked to exposure, generational shifts, and socio-cultural positioning. The presence of widespread ICT access, alongside persistent gender-based mediation, highlights a digital environment where inclusion is growing but not yet equitable. Understanding these nuanced dynamics is critical for designing ICT initiatives that are both inclusive and effective, recognizing women not as a monolithic group but as diverse actors with varied experiences, needs, and digital aspirations. Future studies should examine longitudinal shifts in ICT behavior as women transition across stages of farming experience and digital exposure.

References

Aker, J. C., Ghosh, I., & Burrell, J. (2021). The promise (and pitfalls) of ICT for agriculture in Africa. *Journal of Development Studies, 57*(10), 1655–1675.https://doi.org/10.1080/00220388.2021.1896830

Ali, M. (2012). Small farm entrepreneurship in Pakistan: The role of ICTs. *Pakistan Journal of Agricultural Sciences, 49*(4), 451–457.

Ayub, M. (2018). Digital barriers in rural agricultural advancement. *Journal of Agricultural Development, 6*(2), 55–68.

Ayub, R. (2018). Digital illiteracy and gendered access to ICTs. *Asian Journal of Communication Studies, 15*(4), 66–81.

Baruah, B., & Mohan, D. (2018). ICTs and empowerment in the global South. *Gender & Development, 26*(2), 223–238.

Baumüller, H. (2018). The little we know: An exploratory literature review on the utility of mobile phone-enabled services for smallholder farmers. *Journal of International Development, 30*(1), 134–154. https://doi.org/10.1002/jid.3314

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Drucza, K., & Paveri, J. (2018). Gender and technology adoption in South Asia. *IFPRI Discussion Paper Series, 1762*.

Drucza, K., & Paveeri, H. (2018). Gender inequality and digital exclusion in South Asia. *Development Policy Review, 36*(4), 543–560. https://doi.org/10.1111/dpr.12352
Farooq, U. (2023). Inclusive digital services for rural women in Punjab. *Livestock Policy and Innovation Journal, 9*(2), 88–97.
GSMA. (2023). *The Mobile Gender Gap Report 2023*. https://www.gsma.com/r/gender-gap
Hutchinson, S. (2023). Agricultural extension and gender in South Asia. *Development Extension Quarterly, 44*(1), 101–122.
Jabeen, S., Shahid, K., & Aslam, F. (2020). Gendered digital divide and ICT access in Pakistan. *Pakistan Journal of Rural Development, 18*(3), 221–235.
Malik, S., Fatima, H., & Iqbal, T. (2022). Empowering agricultural women through ICTs. *Journal of Gender and Development Studies, 11*(2), 115–129.
Malik, S., Fatima, M., & Qureshi, T. (2022). ICT adoption and women's economic empowerment in agriculture: Evidence from Pakistan. *International Journal of Rural Studies, 29*(3), 45–61.
Noor, S., Saleem, A., & Jamal, N. (2021). Gender inequalities in digital access in rural Pakistan. *Journal of ICT and Development, 19*(1), 54–67.
Rajkhowa, P., & Qaim, M. (2022). Mobile phones and female empowerment in agriculture. *World Development, 151*, 105764.
Rajkhowa, P., & Qaim, M. (2022). Mobile phones and gender equity in agriculture. *World Development, 158*, 106024. https://doi.org/10.1016/j.worlddev.2022.106024Raza, M., Ali, A., & Hussain, I. (2023). Financial literacy and ICT adoption in rural Pakistan. *South Asian Economic Journal, 24*(1), 45–62.
Raza, S., Bukhari, H., & Satti, M. (2023). Farming experience and digital financial literacy: Evidence from Pakistan. *Pakistan Journal of Agricultural Research, 61*(1), 72–80. https://doi.org/10.17582/journal.pjar/2023/61.1.72.80
Rimi, F., & Chudi, A. (2017). Empowering rural women through ICT in agriculture. *African Development Review, 29*(1), 74–88.
Saleh, F., Mahmood, Q., & Abbas, R. (2020). ICTs and agricultural knowledge diffusion among female farmers in Pakistan. *Asian Women, 36*(4), 27–49.
Shaikh, A. (2023). Women entrepreneurship and digitalization in Pakistan: Challenges and prospects. *Journal of Gender and Technology, 7*(1), 1–18.
Spielman, D. J., Davis, K., & Negash, M. (2021). Effective ICT tools in agricultural extension. *Agricultural Economics, 52*(5), 707–721.
Tata, J., & McNamara, K. (2017). Infrastructure constraints on ICT access for women. *Information Technologies & International Development, 13*(2), 1–12.
World Bank. (2022). *Digital technologies in agriculture and rural development*. https://www.worldbank.org/en/topic/agriculture/publication/digital-agriculture
Zahou, Y., & Li, J. (2022). Entrepreneurial decision-making and farming experience in digital contexts. *Asian Journal of Agriculture and Development, 19*(1), 34–47.