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SOCIO-ECONOMIC AND INSTITUTIONAL CONSTRAINTS FACED BY RURAL WOMEN IN RICE PRODUCTION: A CASE STUDY FROM THE RICE BELT OF PUNJAB, PAKISTAN

Muhammad Salman, Ijaz Ashraf*, Muhammad Nadeem, Syed I. Sarmad, Muhammad T. Rehman, Aleem Ashraf
Institute of Agricultural Extension Education and Rural Development, University of agriculture Faisalabad, Pakistan.

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ABSTRACT

Women are an integral part of agriculture system in Pakistan, where agriculture is the mainstay for millions of farm families. However, the work of women in agriculture is usually less acknowledged. In this study, an attempt was made to explore the key challenges of rural women working in the rice production system. This study was conducted in the prominent rice-producing district of Sialkoat. A total of 16 purposively selected women were interviewed face to face with the help of trained female enumerators on a structured, validated and reliable questionnaire. The collected data were analysed using the Statistical Package for Social Sciences (SPSS). Mainly, Principal Component Analysis (PCA) was employed on the data to explore the critical challenges. KMO Measure of sampling adequacy was adequate (KMO=0.658), and Bartlett's Test of Sphericity was significant (P=0.000), and a total of eight latest factors emerged as a result of PCA. Results showed that information and service exclusion (20.26%), socio-cultural and institutional barriers (14.8%), economic disempowerment (10.8%), legal and procedural asset dispossession (9.1%), work burden (8.5%), inclusion in production decision (7.12%), financial constraints (5.3%) and market access challenges were the critical factors impeding women contribution in rice production system. Study suggests that for sustainable rice production this is important to train the women, empower them and ensure their inclusion in decision-making. In addition, the women's access to advisory services should be ensured more proactively.

Corresponding Author: Ijaz Ashraf
Email: gilluagf707@uaf.edu.pk

INTRODUCTION

Gender disparities remain deeply embedded within agricultural systems across developing countries, where women contribute substantially to agricultural production yet continue to face structural inequalities in access to resources, services, and decision-making power. Women account for a significant share of the agricultural labor force in many regions, particularly in South Asia and Sub-Saharan Africa, yet they consistently face limited land ownership, constrained access to credit, restricted mobility, and lower participation in extension services (FAO, 2011; World Bank, 2012). These structural imbalances not only undermine women's empowerment but also constrain agricultural productivity, food security, and rural development outcomes.

Empowerment within the agricultural context extends beyond economic participation to include agency, access to productive resources, decision-making authority, and the ability to shape one's strategic life choices (Kabeer,

1999; Sen, 1999; Beriso et al., 2023). Kabeer (1999) conceptualises empowerment as the expansion of people's ability to make strategic life choices in contexts where this ability was previously denied, emphasizing resources, agency, and achievements as interrelated dimensions (Kinati et al., 2022). In agrarian settings, these dimensions translate into land rights, control over income, participation in production decisions, and involvement in community-level institutions (Agarwal, 1994). Thus, agricultural empowerment is inherently multidimensional and embedded within socio-cultural and institutional structures (Lecoutere et al., 2024).

Development scholarship increasingly recognises that closing gender gaps in agriculture has measurable economic and social returns. FAO (2011) estimates that if women had equal access to productive resources, farm yields could increase significantly, contributing to reductions in hunger and poverty. Similarly, the World Bank (2012) highlights that gender equality in agriculture enhances productivity and intergenerational welfare outcomes. These findings reinforce the argument that gender equity is not solely a matter of social justice but also a prerequisite for sustainable agricultural development. However, persistent structural constraints continue to limit women's agricultural agency. Unequal inheritance systems, discriminatory property laws, patriarchal norms, and disproportionate unpaid care responsibilities restrict women's ability to fully participate in agricultural decision-making (Agarwal, 1994; ILO, 2018). The burden of unpaid care work, in particular, constrains time availability and mobility, thereby affecting access to training, markets, and extension programs (ILO, 2018). These socio-cultural factors interact with institutional arrangements to reproduce gendered disparities within agricultural systems.

Agricultural extension systems occupy a central position in shaping access to knowledge, technology, and innovation. Historically, extension models have often adopted gender-neutral approaches that inadvertently privilege male farmers, thereby marginalizing women's participation (Anderson and Feder, 2004). Contemporary extension scholarship emphasises the need for gender-responsive, inclusive advisory systems that recognise women as active agricultural producers rather than passive beneficiaries (Davis and Sulaiman, 2014). Transformative extension approaches seek not only to disseminate technical information but also to strengthen women's agency and participation in agricultural innovation systems. In addition, broader rural transformation processes—including youth engagement, labor migration, and market integration—interact with gender dynamics in complex ways (IFAD, 2019). As rural economies evolve, understanding how gender relations shape access to resources and decision-making becomes increasingly important for designing equitable development interventions.

Against this backdrop, the present study examines gender dimensions of agricultural empowerment within a rural context, focusing on access to resources, decision-making authority, and participation in agricultural activities. By situating gender empowerment within established theoretical perspectives and empirical development literature, the study aims to provide contextually grounded evidence that informs both policy and extension practice. In doing so, it contributes to ongoing scholarly and policy debates concerning how agricultural systems can be restructured to promote equity, agency, and sustainable rural development.

METHODOLOGY

Study area

Sialkot, in Punjab, is one of Pakistan's prominent rice-producing districts, known for cultivating both fine aromatic and coarse-grain rice varieties, including Super Basmati, Kisan Basmati, and IRRI-9 (Raza and Anwer, 2015). Sialkot, along with other districts such as Gujranwala, Sheikhupura, and Hafizabad, is a major rice-growing region of Punjab, accounting for a large share of the country's Basmati rice production.

Study population and sample

The current study was conducted in the district of Sialkot, which is one of the leading rice-producing districts in the Punjab province. District Sialkot comprises four tehsils: Sialkot, Pasrur, Daska, and Sambrial. All rural women involved in rice production in the study district were included.

Multistage sampling was applied in the study. In the 1st stage district Sialkot was selected. In the 2nd stage, all four tehsils were selected. In the 3rd stage, four union councils were chosen randomly from each tehsil. In the fourth stage, 10 female respondents were selected conveniently, bringing the sample size to 160.

Instrumentation, data collection and analysis

This study employs an interview schedule as a research instrument. The interview schedule was prepared with the research objectives in mind. Research reports, scholarly articles, and periodicals were carefully reviewed to prepare the research instrument. The interview schedule included closed-ended questions. Five-point Likert scales were used for respondents' in-depth responses.

Data were collected via face-to-face interviews. Female enumerators who were trained first collected the data from women. Questions were explained in the local language to the respondents because the narrative language of the respondents was Punjabi, so the local language was suitable; respondents were comfortable in the local language, and they were able to understand the aim of the study when it was explained to them in the local language.

The collected data were analysed using the Statistical Package for the Social Sciences (SPSS). Frequency, percentages, mean, and Principal Factor Analysis (PCA) were employed in the data.

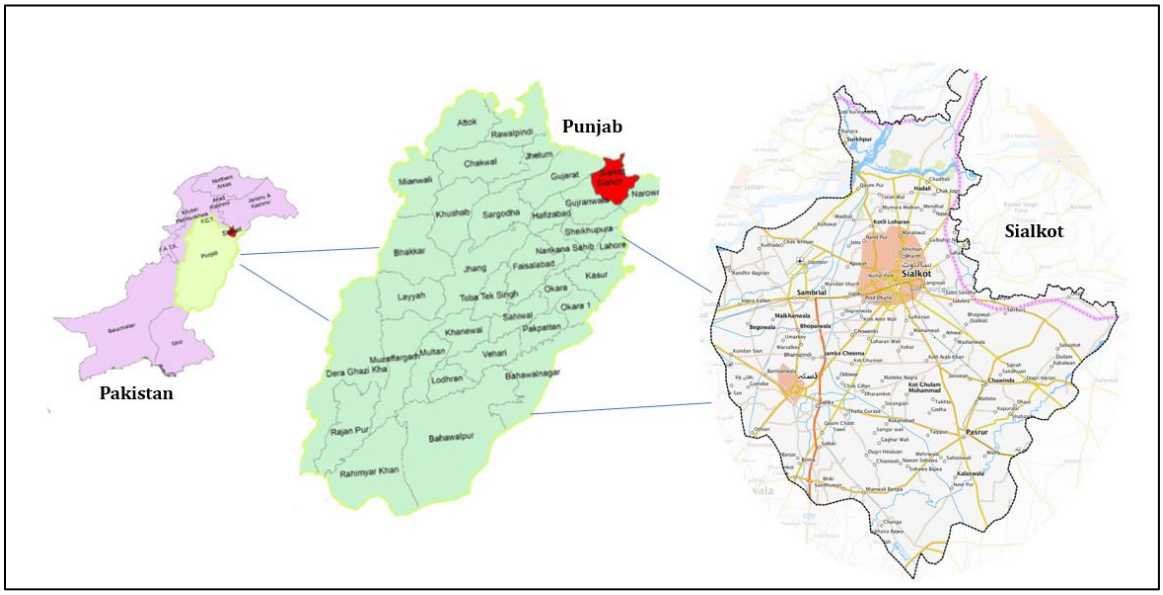

Figure 1. Map of study area.

RESULTS

Demographic attributes

The demographic profile of the rural women participants is presented in Table 1. The respondents had a mean age of 47.62 years (SD = 7.84), indicating a predominantly middle-aged cohort. Their average level of formal education was low at 4.90 years (SD = 5.152), though the high standard deviation points to considerable diversity, ranging from no formal schooling to higher education. Regarding agricultural assets, the mean land size was 11.34 units (SD = 7.075), suggesting moderate landholdings with some variation among the women. Finally, the participants reported an average of 15.16 years of farming experience (SD = 9.216), confirming a generally experienced group of farmers. However, the wide standard deviation again highlights a mix of both novice and highly experienced individuals within the sample.

Table 1. Demographic profile of rural women.

Attributes	Mean ± SD
Age	47.62±7.84
Education	4.90±5.152
Land size	11.34±7.075
Farming experience	15.16±9.216

Principal Component Factor Analysis

To extract the key factors, Principal Component Analysis was performed on the 26 key obstacles. Rotaru et al. (2012) reported that PCA is useful in variable reduction and meaningful interpretation. Therefore, PCA was applied, and the results of the reliability analysis, PCA and Normality Tests are presented below.

Reliability analysis

This study's Cronbach's alpha, a measure of the research instrument's reliability, was 0.784. This value should

ideally be between 0.65 and 0.75, according to Kröz et al. (2003), and greater than 0.60, according to Abu and Tasir (2001). The reliability analysis in our study yielded a score above 0.65, indicating good reliability of the research tool.

Principal Component Analysis

A total of 26 factors were included in the analysis, and the reliability of the running factor analysis was ensured. The newly extracted factors, factor loadings, and normality are presented in Tables 2-4.

Table 2. Factor analysis of the challenges faced by the women in rice zone.

Total Factors	Newly Extracted Factors							
	1	2	3	4	5	6	7	8
Limited educational facility					.589			
Male dominance			.757					
Cultural issues		.630						
Low wages	.536		.614					
Health issues								
Women harassment		.646						
There are no opportunities for training of women		.556			.524			
Low educational level among women	.537				.607			
Long working hours	.596					.557		
Low paid and low status jobs	.605					.507		
Lack of recognition of women's unpaid work as productive	.572							
Women are not involved in decision-making				.756			.585	
Undue family pressures		.635					-.529	
Women are not allowed to buy land		.506	-.673					
Limited education and departmental procedure are the main hurdles		.504			.525			
Share in land is not given to women		.640						
Inadequate access to loan and credit facility				.512				.658
Less access to technology		.649						
Long distance between field and market						-.656		.625
No contact with middleman		-.519						.494
Produce do not achieve reasonable price	.535				.546			
No access to large market	.579					.585		
Advisory services (public sector)	.773							
Advisory services (private sector)	.638	-.125	-.370		.399		-.276	
No access to pesticides dealers	.712	-.109	-.317	-.375	.104	-.252		
Unawareness about agricultural information and services	.729			-.405		.166		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy= 0.685 Bartlett's Test of Sphericity= 748.44 Df=325 Sig: 0.000								

Table 2 shows the factor loadings for the factor analysis of the 26 total factors**.** Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy is 0.685**,** which is above the acceptable threshold of 0.60. This indicates that the patterns of correlation among the variables are adequate, making the data *suitable* for reliable factor analysis. Whereas, high and significant Bartlett's Test of Sphericity (χ^2=748.44, p=0.000) suggests that some latent structure exists, allowing for a cautious and exploratory interpretation of the extracted factor patterns. Analysis extracted eight latent factors that group the 26 observed challenges into broader, underlying dimensions of constraint. The first factor appears to be the most dominant, characterized by high loadings on variables related to Systemic Information and Service Exclusion. This includes no access to advisory services (public sector) (M=0.773), unawareness about agricultural information and services (M=0.729*),* no access to pesticide dealers (0.712) and to a lesser extent, advisory

services (private sector) (M=0.638). This suggests a core, unifying challenge: women's systematic disconnection from formal and informal agricultural knowledge networks, input suppliers and support systems.

The second factor group challenges related to Gendered Sociocultural and Institutional Barriers**.** High loadings are seen for Male dominance *(0.757),* Cultural issues *(0.630),* Women harassment *(0.646)* and Undue family pressures *(0.635).* This factor captures the patriarchal norms and social pressures that directly constrain women's safety, autonomy, and mobility. Factor Three seems to align with Economic Disempowerment and Unrecognised Labour, loading highly on Low wages (0.614), low-paid and low-status jobs (0.605), and lack of recognition of women's unpaid work (0.572), indicating an underlying dimension of economic exploitation and the devaluation of women's contributions. The fourth factor is defined by issues of legal and procedural asset possession**,** with very high negative and positive loadings for 'Women are not allowed to buy land ' *(-0.673)* and 'Share in land is not given to women ' (0.640). This highlights the acute, specific barrier of land ownership denial as a distinct structural pillar of disenfranchisement. Factor Five tentatively combines elements of Work Burden and Educational Deficit**,** with notable loadings for long working hours (0.557), Low educational level among women (0.607) and no opportunities for women's training (0.524), linking time poverty with a lack of human capital development.

The sixth, seventh and eighth factors are less clearly defined but suggest further differentiation. Factor Six, with loadings such as " Women are not involved in decision-making " (0.585), may relate to Agency and Voice in Production Decisions**.**

Factor Seven, showing a high loading for Inadequate access to loan and credit facility (0.658), points to a distinct financial capital constraint**.** Finally, factor eight, with a notable loading for long distance between field and market (0.625), hints at Logistical and Market Access Challenges**.**

Table 3. Factors loading of newly extracted factors.

Factors	Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
Systemic Information and Service Exclusion	5.217	20.065	20.065
Gendered Sociocultural and Institutional Barriers	3.860	14.848	34.912
Economic Disempowerment and Unrecognized Labor	2.858	10.991	45.903
Legal and Procedural Asset Dispossession	2.372	9.124	55.027
Work Burden and Educational Deficit	2.235	8.597	63.624
Intervention and inclusion in Production Decisions	1.852	7.122	70.746
Financial Capital Constraint	1.396	5.371	76.117
Logistical and Market Access Challenges	1.197	4.603	80.720

Table 3 reveals a clear hierarchy in the underlying structure of constraints faced by women in the rice zone, quantifying the relative importance of each systemic dimension. The eight extracted factors collectively explain 80.72% of the total variance in the original 26 challenges, indicating they provide a comprehensive and efficient framework for understanding the complex web of gendered disadvantages.

The most dominant factor, systemic information and service exclusion," accounts for 20.065% of the total variance. This underscores that the single most significant underlying dimension of constraint is women's systematic disconnect from agricultural knowledge systems, advisory services, input dealers and technological information. It is not merely one problem among many but the core structural failure that isolates women from the resources needed to improve productivity and agency. A systematic disconnect has been reported among women in various studies, including Adebayo and Worth (2022), Gartaula et al. (2025), Perelli et al. (2024) and Mugion et al. (2026). Following this, the second most critical factor is "Gendered Sociocultural and Institutional Barriers**,"** explaining 14.848% of the variance. This highlights that patriarchal norms encompassing male dominance, cultural restrictions, harassment and undue family pressure constitute a powerful, independent force shaping women's experiences, nearly as significant as the lack of information access as reported by Fletchner and Mesbah (2011) and Abbas et al. (2021). The third and fourth factors**,** "economic disempowerment and unrecognised labour" (10.991%) and "**l**egal and procedural asset dispossession" (9.124%)**,** together explain another

fifth of the total variance. This confirms that the economic exploitation of women's labor (through low wages and the invisibility of unpaid work) and the legal denial of land ownership are not just symptoms but are fundamental, distinct pillars of the gender gap (Tahmaseb, 2021; Khalid and Tarar, 2025). The cumulative variance reaches 55.027% after these first four factors, indicating that over half of the challenges reported can be explained by these four core themes: exclusion from knowledge, patriarchal social structures, economic devaluation, and asset dispossession. The remaining four factors, like work burden and educational deficit (8.597%), agency and voice in production decisions (7.122%), financial capital constraint (5.371%) and logistical and market access challenges (4.603%) provide further irregularity (Kaur and Virk, 2024; Safdar et al., 2021; Mwabu, 2018). They explain an additional 25.693% of the variance, detailing important sub-dimensions, including the intersection of time poverty and low education, lack of decision-making power, specific credit shortages and physical market barriers. While each is less individually impactful than the top four factors, they are essential for a complete picture, explaining the specific mechanisms through which the larger systemic failures manifest.

Table 4. Tests of normality.

Factors	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Systemic Information and Service Exclusion.	.099	303	.000
Gendered Sociocultural and Institutional Barriers	.103	303	.000
Economic Disempowerment and Unrecognized Labor	.165	303	.000
Legal and Procedural Asset Dispossession	.104	303	.000
Work Burden and Educational Deficit	.131	303	.000
Agency and Voice in Production Decisions	.145	303	.000
Financial Capital Constraint	.119	303	.000
Logistical and Market Access Challenges	.128	303	.000

Table 4 shows a clear, consistent pattern across all eight extracted factors. For every factor Systemic Information and Service Exclusion, Gendered Sociocultural and Institutional Barriers, Economic Disempowerment and Unrecognized Labour, Legal and Procedural Asset Dispossession, Work Burden and Educational Deficit, Agency and Voice in Production Decisions, Financial Capital Constraint and Logistical and Market Access Challenges the test statistic is significant at the $p < 0.001$ level (Sig. = .000). This means we must reject the null hypothesis that the data for each factor are normally distributed in the population from which this sample was drawn.

DISCUSSION

This study examined the multidimensional challenges faced by rural women engaged in rice production. The findings reveal that women's constraints are not isolated operational limitations but structurally embedded barriers spanning informational, sociocultural, economic, legal, institutional, and market domains. The extraction of eight latent factors, which explain 80.72% of the total variance, demonstrates that women's marginalisation in rice production is systemic rather than incidental. The most dominant factor—Systemic Information and Service Exclusion—accounted for 20.07% of total variance, underscoring that women's primary constraint lies in their exclusion from agricultural knowledge systems. High loadings on lack of access to public and private advisory services, pesticide dealers, and agricultural information indicate that women remain disconnected from formal and informal extension networks.

This finding aligns with longstanding critiques of public extension systems, which have historically struggled to reach marginalised smallholder farmers effectively (Anderson and Feder, 2004). Gender-disaggregated analyses further demonstrate that women farmers are frequently bypassed in advisory outreach and innovation dissemination processes (FAO, 2011; World Bank, 2012). The notion of the "new extensionist" emphasizes inclusivity and systemic engagement; however, such transformation remains incomplete in many developing contexts (Davis and Sulaiman, 2014). The dominance of this factor suggests that informational asymmetry is not peripheral but constitutes the core structural barrier constraining women's productive agency. The second most influential dimension—Gendered Sociocultural and Institutional Barriers (14.85%)—highlights entrenched patriarchal norms manifested through male dominance, cultural

restrictions, harassment, and family pressure. These findings reflect broader analyses of gendered power relations that structure access to resources, mobility, and decision-making authority (Kabeer, 1999). The development literature consistently shows that patriarchal institutional arrangements limit women's economic participation despite their substantial contributions to agricultural labour (FAO, 2011; World Bank, 2012). Cultural norms governing women's public interactions further constrain their engagement with markets, extension agents, and input suppliers. Thus, the strong loading of male dominance and harassment reflects systemic control over women's productive roles rather than isolated social discomfort. These results indicate that technical interventions alone are insufficient unless accompanied by normative and institutional change.

The third factor—Economic Disempowerment and Unrecognised Labour (10.99%)—reveals the persistent undervaluation of women's contributions to rice production. Low wages, low-status jobs, and invisibility of unpaid labor collectively signal structural devaluation. Feminist economic scholarship has long emphasised that women's agricultural labour is often rendered invisible in household and national accounting systems (Agarwal, 1994).

The International Labour Organisation similarly highlights the disproportionate burden of unpaid and informal labour borne by rural women (ILO, 2018). The invisibility of unpaid work weakens women's bargaining power and perpetuates income inequality. The findings therefore reinforce the argument that productivity-enhancement strategies must incorporate labour recognition and equitable remuneration mechanisms.

Legal and Procedural Asset Dispossession (9.12%) emerged as a distinct structural constraint, particularly concerning denial of land ownership and inheritance rights. Land ownership is widely recognized as a critical determinant of bargaining power, economic security, and agricultural investment capacity (Agarwal, 1994). Without secure land tenure, women remain dependent labor contributors rather than autonomous producers.

Global assessments confirm that gender disparities in land rights persist across developing regions, limiting access to credit, extension services, and formal agricultural programs (FAO, 2011; World Bank, 2012). The distinct focus on asset dispossession in this study underscores that legal exclusion operates as an independent mechanism that reinforces economic dependency. The remaining four factors—Work Burden and Educational Deficit, agency and voice in production decisions, Financial Capital Constraint, and Logistical and Market Access Challenges—collectively explain an additional 25.69% of variance. These dimensions represent the operational manifestations of structural marginalization.

Time poverty has been identified as a critical barrier limiting women's participation in training, innovation adoption, and market engagement (ILO, 2018; UNDP, 2020). Similarly, constrained decision-making power reflects limited agency within household production systems, consistent with capability-based interpretations of empowerment (Sen, 1999; Kabeer, 1999). Financial capital constraints further limit women's ability to invest in inputs, mechanisation, and risk-mitigation strategies. Empirical evidence consistently shows that limited access to credit disproportionately affects women farmers (World Bank, 2012; FAO, 2011). Finally, mobility restrictions and infrastructural deficits impede women's integration into agricultural markets, reinforcing localized isolation (IFAD, 2019). Although individually less dominant than the primary factors, these dimensions collectively depict a layered disadvantage in which sociocultural norms, institutional neglect, economic marginalization, and infrastructural barriers converge. Findings indicate the need for targeted, context-sensitive interventions rather than uniform policy prescriptions.

CONCLUSION

This study provides empirical evidence that rural women involved in rice production in Punjab face a complex, multidimensional system of constraints. The findings demonstrate that their challenges extend far beyond individual capacity limitations and are embedded within structural informational exclusion, patriarchal sociocultural norms, economic undervaluation, legal asset dispossession, limited agency, financial constraints, and market isolation.

The dominance of Systemic Information and Service Exclusion indicates that the core barrier lies in women's disconnection from agricultural knowledge and institutional support systems. However, informational exclusion is intertwined with gendered power structures, land ownership denial, and economic marginalization, creating a reinforcing cycle of disadvantage. The study highlights that improving women's productivity in rice production requires integrated interventions. Policies must simultaneously address extension inclusion, land rights enforcement, credit accessibility, labor recognition, and

sociocultural transformation. Isolated technical training programs are unlikely to generate sustainable change without parallel institutional reforms. Ultimately, empowering rural women in rice production is not merely a matter of equity but of agricultural sustainability and productivity. Addressing the identified barriers can enhance household food security, improve rural livelihoods, and strengthen rice value chain in Punjab.

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