

Gender Differences in Attitudes, Perceptions, and Barriers to Agricultural Extension Services among Paddy Seed Growers in Nepal

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Abstract

Introduction:

Agricultural extension services play a critical role in improving agricultural productivity and rural livelihoods; however, access to these services remains highly gendered. While previous studies have focused mainly on gender differences in access, less attention has been given to how men and women differ in their attitudes, perceptions, and experiences of extension services, particularly amid the increasing feminisation of agriculture in developing countries. Guided by Penchansky and Thomas's Theory of Access and Social Role Theory, this study examines these dimensions among paddy seed growers in Rautahat District, Nepal.

Methods

A convergent mixed-methods design was employed, combining a survey of 265 farmers (150 men and 115 women) with four focus group discussions and ten key informant interviews. Gender differences in attitudes and perceptions were analysed using the Mann–Whitney U test, while Garrett's ranking technique was used to identify and prioritise barriers affecting women's access to extension services. Qualitative data were analysed thematically and integrated with quantitative findings to provide a comprehensive understanding of gendered experiences of extension services.

Results

Women exhibited significantly more positive attitudes towards extension services than men ($p = 0.036$). Significant gender differences were also observed across the five dimensions of access. Men reported higher levels of availability, accessibility, and acceptability, whereas women rated affordability and accommodation more positively ($p < 0.001$). Women identified the lack of women extension workers and financial limitations as the most significant barriers. At the same time, men perceived limited decision-making power and household workload as the primary constraints affecting women's participation. The findings indicate that positive attitudes alone are insufficient to ensure equitable participation when institutional, economic, and socio-cultural barriers remain unresolved.

Conclusion

The findings demonstrate that access to extension services is multidimensional and shaped by gendered social roles and institutional arrangements. The study highlights the need for gender-responsive extension systems that increase women extension staffing, strengthen women's financial inclusion, and address structural and socio-cultural barriers limiting equitable participation. Addressing these barriers is essential for enhancing the effectiveness, inclusiveness, and long-term impact of agricultural extension systems in Nepal and similar developing-country contexts.

1. INTRODUCTION

Agricultural extension services are widely recognized as a critical mechanism for translating agricultural research into practice by facilitating knowledge transfer, technology adoption, capacity building, and farm-level decision-making (Anderson & Feder, 2007; Davis et al., 2012). Effective extension systems have been associated with increased agricultural productivity, improved household incomes, enhanced food security, and reduced rural poverty across developing countries (Davis et al., 2012). However, growing evidence suggests that the benefits of extension services are not distributed equitably among different social groups, particularly between men and women farmers (Ragasa et al., 2013; Peterman et al., 2014; Nyberg & Mackay, 2025).

Women constitute approximately 43% of the global agricultural labor force and contribute substantially to food production, especially in Asia and sub-Saharan Africa (Doss, 2018). Despite their critical role, women continue to experience lower access to agricultural information, advisory services, credit, training opportunities, and productive resources than men (FAO, 2011; Quisumbing & Pandolfelli, 2010; Peterman et al., 2014). Recent studies have shown that gender inequalities in extension systems remain pervasive and are shaped by a combination of institutional barriers, socio-cultural norms, limited mobility, unequal decision-making power, and inadequate representation of women extension personnel (Lamontagne-Godwin et al., 2018; Adebayo & Worth, 2022; Midamba & Mugonola, 2024; Nyberg & Mackay, 2025). Consequently, improving women's access to extension services is increasingly viewed not only as a matter of social equity but also as a prerequisite for enhancing agricultural productivity, resilience, and sustainable rural development.

The challenge is particularly important in South Asia, where the feminisation of agriculture has accelerated due to men out-migration and changing rural labour dynamics (Gartaula et al., 2012; KC & Race, 2020). Nepal provides a particularly relevant context for examining these issues. Agriculture contributes approximately one-quarter of the national GDP and supports the livelihoods of more than 60% of the population (Yogi et al., 2025). Rice remains Nepal's most important staple crop and occupies a dominant position in the agricultural economy (Choudhary et al., 2022). Simultaneously, women now constitute a substantial proportion of the agricultural workforce and increasingly serve as de facto farm managers. Nevertheless, their access to agricultural extension services, training opportunities, financial resources, and productive inputs remains constrained by persistent social, institutional, and economic barriers (FAO, 2019; KC & Race, 2020).

Although a growing body of literature has documented gender disparities in access to agricultural extension services, important knowledge gaps remain. Existing studies have predominantly focused on measurable indicators of access, such as frequency of contact with extension personnel, participation in training programs, and access to agricultural inputs (Ragasa et al., 2013; Peterman et al., 2014). Comparatively less attention has been given to understanding how women and men perceive extension services, how their attitudes toward these services differ, and how these perceptions influence utilisation and effectiveness. Furthermore, barriers to women's participation are often identified by researchers or institutions rather than systematically prioritised by women farmers themselves (Lamontagne-Godwin et al., 2018; Nyberg & Mackay, 2025). This limitation reduces the ability of policymakers and extension agencies to design interventions that address locally relevant constraints.

Recent evidence from Nepal further highlights this gap. A study of paddy seed growers in Rautahat District found significant gender differences in access to extension services and agricultural inputs, with women demonstrating lower access but higher utilisation once services were obtained (Timalsina et al., 2026). However, little is known about whether women and men perceive extension services differently across multiple dimensions of access, including availability, accessibility, affordability, accommodation, and acceptability. Similarly, empirical evidence remains limited on the relative importance of specific barriers experienced by women farmers within Nepal's paddy seed production systems. Addressing these gaps is important because perceptions and attitudes often mediate behavioural responses, technology adoption, and service utilisation, thereby influencing the ultimate effectiveness of extension programs (Siddiqui & Mirani, 2013).

This study is guided by Penchansky and Thomas's Theory of Access (1981), which conceptualises access as a multidimensional construct comprising availability, accessibility, affordability, accommodation, and acceptability (Saurman, 2016). The study is further informed by Social Role Theory (Eagly, 1987), which explains how socially constructed gender roles influence access to resources, decision-making authority, mobility, and participation in institutional processes. Together, these frameworks provide a comprehensive lens for examining how gender shapes perceptions of agricultural extension services and the barriers affecting their utilisation.

In this context, the overall aim of this study is to examine gender differences in perceptions, attitudes, and barriers related to agricultural extension services among paddy seed growers in Rautahat District, Nepal. The specific objectives are to:

1. Compare men's and women's attitudes toward agricultural extension services.
2. Examine gender differences across the five dimensions of access: availability, accessibility, affordability, accommodation, and acceptability.
3. Identify and prioritise the key barriers limiting women's access to agricultural extension services.

This study contributes to the literature by moving beyond conventional measures of extension access to examine gendered differences in attitudes, perceptions, and perceived barriers using a multidimensional access framework. By using Nepal's paddy seed production system as a case study, the research provides evidence to inform the design of more gender-responsive agricultural extension systems in developing countries.

2. Literature review

2.1 Attitudes and Perceptions Toward Agricultural Extension Services

Farmers' attitudes are widely recognized as significant determinants of extension service uptake and technology adoption (Rehman et al., 2003), yet the relationship between attitude and actual utilization is not straightforward. Farmers frequently disengage not due to indifference but because recommendations are perceived as poorly aligned with their agronomic realities (Siddiqui & Mirani, 2013) – a disconnect reflecting broader systemic failures shaped by power relations, institutional factors, and social determinants. Recent evidence from Southeast Asia confirms that these barriers are patterned rather than incidental, with smallholders facing overlapping constraints including weak digital infrastructure and limited trust in information sources (Sen et al., 2024), while digital extension risks reproducing existing exclusions unless deliberately designed for inclusion (Sen et al., 2025).

Gender introduces a further layer of complexity. Women consistently report lower satisfaction with extension services than men, citing irrelevant information and poor agent communication even when contact occurs (Ragasa et al., 2013; Deka et al., 2018). Critically, however, this dissatisfaction does not reflect negative attitudes toward extension in principle – women frequently hold favorable attitudes while rating services as less useful in practice, a paradox that exposes the inadequacy of treating attitude and utilization as equivalent constructs (Deka et al., 2018; Saikia et al., 2018). This inconsistency points to a critical gap: existing studies have overemphasized women's individual attitudes while underemphasizing how institutional responsiveness shapes those attitudes (Nyberg et al., 2025).

Social and relational dynamics further mediate this relationship. Participation decisions are embedded in intra-household power relations rather than individual choice (Mudege et al., 2016), while male-dominated communication systems reduce women's interactions with agents and reinforce perceptions of services as irrelevant (Lamontagne-Godwin et al., 2018). Maulida et al. (2025) demonstrate that women extension agents face structural disadvantages – restricted career advancement, work-family burdens, and underrepresentation in decision-making – that constrain the quality of farmer-agent interactions and reproduce negative perceptions among women service users. Women's perceptions of extension are therefore not stable individual attributes but are actively constituted through gendered social and organizational structures.

Applying Penchansky and Thomas's (1981) framework, Saurman (2016) identified five dimensions shaping perceived access – availability, accessibility, affordability, accommodation, and acceptability – with women's ratings differing significantly from men's due to gendered constraints on mobility, time, and decision-making authority (Lamontagne-Godwin et al., 2018). Recent evidence confirms that gender integration in extension materials remains superficial (Silvert et al., 2025), that structural dimensions of access outweigh attitudinal ones (Man et al., 2024), and that accommodation is the most neglected yet consequential dimension for gendered access (Sen et al., 2025). Most studies applying this framework do so descriptively, without empirically testing gender differences across all five dimensions simultaneously or within specific crop contexts – a gap the present study addresses among paddy seed growers in Nepal.

2.2 Gender Differences in Access to Extension Service

Women's exclusion from agricultural extension services remains one of the most entrenched and consequential inequalities in rural development — consistently documented, rarely adequately explained, and even more rarely resolved. Women across diverse regions receive fewer extension contacts than men — and this is not the result of any single factor but rather a convergence of institutional structures, cultural expectations, and delivery systems that were never designed with women in mind (FAO, 2011; Quisumbing & Pandolfelli, 2010). The consequences are well-documented: lower rates of technology adoption among women and a widening productivity gap between male and female farmers (Peterman et al., 2014). South Asian extension systems have been particularly critiqued for structurally sidelining women — through exclusion from trainings, barriers tied to land ownership, and limited space within farmer organizations (Meinzen-Dick et al., 2011). In rice farming specifically, these institutional, cultural, and logistical barriers stack on top of one another, blocking women's meaningful access to production technologies across multiple country settings (Achandi et al., 2018).

Beyond the household level, institutional exclusion — rooted in customary laws, gender-blind policies, and the internal culture of extension organizations — continues to entrench these inequalities across sub-Saharan Africa (Agholor, 2019). Addressing them calls for systemic change, not marginal adjustments. The gender gap in extension access resists easy explanation precisely because it has no single cause — it is context-shaped, layered, and self-reinforcing. In Ethiopia, women engaged in poultry farming contend with a compounding set of disadvantages: limited education, larger households, long distances to extension offices, and too few female agents to serve them (Atsbeha & Gebre, 2021). No one factor alone creates the barrier — it is their combination that makes isolated, piecemeal interventions so ineffective. Uganda tells a similar story: women-headed households carry the additional burdens of smaller landholdings, restricted credit access, and the relentless pull of domestic responsibilities (Midamba & Mugonola, 2024). And even when extension services are geographically close, physical proximity does not guarantee meaningful access — gender norms and intra-household power dynamics determine whether women can realistically seek out, engage with, and act on agricultural advice (Badstue et al., 2020).

Nepal offers a particularly striking illustration of these dynamics. Male out-migration at scale has pushed women to take on the bulk of agricultural work, with women now making up over 80% of the farming workforce. Yet this demographic reality has not translated into proportional access to extension services, training, or productive inputs (FAO, 2019; Gartaula et al., 2012). In the seed sector, women's limited involvement in the seed value chain appears to stem less from disinterest than from underutilization of extension services (Thapa et al., 2020). Patriarchal norms continue to constrain women's mobility and their authority to make decisions independently (Shrestha & Gartoulla, 2015), and these restrictions carry real costs for agricultural output and household income (Paudyal et al., 2019). What existing Nepal-based studies have not done, however, is move beyond description to identify which specific dimensions of access most limit women's engagement with extension services. The present study takes up that question directly, applying Penchansky and Thomas's (1981) access framework to primary data collected from paddy seed growers in Rautahat district.

2.3 Barriers to Women's Access to Extension Services

Women farmers face multiple, intersecting barriers to extension access spanning household, sociocultural, institutional, economic, and informational domains — not as discrete constraints but as mutually reinforcing products of cultural norms, legal restrictions, and institutional biases (Haile, 2016). The literature documents these barriers extensively but has been considerably less successful at determining which are most binding or how they interact.

Time poverty — driven by women's disproportionate domestic and agricultural labor — consistently limits extension participation (FAO, 2019; Gartaula et al., 2012), producing a striking disparity in extension contact: 30% of women versus 55% of men in Kenya (Nyberg et al., 2025). Critically, time poverty is not a standalone constraint but is entangled with intra-household power relations governing labor allocation, meaning interventions targeting time burdens in isolation produce limited gains without accompanying changes in household decision-making dynamics (Marter-Kenyon et al., 2023).

Sociocultural constraints are particularly acute in Nepal's Terai region, where cultural and religious norms restrict women's interaction with unrelated men, rendering male-dominated extension workforces a fundamental barrier to knowledge transfer

(FAO, 2011; Mudege et al., 2016). Proposed solutions – particularly recruiting more women agents – are insufficient without organizational reform, as women extension agents themselves face career barriers and institutional marginalization that reproduce the inequities extension systems are tasked with addressing (Maulida et al., 2025). Institutionally, residential training programs lack gender-segregated facilities and childcare provision (Staudt, 1988), while women comprise less than 11% of Nepal's agricultural professionals (FAO, 2019). Nyberg et al. (2025) further found that women agents are assigned lower-status roles with less training, while Sen et al. (2025) identify accommodation – organizational responsiveness to women's schedules and communication preferences – as the most neglected yet consequential institutional barrier.

Economically, women's limited land ownership reduces collateral for credit and constrains investment in extension-recommended inputs (Doss, 2018; FAO, 2011), with economic barriers interacting with sociocultural constraints rather than operating independently (Midamba & Mugonola, 2024). Most extension guidance treats these economic barriers superficially without engaging with land tenure insecurity or gendered credit markets (Silvert et al., 2025). Informationally, the assumption that knowledge flows from male household heads to women is empirically unreliable (Lamontagne-Godwin et al., 2018), while digital channels risk entrenching rather than disrupting gender hierarchies through lower women's phone ownership and digital literacy deficits (Dhungana, 2024; Sen et al., 2024) – though targeted digital literacy interventions demonstrate these barriers are surmountable with intentional design (Sarah, 2025).

Four critical gaps remain: most studies describe barriers without measuring relative intensity or testing causal pathways; barrier profiles across intersecting social categories remain underexamined; no study has applied the Penchansky–Thomas framework to Nepal to identify which dimensions most constrain women's utilization; and digital extension evidence from Nepal remains limited (Alam et al., 2024). The present study addresses these gaps through Garrett's Ranking Technique to prioritize barriers by salience and tests whether acceptability and accommodation dimensions mediate the relationship between gender and extension utilization.

2.4 Gender-Responsive Extension Systems and Women's Empowerment in Agriculture

A growing body of literature emphasises that reducing gender disparities in agricultural extension requires extension systems that are responsive to the specific needs and circumstances of women farmers. Despite women's substantial contribution to agricultural production, they often receive extension services that are less frequent, less relevant, and less accessible than those available to men due to persistent institutional, socio-cultural, and economic constraints (Gebre et al., 2021; Rola-Rubzen et al., 2020).

In Nepal, the feminisation of agriculture resulting from male out-migration has increased women's involvement in farm management and agricultural decision-making (KC & Race, 2020). However, extension systems have not always adapted to these changing roles. Studies show that gender-responsive approaches, including targeted training, women-focused communication strategies, and the use of women extension personnel, can improve women's access to agricultural information, strengthen decision-making capacity, and enhance technology adoption (Lecoutere et al., 2023).

The literature further suggests that effective gender-responsive extension requires institutional commitment to inclusive service delivery, improved representation of women within extension organisations, and extension approaches that recognise the diverse social and economic realities of women farmers (Adebayo & Worth, 2022; Alvi et al., 2021). Such approaches are increasingly recognised as important for promoting both women's empowerment and broader agricultural development outcomes.

2.5 Synthesis of Literature and Knowledge Gaps

The literature consistently demonstrates that gender disparities in agricultural extension services remain a significant challenge across developing countries. Previous studies have documented inequalities in access to extension services, highlighted the influence of socio-cultural norms and institutional arrangements, and identified a range of barriers that limit women's participation in extension programs. Collectively, the evidence suggests that women's engagement with extension

services is shaped by a complex interplay of individual, household, social, and institutional factors, including domestic responsibilities, mobility constraints, access to resources, decision-making power, and the gender responsiveness of extension systems.

Despite these contributions, several important gaps remain. Existing research has largely examined attitudes, access, and barriers as separate areas of inquiry, resulting in a fragmented understanding of women's experiences with extension services. Limited attention has been given to examining how these dimensions interact and collectively influence participation and service utilisation. Furthermore, while numerous studies have documented barriers to women's access, relatively few have systematically compared men's and women's perceptions across multiple dimensions of access. Evidence from Nepal, particularly within paddy seed production systems, also remains scarce. Consequently, there is a need for a more integrated assessment that simultaneously examines attitudes, multidimensional perceptions of access, and barriers to participation within a unified analytical framework. The present study addresses this gap by combining these dimensions to provide a more comprehensive understanding of gendered experiences of agricultural extension services among paddy seed growers in Nepal.

2.6 Theoretical Review

This study is guided by two complementary theoretical perspectives: Social Role Theory (Eagly, 1987) and Penchansky and Thomas's Theory of Access (1981). Social Role Theory explains how socially constructed gender roles influence attitudes, behaviours, decision-making authority, and participation in agricultural activities, whereas the Theory of Access focuses on the institutional and service-delivery factors that shape access to services. Together, these frameworks provide a conceptual foundation for examining gender differences in attitudes, perceptions, and barriers related to agricultural extension services.

2.6.1 Social Role Theory (Eagly, 1987)

Social Role Theory argues that gender-linked social expectations decide how people behave, what they value, and how roles get handed out in society, where men end up as the main agricultural decision holders, while women get pulled into home tasks, with only very little personal authority (Eagly, 1987; Meizen-Dick et al., 2011). In agricultural extension settings, this perspective would suggest that when women and men show gaps in access, it's not so much that someone is less willing or less able, but more that deep, built-in constraints are doing the pushing—like reduced movement, time poverty, and being cut off from information exchange channels.

Within the context of agricultural extension, Social Role Theory suggests that women's participation is often constrained by socially assigned responsibilities and unequal access to resources rather than by a lack of interest in extension services. Consequently, observed gender differences in attitudes and participation are interpreted as outcomes of broader social and cultural structures

This theory really serves as the backbone for Objectives 1 and 3. For Objective 1, it basically led to the idea that women paddy seed growers could actually have similarly positive attitudes toward extension services, but still stay locked into constraints that prevent those attitudes from turning into real participation, so the focus becomes the role-based structures themselves, not individual dispositions, as the main engine behind the gender gap. For Objective 3, the framework shaped which barrier variables were chosen and how they were ranked, for instance, time availability, mobility limitations, who makes household decisions, and whether people can tap into knowledge networks. In this framing, those issues are treated as expressions of socially mandated role setups, not as personal shortcomings. The results that relate to barriers are therefore read through that lens.

Therefore, Social Role Theory provides the conceptual basis for interpreting gender differences in attitudes towards extension services and understanding the socio-cultural barriers influencing women's participation.

2.6.2 Penchansky and Thomas's Theory of Access (1981)

Penchansky and Thomas (1981) look at access as a kind of multidimensional thing, made up of five linked dimensions, availability (how enough services are compared to need), accessibility (how close services are to users), accommodation (how well organizations adjust to people's circumstances), affordability (what it costs compared with what households can manage) and acceptability (how culturally or socially compatible providers and users are). In a way, this framework is what made Objective 2 work, because it gave the conceptual grounding for taking gendered access and measuring it, and then comparing it among paddy seed growers across each part of the system.

Then each dimension got turned into variables that could be observed or counted: availability using the frequency of extension visits; accessibility using distance and travel time to reach extension offices; accommodation judged by how responsive agents are to women's schedules and their farming responsibilities; affordability using both direct and indirect participation costs; and acceptability through how people judge the cultural appropriateness, including whether the extension agent is a man or a woman, plus whether the info feels relevant. This whole operational approach then shaped the hypotheses and the tools at the same time—like expecting that women would score acceptability and accommodation noticeably lower than men, which fits with the well-known obstacles linked to extension workforces that are mostly men, and to delivery that doesn't flex around users' realities. It also informed the survey design, plus the gender-disaggregated comparative analysis.

The multidimensional nature of this framework enables the identification of specific aspects of service delivery that may contribute to gender disparities in extension access. Rather than treating access as a simple binary condition, the framework allows for a more detailed assessment of where inequalities occur and how they may influence service utilisation.

Thinking about access as something dimensional, not simply yes-or-no, helps pinpoint exactly which features of service delivery keep reinforcing gender gaps among paddy seed growers, and that matters a lot for how programs and policy can respond in a more targeted manner.

Therefore, the Theory of Access provides the analytical framework for examining gender differences across the five dimensions of access and for assessing the institutional factors influencing extension service utilisation.

3 MATERIALS AND METHODS

3.1 Study Area

This study was conducted in Chandrapur Municipality, Rautahat district, Madhesh Province, located in the Terai lowlands of southern Nepal. Rautahat is one of the country's prominent rice-producing districts, accounting for approximately 4.08% of Nepal's total harvested rice area and ranked 13th nationally (Sapkota et al., 2021).

The district was selected purposively for three reasons. First, Rautahat falls within the Prime Minister Agriculture Modernization Project (PMAMP) Paddy Seed Zone, where paddy seed production is supported through specialised extension services, farmer training, input support, and technology dissemination programs. This provides an appropriate institutional setting for examining farmers' access to and perceptions of agricultural extension services. Second, the district represents an area where the feminisation of agriculture has increased due to male out-migration, with women assuming greater responsibility for agricultural production and farm management. As a result, understanding gender differences in extension service utilisation has important practical and policy relevance. Third, the district contains a large population of registered paddy seed growers operating under a common extension framework, providing an opportunity to systematically compare men's and women's attitudes, perceptions, and barriers related to extension services.

Chandrapur Municipality was randomly selected from the PMAMP operational area, and the study site is shown in Fig. 1.

3.2 Research Philosophy and Design

This study adopted a convergent parallel mixed-methods design grounded in post-positivist and interpretivist philosophy. Quantitative and qualitative data were collected concurrently, analysed independently, and merged for triangulation (Creswell, 2014) – balancing statistical generalizability with contextual depth to explain gender differences in extension access.

3.3 Sampling Procedure

The PMAMP paddy seed zone in Ward 9 was purposively selected for its established extension infrastructure. The sampling frame comprised 845 active paddy seed producers across four PMAMP-registered farmer groups. Using Yamane's (1967) formula:

$$n = N / (1 + N(e)^2)$$

with $N = 845$ and $e = 0.05$, a sample of 265 was derived. Simple random sampling was applied separately to men and women farmer lists, yielding 150 men and 115 women proportional to the population's gender composition.

3.4 Questionnaire Development and Measurement

A structured questionnaire was developed through item generation, expert review, and pre-testing, and organized around three measurement domains. To capture farmers' attitudes toward extension services, 10 Likert-scale items were used (1 = Strongly Disagree to 5 = Strongly Agree), covering their dispositions toward extension programs, perceptions of agent competence, and the relevance of information received. Access perceptions were then examined across five dimensions adapted from Penchansky and Thomas's (1981) framework – availability, accessibility, affordability, accommodation, and acceptability – with four items assigned to each, totalling 20 items. Availability captured visit frequency and sufficiency; accessibility assessed geographic proximity; affordability measured participation costs; accommodation examined scheduling responsiveness to farmers' constraints; and acceptability assessed cultural appropriateness, including agent gender and content relevance. Barrier prioritization was measured through 11 items ranked by respondents from 1 (most significant) to 11 (least significant) for Garrett's Ranking analysis.

3.5 Validity, Reliability, and Pre-testing

Content validity was established through review by five subject matter specialists in agricultural extension, gender studies, and rural sociology. Reliability was assessed using Cronbach's alpha in SPSS version 27, with all three scales surpassing the 0.70 threshold recommended for social science research (Nunnally, 1978). Pre-testing was carried out with 27 respondents – 14 men and 13 women – who were excluded from the final sample, and item wording was revised where necessary before full data collection began. Four FGDs were held with 28 farmers – 14 men and 14 women – grouped separately by gender. The decision to segregate groups was deliberate, since mixed-gender settings tend to discourage women from speaking candidly. Single-gender groupings created a more comfortable environment for open discussion, with each session lasting between 60 and 90 minutes.

3.6 Qualitative Data Collection

Ten Key Informant Interviews (KIIs) were conducted with purposively selected informants – including PMAMP officials, municipal agricultural officers, and local development staff – using a semi-structured guide covering extension implementation, gender disparities, and institutional constraints. Interviews lasted 45–60 minutes and were audio-recorded with informed consent.

3.7 Data Analysis

Quantitative data was analysed using SPSS version 27 and Microsoft Excel. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarise respondents' socio-economic characteristics and survey responses. Gender differences in attitudes towards extension services and perceptions of access were assessed using the Mann–Whitney U test, as the data were measured on ordinal Likert scales and did not satisfy the assumption of

normality. Statistical significance was assessed at $p < 0.05$. Garrett’s Ranking Technique (Garrett, 1953) was employed to identify and prioritise barriers to women’s access to extension services. Qualitative data obtained from FGDs and KIIs were analyzed using thematic analysis following Braun and Clarke’s (2022) framework. Themes were developed inductively and aligned with the study objectives. Quantitative and qualitative findings were subsequently integrated through a convergent mixed-methods approach to provide a comprehensive understanding of gender differences in attitudes, perceptions, and barriers related to agricultural extension services.

4. RESULTS

4.1 Sample Characteristics

Of the 265 respondents, 150 were men (56.6%), and 115 were women (43.4%).

4.2 Gender Differences in Attitudes Toward Extension Services

The Mann-Whitney U test revealed a statistically significant difference in attitudes between men and women ($U = 7355.0$, $Z = -2.097$, $p = .036$). Women recorded a higher mean rank (144.04) than men (124.53), indicating that women held more favorable attitudes toward extension services (Table 1).

Table 1 Gender differences in attitudes toward extension services among paddy seed growers, Rautahat district, 2024.						
Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	p
Men	150	124.53	18680.0	7355.0	-2.097	.036*
Women	115	144.04	16565.0			
Total	265					
*p < .05						

Table 1 Distribution of respondents based on the education level in Rautahat district, 2024			
Education Level	Men (%)	Women (%)	Total (%)
Primary	8.42	13.45	21.87
Secondary	33.41	17.22	50.63
Higher Secondary	16	11.5	27.5

4.3 Gender Differences in Perceptions of Access to Extension Services

Statistically significant gender differences emerged across all five dimensions of access ($p < .001$) (Table 2). On availability, accessibility, and acceptability, men recorded considerably higher mean ranks than women – 188.06 versus 61.18 ($U = 366.0$, $Z = -13.471$), 160.71 versus 96.85 ($U = 4468.0$, $Z = -6.871$), and 164.37 versus 92.08 ($U = 3919.0$, $Z = -8.007$) respectively – pointing to more favorable perceptions among men on these dimensions. The picture reversed on affordability and accommodation, where women returned notably higher mean ranks – 163.81 versus 109.38 ($U = 5082.0$, $Z = -6.618$) and 179.64 versus 97.24 ($U = 3261.5$, $Z = -9.037$) – reflecting greater perceived constraints among women in these areas. The widest gap of all appeared on availability ($Z = -13.471$), with accommodation not far behind ($Z = -9.037$).

Table 2
Gender differences in perceptions of access to extension services across five dimensions, Rautahat district, 2024.

Dimension	Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	p
Accessibility	Man	150	160.71	24107.00	4468.000	-6.871	.000***
	Woman	115	96.85	11138.00			
Availability	Man	150	188.06	28209.00	366.000	-13.471	.000***
	Woman	115	61.18	7036.00			
Acceptability	Man	150	164.37	24656.00	3919.000	-8.007	.000***
	Woman	115	92.08	10589.00			
Affordability	Man	150	109.38	16407.00	5082.000	-6.618	.000***
	Woman	115	163.81	18838.00			
Accommodation	Man	150	97.24	14586.50	3261.500	-9.037	.000***
	Woman	115	179.64	20658.50			

Table 2
Distribution of respondents based on the type of farming in Rautahat district, 2024

Type of farming	Men (%)	Women (%)	Total (%)
Subsistence	0.5	0.9	1.4
Commercial	35.57	23.4	58.97
Mixed	18.49	21.14	39.63

***p < .001. Higher mean rank indicates more favorable perception on that dimension.

4.4 Difference in barriers faced by women in accessing extension services.

Percent positions for each rank position were calculated using the formula $PP = [100(R_{ij} - 0.5)] / N_j$, where $N_j = 11$, and converted to Garrett scores using the standardized conversion table (Table 3). Rank positions ranged from a percent position of 4.5 (Rank 1) to 95.4 (Rank 11), corresponding to Garrett scores of 83 and 17 respectively, reflecting a monotonically decreasing score distribution in which higher-ranked barriers (assigned lower rank numbers) receive progressively greater weight in the final Garrett score calculation.

Table 3
Percent position and Garrett values for barrier ranking of
women farmers in Rautahat district, 2024

S.N.	$100(R_{ij} - 0.5)/N_j$	Calculated value	Garret value
1	$100(1-0.5)/11$	4.5	83
2	$100(2-0.5)/11$	13.6	72
3	$100(3-0.5)/11$	22.7	65
4	$100(4-0.5)/11$	31.8	59
5	$100(5-0.5)/11$	40.9	55
6	$100(6-0.5)/11$	50	50
7	$100(7-0.5)/11$	59.1	45
8	$100(8-0.5)/11$	68.2	41
9	$100(9-0.5)/11$	77.3	35
10	$100(10 - 0.5)/11$	86.4	28
11	$100(11 - 0.5)/11$	95.4	17

Table 3
Distribution of respondents based on farming experience and land
allocation in Rautahat district

Variables	Mean	Standard deviation
Years of paddy seed production (Years)	3.53	2.22
Area of paddy seed production (Hectare)	0.44	0.19
Farming Experience (Years)	13.6	6.24

Men's perceptions

Men identified limited decision-making power (927.73; Rank I), household workload (925.1; Rank II), and language barriers (906.1; Rank III) as the three most significant barriers to women's extension access, followed by safety concerns (870.73; Rank IV) and socio-cultural barriers (833.6; Rank V). Financial limitations (362.45; Rank XI) and inadequate service customization for women (411.6; Rank X) were considered least significant.

Women's perceptions

Women identified lack of women extension workers (603.1; Rank I), financial limitations (592.1; Rank II), and limited access to information and resources (576.6; Rank III) as the most significant barriers, followed by household workload (575.5; Rank IV) and limited decision-making power (571.73; Rank V). Inadequate service customization for women (336.6; Rank XI) and safety concerns (419.45; Rank X) were considered least significant.

Gender divergence

A notable gap exists between men's and women's prioritization of barriers. Men emphasized structural and sociocultural constraints – particularly language barriers and safety concerns – while women prioritized institutional supply-side barriers, notably the lack of women extension workers and financial limitations. The starkest divergence concerned financial limitations, ranked 11th by men but 2nd by women.

Table 4
Garrett ranking of barriers to women's access to extension services, Rautahat district, 2024.

Barriers	Ranks given by men respondents											Total	Average	Rank
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th			
Socio-cultural barriers	22	19	5	24	47	33	0	0	0	0	0	9170	833.6	V
Limited mobility	0	0	0	0	33	16	45	37	0	19	0	6689	608.1	VII
Time and workload constraints	0	22	19	5	5	50	33	16	0	0	0	8030	730	VI
Limited access to information and resources	0	0	0	0	0	0	0	59	20	55	16	4931	448.27	IX
Financial limitations	0	0	0	0	0	0	0	0	56	39	55	3987	362.45	XI
Language barriers	24	10	76	35	0	5	0	0	0	0	0	9967	906.1	III
Limited decision-making power	37	43	10	22	38	0	0	0	0	0	0	10205	927.73	I
Lack of women extension workers	0	0	0	0	0	0	56	5	33	37	19	5239	476.3	VIII
Safety concerns	24	0	40	64	22	0	0	0	0	0	0	9578	870.73	IV
Household workload	43	56	0	0	5	46	0	0	0	0	0	10176	925.1	II
Inadequate service customization for women	0	0	0	0	0	0	16	33	41	0	60	4528	411.6	X

Barriers	Ranks given by women respondents											Total	Average	Rank
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th			
Socio-cultural barriers	23	0	0	1	0	25	22	0	24	20	0	5076	461.5	IX
Limited mobility	20	1	24	0	0	11	20	1	2	40	0	5973	543	VI
Time and workload constraints	7	1	19	1	0	53	11	0	24	0	0	5932	539.3	VII
Limited access to information and resources	24	0	6	0	0	20	23	1	41	0	0	6343	576.6	III
Financial limitations	31	10	6	1	0	1	39	0	22	7	0	6513	592.1	II
Language barriers	10	1	50	0	0	5	0	0	2	46	0	5760	523.6	VIII
Limited decision-making power	0	45	10	0	0	0	0	57	0	1	2	6289	571.73	V
Lack of women extension workers	0	37	0	60	1	0	0	5	0	0	10	6634	603.1	I
Safety concerns	0	1	0	20	41	0	0	10	0	0	41	4614	419.45	X
Household workload	0	19	0	32	39	0	0	22	0	1	0	6331	575.5	IV
Inadequate service customization for women	0	0	0	0	34	0	0	19	0	0	62	3703	336.6	XI

5. Discussion

The finding that women held significantly more favorable attitudes toward extension services than men (Table 2) presents a theoretically important paradox that challenges individual-level explanations for gender gaps in extension utilization. If women's limited engagement were attributable to disinterest or negative dispositions, one would expect them to report less favorable attitudes than men. The opposite pattern women expressing stronger attitudinal support yet facing greater structural barriers is consistent with Social Role Theory (Eagly, 1987), which holds that role-based structural constraints rather than attitudinal deficits drive women's constrained access. This finding corroborates Deka et al. (2018), who similarly found that women in India held favorable attitudes toward extension in principle while rating services as less useful in practice. This paradox is not unique to Nepal. Earp (2025), studying gender-targeted farmer training in Northern Laos, found that women's engagement was significantly constrained by domestic responsibilities: 51.5% of women participants brought children to training sessions compared to only 12.1% of men, demonstrating that positive attitudes do not automatically translate into participation when caregiving burdens remain unaddressed. One plausible interpretation is that women's positive attitudes reflect unmet demand rather than satisfaction; however, this study did not directly measure satisfaction, so this remains speculative with existing services. Nyberg et al. (2025), synthesizing evidence from 111 studies, concluded that focusing on women's attitudes or basic education is insufficient if interventions do not simultaneously address gendered power dynamics and intra-household relations. These findings are consistent with the view that attitudinal measures alone

are insufficient proxies for extension engagement and that structural conditions, not women's dispositions, constitute the primary mechanism through which gender inequality in extension access is reproduced.

The pattern of gender differences across the five Penchansky–Thomas dimensions (Table 3) reveals a nuanced picture that moves beyond the binary framing of access as something women simply "have" or "lack." Men reported significantly more favorable perceptions on availability, accessibility, and acceptability, while women reported significantly more favorable perceptions on affordability and accommodation, reflecting the gendered architecture of extension delivery in the study context rather than uniform disadvantage across all dimensions. The most pronounced disparity on availability ($Z = -13.471$) indicates that women perceive a fundamental deficit in the frequency of extension services reaching them, consistent with FAO (2019) evidence that women in Nepal's Terai region receive substantially fewer extension contacts than men despite comprising the majority of the agricultural workforce. This is further explained by Lamontagne-Godwin et al. (2018), who documented that extension agents in similar contexts systematically prioritize men-headed households, rendering women's agricultural roles structurally invisible to advisory systems. The significant gender gap in acceptability ($Z = -8.007$) reflects the well-documented barrier posed by male-dominated extension workforces in sociocultural contexts where women's interaction with unrelated men is constrained by cultural and religious norms (FAO, 2011; Maulida et al., 2025). That women rated acceptability significantly lower than men suggests that cultural compatibility, not merely physical proximity, may be an important factor in the Terai context. Conversely, women's more favorable perceptions of affordability and accommodation warrant careful interpretation. These findings do not indicate that women face fewer economic constraints; rather, they may reflect that group-based extension modalities prevalent in the PMAMP reduce individual participation costs, or that women evaluate affordability relative to their already-constrained economic circumstances. The counterintuitive finding on accommodation that women perceive extension scheduling as more responsive to their needs than men may reflect that PMAMP's targeted outreach has partially addressed scheduling constraints in this specific institutional context, or may constitute a response artifact of the inverted scoring applied in the perception scale, warranting further qualitative investigation. Taken together, these dimensional findings support Sen et al.'s (2025) argument that accommodation and acceptability are the most consequential yet neglected aspects of gendered extension access, and extend Silvert et al.'s (2025) critique that most extension programs address access superficially without engaging with the specific dimensional constraints that most bind women.

The divergence between men's and women's barrier prioritization (Table 4) is perhaps the most telling finding of this study. It reveals that the two groups hold quite different understandings of what most constrains women's extension access and that difference matters for how barrier assessments are designed and whose voices shape program decisions. Women's prioritization of the lack of women extension workers (Rank I) suggests that they experience their exclusion not primarily as a product of intra-household power dynamics as men's rankings imply but as a direct institutional failure on the supply side. This finding resonates with recent evidence from across South Asia: Bahubalendra et al. (2025), working with tribal farm women in Odisha using the same Garrett ranking methodology, identified the absence of women-friendly extension infrastructure as a critical constraint, while Adithyan et al. (2025) found that limited training opportunities and the lack of local mentorship ranked as the most pressing barriers among women farmers in Kerala. That similar patterns emerge across such different contexts points to something deeper: a broader regional dynamic in which women's access to agricultural services is persistently held back by overlapping educational, economic, and institutional disadvantages. Men's prioritization of limited decision-making power (Rank I) and household workload (Rank II), by contrast, reflects an externally observed account of women's constraints, one corroborated by Balayar and Mazur (2022), who found that patriarchal norms systematically restrict women's agricultural decision-making authority. Where men's and women's rankings converge on household workload and decision-making power, there may be enough shared recognition to build a basis for joint advocacy. Where they diverge sharply, particularly on supply-side institutional barriers, this pattern strengthens the case for gender-disaggregated assessments in future extension needs analyses.

Table 4

Distribution of respondents based on the socioeconomic and participatory characteristics in Rautahat district

Variables		Description of Variables	Percentage
Ethnicity of respondents	Brahmin	Men	22.66
		Women	19.3
	Chhetri	Men	13.36
		Women	8.01
	Janajati	Men	1.7
		Women	4.89
	Madhesi	Men	15.75
		Women	14.33
Income in lakhs of respondents (Rs.)	0–5	Men	7.17
		Women	8.67
	5–10	Men	19.78
		Women	20.15
	10–15	Men	27.56
		Women	16.67
Age of respondents	Economically active population	Men	53.56
		Women	44.16
	Economically inactive population	Men	1.38
		Women	0.9
Frequency of participation in meetings of respondents	Whenever conducted	Men	23.44
		Women	8.22
	Sometimes	Men	26.59
		Women	20.18
	Never	Men	6.08
		Women	15.49

Table 5

Gender differences in attitudes toward extension services among paddy seed growers, Rautahat district, 2024.

Gender	N	Mean Rank	Median (IQR)	Mann-Whitney U	Z	p	Effect Size(r)
Men	150	124.53	2.73 (2.64–2.91)	7355.0	-2.097	.036*	-0.13
Women	115	144.04	2.82 (2.64–3.00)				
Total	265						
*p < .05							

Table 6

Gender differences in perceptions of access to extension services across five dimensions, Rautahat district, 2024.

Dimension	Gender	N	Mean Rank	Median (IQR)	Mann-Whitney U	Z	p	Effect Size (r)
Accessibility	Men	150	160.71	3.00(2.75–3.25)	4468.000	-6.871	.000***	-0.42
	Women	115	96.85	3.00(2.75–3.25)				
Availability	Men	150	188.06	3.75(3.25-4.00)	366.000	-13.471	.000***	-0.83
	Women	115	61.18	2.25(2.00-2.50)				
Acceptability	Men	150	164.37	3.00(3.00-3.25)	3919.000	-8.007	.000***	-0.49
	Women	115	92.08	2.75(2.50–3.25)				
Affordability	Men	150	109.38	1.50(1.00-1.50)	5082.000	-6.618	.000***	-0.41
	Women	115	163.81	1.50(1.50-2.00)				
Accommodation	Men	150	97.24	3.00(3.00-3.25)	3261.500	-9.037	.000***	-0.56
	Women	115	179.64	2.75(2.75-3.00)				
***p < .001. Higher mean rank indicates more favorable perception on that dimension. Effect size r = Z/√N, where N = 265 (Cohen's guidelines: r ≈ 0.1 small, 0.3 medium, 0.5 large).								

Table 7

Percent position and Garrett values for barrier ranking of women farmers in Rautahat district, 2024

S.N.	$100(R_{ij} - 0.5)/N_j$	Calculated value	Garrett value
1	$100(1-0.5)/11$	4.5	83
2	$100(2-0.5)/11$	13.6	72
3	$100(3-0.5)/11$	22.7	65
4	$100(4-0.5)/11$	31.8	59
5	$100(5-0.5)/11$	40.9	55
6	$100(6-0.5)/11$	50	50
7	$100(7-0.5)/11$	59.1	45
8	$100(8-0.5)/11$	68.2	41
9	$100(9-0.5)/11$	77.3	35
10	$100(10 - 0.5)/11$	86.4	28
11	$100(11 - 0.5)/11$	95.4	17

Table 8
Garrett ranking of barriers to women's access to extension services by gender, Rautahat district, 2024

Barriers	Men: Garrett Score	Men: Garrett Score	Women: Garrett Score	Women: Garrett Score
Socio-cultural barriers	833.6	V	461.5	IX
Limited mobility	608.1	VII	543	VI
Time and workload constraints	730	VI	539.3	VII
Limited access to information and resources	448.27	IX	576.6	III
Financial limitations	362.45	XI	592.1	II
Language barriers	906.1	III	523.6	VIII
Limited decision-making power	927.73	I	571.73	V
Lack of women extension workers	476.3	VIII	603.1	I
Safety concerns	870.73	IV	419.45	X
Household workload	925.1	II	575.5	IV
Inadequate service customization for women	411.6	X	336.6	XI

These findings collectively indicate that extension services in Rautahat currently operate at best at the 'reaching' level of the RBET framework (Johnson et al., 2018), consistent with how Silvert et al. (2025) apply the same framework to smallholder agricultural commercialization, with insufficient attention to empowerment or structural transformation. Achieving gender equity in extension requires multidimensional, gender-transformative interventions that simultaneously address supply-side institutional failures and demand-side structural constraints. The findings have important practical and policy implications for agricultural extension systems in Nepal and other developing countries experiencing the feminisation of agriculture. The results suggest that improving gender equity requires more than simply increasing the availability of extension services. Rather, extension programs need to address the specific institutional, socio-cultural, and economic barriers that limit women's effective participation and utilisation of services.

Lecoutere et al. (2023) found that peer-learning approaches combined with targeted training significantly improved both men's and women's extension access in Uganda, suggesting that similar modalities delivered by women agents at times accommodating women's schedules would be more effective than generic information dissemination in Rautahat. Maulida et al. (2025) caution that hiring more women agents is insufficient without organizational culture reform, while FAO (2025) emphasizes that digital extension risks widening gender gaps unless deliberately designed with gender-responsive features. Based on these findings, four interventions are recommended: deliberate recruitment and deployment of women extension agents; integration of women-accessible credit mechanisms with extension messaging; gender-transformative approaches engaging both men and women in renegotiating household decision-making dynamics; and systematic accommodation strategies including flexible scheduling and childcare provision (Sen et al., 2025).

Collectively, these interventions would help address both the institutional barriers identified through the multidimensional access framework and the socio-cultural constraints highlighted by Social Role Theory. By targeting the specific barriers prioritised by women farmers themselves, extension systems can move beyond simply reaching women towards promoting meaningful participation, empowerment, and more equitable agricultural development outcomes.

These recommendations are grounded in gender-disaggregated, empirically derived barrier prioritization and are therefore more targeted than generic programmatic responses to gender gaps in extension access.

6. Limitations and Suggestions for Future Research

This study is subject to several limitations. First, the cross-sectional design limits causal inference; the observed association between women's more favorable attitudes and their constrained structural access should not be interpreted as evidence of a causal pathway between the two. Second, reliance on self-reported data may introduce recall and social desirability bias, particularly for questions on satisfaction with government service providers. Third, the Garrett ranking technique used to rank barriers (Table 4) captures respondents' perceived feelings rather than the objectively measured frequency or severity of each barrier, and rankings may be sensitive to the specific list of barriers presented. Fourth, the focus on a single district (Rautahat) limits the generalisability of findings to other districts of Nepal with different extension delivery structures. Finally, variables such as caste, ethnicity, land holdings, and household structure were not examined in detail despite their likely intersection with gender in shaping women's experiences of extension services. Future studies should follow longitudinal and multi-location designs, incorporate an intersectional perspective disaggregating results by caste and ethnicity, and consider triangulating self-reported perceptions with objective indicators of extension contact frequency.

7. Conclusion

This study demonstrates that gender significantly shapes attitudes, perceptions, and access to agricultural extension services among paddy seed growers in Nepal. Women exhibited more positive attitudes toward extension services than men, despite facing substantially greater constraints in accessing them. Significant gender differences were observed across the five dimensions of access, with women reporting lower availability, accessibility, and acceptability of services, while rating affordability and accommodation more positively. The findings also reveal important differences in how barriers are perceived. Women identified the lack of women extension workers and financial limitations as the most significant constraints, whereas men considered limited decision-making power and household workload to be the primary barriers affecting women's participation.

These findings support both Penchansky and Thomas's Theory of Access and Social Role Theory, highlighting that access to extension services is multidimensional and strongly influenced by gendered social norms and institutional arrangements. The study contributes to the literature by moving beyond conventional measures of extension access to examine how attitudes, perceptions, and perceived barriers collectively shape extension outcomes.

The results suggest that improving gender equity in agricultural extension requires more than increasing service availability. Extension systems should adopt gender-responsive approaches, including greater recruitment of women extension workers, targeted financial inclusion initiatives, flexible and locally appropriate service delivery mechanisms, and interventions that address socio-cultural barriers limiting women's participation and decision-making authority. Such efforts are essential not only for promoting gender equality but also for enhancing agricultural productivity, strengthening rural livelihoods, and supporting inclusive agricultural development in Nepal and other developing-country contexts experiencing the feminisation of agriculture.

Declarations

8.2 Ethics Approval and Consent to Participate

Human Research Ethics approval was waived by Tribhuvan University before data collection. Each participant was briefed through a Participant Information Sheet covering the study's purpose, expected time commitment, potential risks, and their rights. Verbal informed consent was obtained before participation began, and involvement was entirely voluntary; participants were free to withdraw at any point without consequence. All responses were anonymised, personal identifiers removed before analysis, and data stored on password-protected systems accessible only to the research team.

8.4 Clinical Trial Number

Not applicable.

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This research was carried out without any external funding.

Author Contribution

Author Contributions: Sandeep Timalsina: Conceptualization, Formal Analysis, Investigation, Methodology, Resources, Supervision, Writing – original draft, Writing – review & editing Rajesh Paudel: Conceptualization, Supervision, Visualization, Writing – review & editing Milan Subedi: Conceptualization, Data curation, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing Hari Krishna Panta: Data curation, Formal Analysis, Writing – review & editing Jay Chaurasia: Methodology, Writing – review & editing Prof. Tek Narayan Maraseni: Writing – review & editing Deepshikha Adhikari: Writing – review & editing

Data Availability

The data supporting the findings of this study were collected through primary fieldwork conducted among paddy seed growers in Rautahat District, Nepal. The quantitative survey data and qualitative interview and focus group transcripts are not publicly available due to participant confidentiality commitments made at the time of data collection.

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Figures

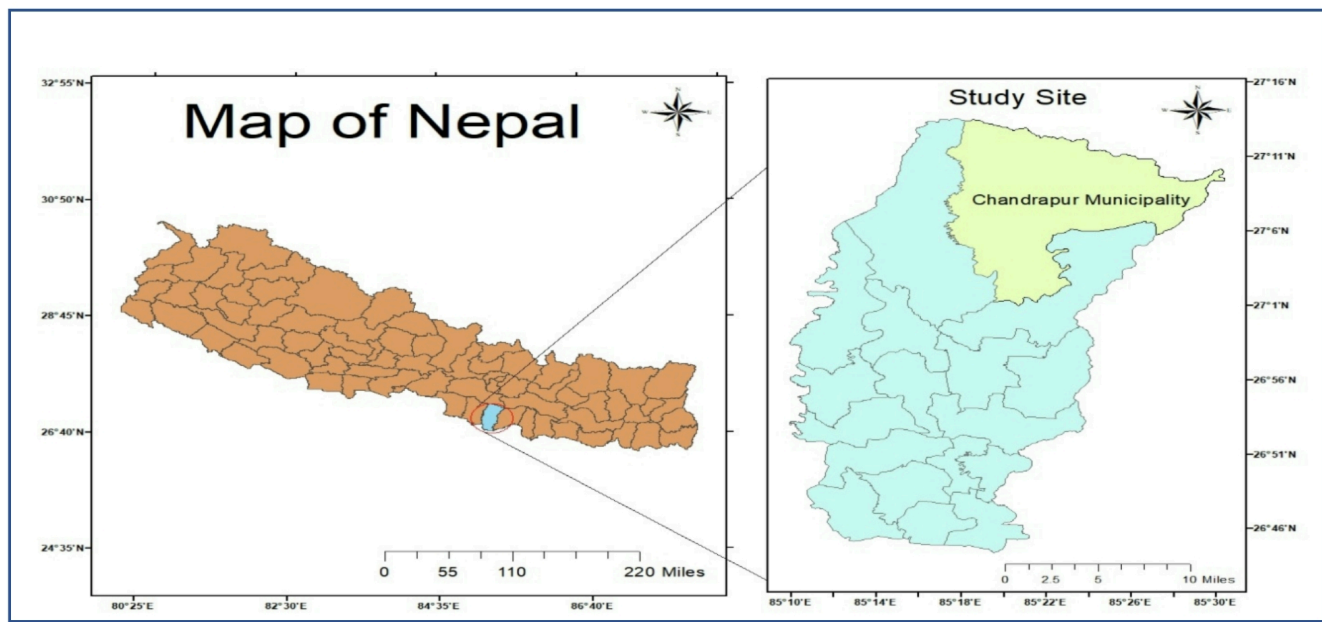


Figure 1

Location of the study site

Supplementary Files

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- [Table.docx](#)
- [QuestionnaireGenderExtensionPaddySeed.docx](#)