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# CLIMATE CHANGE AND GENDER ROLES IN RURAL COMMUNITIES A STUDY IN MUZAFFARGARH

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## ABSTRACT

*Climate change is increasingly disrupting rural livelihoods and reinforcing existing gender inequalities, particularly in vulnerable regions. This study investigates the gender-specific impacts of climate change on rural communities in Muzaffargarh District, Pakistan—an area frequently exposed to extreme weather events such as floods, droughts, and heatwaves. Using a mixed-methods approach, data were collected from 110 respondents (55 men and 55 women) through structured questionnaires, focus group discussions, and key informant interviews. Findings reveal significant gender disparities in land ownership, decision-making power, CSA awareness, and institutional access. Only 18% of women owned agricultural land, compared to 82% of men, limiting their capacity to access credit and adopt CSA practices. Women also reported lower confidence in adapting to climate change and relied more on informal coping strategies, such as unpaid labor and community support, while men tended to migrate or mechanize operations. Despite these challenges, 76% of respondents expressed willingness to adopt CSA practices if adequate financial or technical support were provided. However, preferred support mechanisms varied: women prioritized training and input provision, while men favored mechanization and market access. The study also found that institutional support was insufficient, especially for women, due to limited outreach by extension services and a lack of gender-sensitive programming. This research underscores the need for climate adaptation policies that are both gender-inclusive and context-specific. It recommends targeted interventions such as female-focused extension services, accessible financial tools, and gender disaggregated planning to enhance equitable climate resilience in rural Pakistan.*

***Keywords:*** *Climate change, Flood, Indus River, Agriculture, Livestock*

## INTRODUCTION

Climate change is among the greatest challenges facing the globe during the twenty-first century. Its repercussions extend to ecosystems, livelihood systems, and social structures (Sahoo et al., 2023). Gender cannot be separated from climate change; it intersects with the existing social, economic, and cultural inequalities, making certain sections of society vulnerable women in particular-more susceptible to climate-induced damages (Prakash et al., 2024). These climate-induced consequences are being felt very acutely in developing countries like Pakistan, where agriculture and natural resources are the primary source of rural livelihoods, especially by marginalized communities and communities depending on resources (Habib et al., 2022).

Pakistan is among the countries worst hit by the extreme climate events that have included floods, droughts, heatwaves, and erratic rain patterns (Hussain et al., 2023). Among these, the southern Punjab region, especially Muzaffargarh District, has been prone over time to flooding by

the Indus River, heat stress, and scarcity of water, causing interruptions in agricultural production and food security (Khalid et al., 2024). These environmental changes create cascades for rural households, changing labor demands, economic burdens, and mechanisms to cope. Within these communities, gender roles - the responsibilities and expectations assigned to men and women-as socially constructed-are directly fashioned and refashioned by the pressure exerted through climate change (Lau et al., 2021).

Women in rural Muzaffargarh are key workers in household management, subsistence farming, livestock keeping, and caregiving (Nosheen et al., 2023). However, there is hardly ever a situation in which they could full enjoyment of formal education, land ownership, financial resources, and participation in decision-making processes, all of which hamper their adaptive capacity (Walker et al., 2022). Climate-associated changes add extra burdens to them, bringing other safety-and-health-related risks and aggravating existing inequalities (Smith et al., 2022). Whereas men are coping with pressures of migration, income instability, and changes in agriculture, the power dynamics surrounding gender are shifting (Leder, 2022). Understanding how climate stress shapes contesting notions of gender will be critical in the quest for equitable adaptation strategies and sustainable rural development-related policies.

Although there is an increasing interest in the gendered consequences of climate change globally, very little empirical work has been done on the gender–climate change nexus at the local level and more so in vulnerable districts like Muzaffargarh, Pakistan. Existing studies tend to ignore the ways in which climate change hammers the everyday chores, resource accessibility, social power relations, and coping strategies of men and women with time. Continuing gendered inquiry into the local socio-cultural context is sorely needed for better informed, more inclusive, and gender-sensitive climate adaptation and mitigation.

This study aims to fill this knowledge gap by exploring how climate change is influencing gender roles in rural communities of Muzaffargarh District. It seeks to examine both the burdens and the agency of women and men in navigating climate-related challenges, providing insights that can guide policymakers, NGOs, and development practitioners in crafting gender responsive interventions. By focusing on local perspectives and lived experiences, the research contributes to a more grounded understanding of how climate change is reshaping social structures and gender relations in one of Pakistan's most climate-vulnerable regions.

This research aimed to examine how climate change impacts traditional gender roles in rural communities of Muzaffargarh District, focusing on changes in household responsibilities, agricultural labor, and income-generating activities. To assess gender-specific vulnerabilities and risks faced by men and women due to climate-induced events such as floods, heatwaves, and droughts. To analyze the coping mechanisms and adaptive strategies employed by men and women in response to climate-related challenges, including shifts in livelihood practices and migration patterns. To explore gendered access to resources, information, and decision-making platforms related to climate change adaptation and disaster management in the study area. To provide policy recommendations for integrating gender perspectives into local climate change adaptation strategies and rural development programs in Muzaffargarh District.

## METHODOLOGY

### 1. Research Design

This study employed a mixed-methods research design, integrating both qualitative and quantitative approaches to gain a comprehensive understanding of the gendered impacts of climate change in rural communities of Muzaffargarh District, Punjab, Pakistan. The combination of methods allowed for triangulation of findings and offered a nuanced view of how gender roles, livelihood practices, and coping strategies were shaped by climate variability and institutional responses.

### 2. Study Area

The research was conducted in Muzaffargarh District, a climate-vulnerable region in southern Punjab. The area was frequently affected by extreme weather events such as floods from the Indus River, droughts, and heatwaves. Several rural villages were purposively selected to

represent a diversity of socio-economic and ecological conditions.

### 3. Population and Sampling

The study population comprised adult male and female residents (aged 18 and above) who were involved in agriculture, livestock, and other rural livelihood activities. A stratified random sampling technique was employed to ensure gender balance and representation across different age groups and occupational categories. The final sample consisted of 110 respondents, evenly split between 55 men and 55 women.

### 4. Data Collection Methods

Primary data were collected using structured questionnaires, semi-structured interviews, focus group discussions (FGDs), and key informant interviews. The structured questionnaire captured demographic, socio-economic, and CSA-related variables. In-depth qualitative data were gathered through interviews with selected community members, NGO workers, local leaders, and government officials. Separate FGDs were conducted with male and female groups to explore perceptions, adaptive strategies, and barriers to CSA adoption. Participant observation was also used to document gender-divided labor and daily adaptation practices.

Secondary data were sourced from climate records (Pakistan Meteorological Department), disaster reports (NDMA), and gender-disaggregated statistics from the Pakistan Bureau of Statistics, along with relevant policy documents.

### 5. Data Analysis

Quantitative data were analyzed using SPSS, employing descriptive statistics such as frequencies, percentages, and cross-tabulations. Qualitative data were transcribed, translated where necessary, and analyzed thematically using manual coding matrices and NVivo software, identifying key themes related to gender roles, vulnerabilities, adaptation, and institutional responses.

### 6. Ethical Considerations

The study adhered to ethical standards by obtaining informed consent from all participants. Participants were assured of confidentiality, and their identities were anonymized. Given the cultural context, gender-sensitive field practices were employed, including the use of female enumerators to interview women and conducting sessions in culturally appropriate settings. Ethical approval was secured from the relevant Institutional Review Board prior to data collection.

### 7. Limitations

The study faced challenges such as cultural restrictions on women's participation in some conservative areas. This was mitigated by engaging local facilitators and employing female staff. In addition, access to real-time climate data was limited, which was addressed through triangulation with local reports and observational data. Reliance on self-reported information introduced potential biases, which were minimized through cross-verification during FGDs and interviews.

## RESULTS

This chapter presents the empirical findings of the study conducted in Muzaffargarh District, Punjab, to examine the gendered impacts of climate change on rural communities, with a particular focus on livelihoods, adaptation strategies, access to Climate-Smart Agriculture (CSA), and institutional support. The data is derived from 110 respondents (55 men and 55 women), comprising structured survey responses, focus group discussions, and key informant interviews.

### 1. Socioeconomic Characteristics of Respondents

Of the 110 respondents, 50% were female and 50% male, aged between 19 and 67 years, with an average age of 42. Approximately 74% were married, while 18% were single and the remainder widowed or divorced. Education levels varied: 38% of women had no formal education compared to 16% of men, while only 9% of all respondents held a bachelor's degree or higher. The majority (65%) reported farming as their primary income source, followed by livestock rearing (20%), labor (10%), and remittances (5%). Household sizes ranged from 3 to 12 members, with an average of 6. Annual household income showed significant gender disparity: only 14% of women-headed

households earned above PKR 400,000, compared to 41% of male-headed households.

**2. Farm Characteristics and Land Access**

The average landholding size was 3.8 acres, with men reporting significantly larger holdings (avg. 5.2 acres) than women (avg. 2.1 acres). Ownership status also differed: only 18% of women owned land, while 82% of men reported full or partial ownership. Mixed farming (crop + livestock) was the most practiced system (48%), followed by crop-only (35%) and livestockonly (17%). Key crops included wheat (82%), maize (56%), vegetables (34%), and fruits (29%). Only 12% reported cultivating pulses. Irrigation was primarily canal-based (52%), followed by tube well (31%), rain-fed (11%), and drip/sprinkler systems (6%).

**3. Awareness and Access to Climate-Smart Agriculture (CSA)**

Only 41% of respondents were familiar with the term "CSA", with awareness higher among men (56%) than women (26%). Key information sources included fellow farmers (48%), radio/TV (30%), extension officers (26%), and NGOs (22%). Only 15% of respondents (mostly men) had received formal agricultural training. Contact with agricultural extension services was limited: 62% reported rarely or never engaging with such services. Only 9% had weekly contact, while 17% had monthly visits.

**4. Perceived Barriers to CSA Adoption**

Qualitative data from FGDs further highlighted women's restricted mobility, lack of control over land, and exclusion from farmer groups as critical gender-specific barriers to CSA adoption.

**5. Climate Change Risk Perception**

A significant 83% of respondents believed that climate change is negatively affecting farming activities, with no major gender difference. Reported impacts included: Unpredictable rainfall (69%), prolonged droughts (56%), pest and disease outbreaks (44%) and soil degradation (29%). Confidence in adaptation was moderate: 37% felt "somewhat confident," 21% "very confident," and 42% "not confident." Notably, women expressed lower confidence levels and greater reliance on informal coping mechanisms, such as reducing food intake or increasing unpaid labor.

**6. Adaptive Strategies and Gendered Coping Mechanisms**

Men primarily reported strategies such as: Changing crop varieties, Increasing reliance on mechanization and Seasonal migration for wage labor. Women's coping strategies were more centered on: Adjusting food preparation and consumption, managing livestock care and relying on community networks and informal borrowing Qualitative interviews revealed that climate change has intensified women's time burden, especially in water collection, caregiving during heatwaves, and managing livestock during droughts. Shifting gender roles were observed, with some women taking on traditionally male farming tasks, especially in households where men migrated.

**7. Willingness to Adopt CSA and Support Needs**

If provided with financial or technical support: 76% of all respondents were willing to adopt CSA practices, Crop rotation (58%), drought-resistant varieties (51%), and organic farming (44%) were the most preferred practices. Preferred types of support included: Technical training (63%), Input support (55%), Equipment provision (48%), Cash subsidies (42%). Men preferred mechanization and market access, while women favored training and input provision, citing their limited control over cash and mobility.

**8. Institutional Support and Gender Access Gaps**

Only 31% of respondents felt adequately supported by local institutions. Women overwhelmingly reported exclusion from decision-making forums and agricultural trainings.

Although some NGOs have piloted CSA initiatives, most lacked a gender-specific focus.

## DISCUSSION

This study investigated the gendered impacts of climate change on rural communities in Muzaffargarh District, with a focus on Climate-Smart Agriculture (CSA) adoption, risk perception, and institutional support. The findings revealed significant gender disparities that shape adaptation outcomes. Land access and control emerged as a critical barrier. While 82% of men owned land, only 18% of women had ownership, limiting women's access to credit and extension services—consistent with findings by Habib et al. (2022) and Prakash et al. (2024). Land tenure security was closely linked to adaptive capacity and the willingness to adopt CSA practices. CSA awareness was low overall (41%) and significantly lower among women (26%). Most respondents relied on fellow farmers or media for information rather than institutional sources, echoing similar patterns found in Bangladesh and Nigeria (Ahmed et al., 2024; Akinkuolie et al., 2025). Barriers to CSA adoption included lack of training, high costs, and insufficient financial support. Women specifically faced gender-based constraints, such as restricted mobility and exclusion from decision-making—issues supported by studies from Zimbabwe and Kenya (Magwegwe et al., 2024; Walker et al., 2022). Despite challenges, 76% of respondents expressed willingness to adopt CSA, given technical or financial support. Women preferred input provision and hands-on training, while men favored mechanization and market access—indicating the need for gender-differentiated support models. Institutional support was rated as inadequate, especially by women. Limited access to female extension officers and the absence of gender-responsive programs reflect broader institutional gaps highlighted by Lau et al. (2021) and Zembe et al. (2023).

### Conclusion

This study highlights the gendered impacts of climate change on rural livelihoods in Muzaffargarh, Pakistan. Findings revealed that while both men and women face climate-related challenges, women experience heightened vulnerability due to limited land ownership, reduced access to information and finance, and increased unpaid labor responsibilities. Despite these constraints, women showed a strong willingness to adopt CSA practices when given appropriate support. The results emphasize the need for gender-responsive adaptation strategies that account for the differentiated needs and capacities of men and women. Enhancing women's access to land, training, and institutional support is crucial for building equitable resilience. Future climate policies should integrate gender-disaggregated data and promote inclusive extension services to ensure that adaptation efforts are effective and just.

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