

CHAPTER-21

ROLE OF WOMEN IN THE AGRICULTURAL SECTOR IN KASHMIR

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Cite this chapter as: Kachroo, M.M., M. Rashid, A. Bhat, A. Sultan, O.F. Khan & K. Gautam. Role of Women in the Agricultural Sector in Kashmir. In: Bhat, A., A. Sultan, D. Kolhe & P. Banerjee. 2026 Digital Agriculture and Economic Transformation. The AgEcon Frontiers, Faisalabad, Pakistan, pp: 294-302. <https://doi.org/10.66529/book.9786277945022.2026.ch21>

A Publication of The AgEcon Frontiers Received: 26-May-2026 Revised: 05-June-2026 Accepted: 07-June-2026

Abstract

This study highlights the critical yet undervalued role of women in Kashmir's agricultural sector, comprising nearly 30% of the workforce. Women engage in crop production and livestock management, significantly contributing to household income and food security. However, socio-cultural norms restrict their access to resources like land, credit, and training. Utilizing primary surveys, interviews, and secondary data, the research employs Cobb-Douglas and income regression models to quantify the impact of women's labor on productivity and income. Findings reveal that improving access to resources, education, and training boosts women's productivity and income. The study advocates gender-sensitive policies, capacity building, and addressing socio-cultural barriers to empower women, driving agricultural productivity, rural development, and socio-economic progress in Kashmir.

Keywords: Women's Empowerment, Agricultural Productivity, Gender Inequality, Socio-Cultural Barriers, Resource Access

1. Introduction

Agriculture is the backbone of Kashmir's economy, providing livelihoods to about 70% of the population, with women playing a crucial and multifaceted role in this sector. Women are deeply involved in various agricultural activities, from sowing and planting to harvesting and post-harvest processing. Despite their significant contributions, women's work is often unrecognized and undervalued, primarily categorized as unpaid family labor. According to the National Sample Survey Office (2019), women constitute nearly 30% of the agricultural workforce in Kashmir. However, traditional gender roles and socio-cultural norms significantly limit their access to resources such as land, credit, and formal agricultural training. Only a small fraction of women own land, and merely 25% have received any form of agricultural education, highlighting the gender disparity in resource ownership and knowledge acquisition. These socio-cultural barriers restrict women's mobility, participation in agricultural markets, and decision-making opportunities. Addressing these disparities through targeted interventions, capacity building, and policy support is essential for enhancing the productivity and empowerment of women in Kashmir's agricultural sector. Recognizing and valuing their contributions can lead to improved agricultural outcomes and significant socio-economic development in the region.

Objectives

1. To analyze the role of women in agricultural activities in Kashmir
2. To evaluate the socio-economic challenges faced by women in agriculture

3. To assess the impact of women's labor on agricultural productivity and household income
4. To identify strategies for empowering women in agriculture and
5. To recommend measures for addressing socio-cultural barriers

Hypotheses

1. **H1:** Women's labor in agriculture significantly contributes to household income and food security in Kashmir.
2. **H2:** Socio-cultural norms and gender disparities negatively affect women's access to agricultural resources and training in Kashmir.
3. **H3:** Improving women's access to land, education, and agricultural training will significantly enhance agricultural productivity and income levels.
4. **H4:** Addressing socio-cultural barriers and implementing gender-sensitive policies will empower women and lead to broader socio-economic development in Kashmir.

2. Literature Review

Historically, women in Kashmir have been integral to the agricultural sector, dating back centuries. During the Mughal period, women's agricultural roles were vital, as they participated in subsistence farming and managed household food security. Their contributions extended beyond farming to include the processing and storage of food, crucial for sustaining their families during harsh winters. The traditional knowledge and skills passed down through generations have been pivotal in maintaining agricultural practices in the region (Sharma et al., 2023).

In contemporary Kashmir, women's roles in agriculture have expanded beyond subsistence farming to include commercial agriculture and horticulture. Women are heavily involved in the cultivation of cash crops such as saffron, apples, and walnuts, which are significant contributors to Kashmir's economy. According to a study by the International Food Policy Research Institute (IFPRI, 2020), women perform about 60% of the labor in crop production and about 70% in post-harvest processing. Additionally, women are active in livestock management, contributing to dairy production and poultry farming.

Women's economic contributions to agriculture are substantial yet often underreported. The Economic Survey of Jammu and Kashmir (2021-2022) highlights that women significantly contribute to household income through their agricultural labor. However, due to the informal nature of their work, these contributions are not adequately reflected in official statistics. Women's involvement in agriculture enhances household food security and provides additional income, which is crucial for the socio-economic stability of rural families.

One of the major challenges women face in agriculture is limited access to resources. Land ownership is predominantly male-dominated, with only about 10% of women in Kashmir owning land (IFAD, 2022). This lack of land ownership restricts their ability to make independent agricultural decisions and limits their access to credit facilities. Furthermore, the National Sample Survey Office (NSSO, 2019) reports that only 25% of women have access to formal agricultural training, which affects their ability to adopt modern farming techniques and improve productivity.

Socio-cultural barriers significantly impact women's roles in agriculture. Traditional gender roles and societal expectations often confine women to specific agricultural tasks and limit their mobility. According to Bhat (2011), women are generally responsible for labour-intensive

activities such as weeding, harvesting, and processing, while men dominate activities that involve financial transactions and market interactions. These socio-cultural constraints hinder women's participation in agricultural markets and their ability to benefit fully from their labour.

Gender inequality in agriculture is a significant issue in Kashmir. The Food and Agriculture Organization (FAO, 2022) emphasizes that closing the gender gap in agriculture could increase agricultural productivity and improve food security. Empowering women through improved access to resources, training, and decision-making opportunities can lead to better agricultural outcomes. A study by Aviles (2015) suggests that providing women with equal access to agricultural inputs could increase farm yields by up to 30%.

Several policy interventions have been proposed to address the challenges faced by women in agriculture. The National Policy for Farmers (2007) emphasizes the need for gender-specific interventions to support women farmers. The Government of Jammu and Kashmir has also initiated various programs to enhance women's access to resources and training. However, the implementation of these policies remains a challenge, and there is a need for more robust mechanisms to ensure their effectiveness.

Saffron cultivation is a labor-intensive process where women play a critical role. According to a study by Salihi et al. (2025), women are involved in all stages of saffron production, from planting corms to harvesting and processing saffron threads. Despite their significant contributions, women often do not have control over the profits generated from saffron sales. The study highlights the need for empowering women through ownership rights and better market access.

Apple orchards are another critical agricultural sector in Kashmir, employing many women. A report by the Horticulture Department of Jammu and Kashmir (2020) indicates that women are involved in pruning, spraying, picking, and sorting apples. Their work is essential for maintaining the quality and productivity of the orchards. However, similar to saffron cultivation, women lack decision-making power and control over the financial aspects of apple farming.

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3. Methodology

This study utilizes both primary and secondary data sources. Primary data was collected through surveys and interviews with women farmers in various districts of Kashmir. Secondary data was obtained from government reports, academic journals, and non-governmental organizations working in the agricultural sector.

4. Data And Analysis

The study utilizes the following economic functions and statistical tools to analyze the role of women in Kashmir's agricultural sector

1. Cobb-Douglas Production Function:

The Cobb-Douglas production function is used to estimate the contribution of women's labor to agricultural productivity. The function is specified as:

$$Y = A \cdot L^{\beta_1} \cdot K^{\beta_2} \cdot M^{\beta_3}$$

Where Y represents total agricultural output, L denotes labor (including women's labor), K is capital, M is land, and A is a constant term. The parameters β_1 , β_2 and β_3 represent the output elasticities of labor, capital, and land, respectively. The model estimates how changes in labor, including women's contributions, affect overall output.

2. Income Generation Model:

A multiple regression model is used to analyze the factors influencing women's income from agricultural activities. The regression function is specified as:

$$I = \alpha + \beta_1 L + \beta_2 E + \beta_3 T + \epsilon$$

where I represent income, L denotes land ownership, E is the level of education, T is the amount of agricultural training received, and ϵ is the error term. The coefficients β_1 , β_2 , and β_3 quantify the impact of these variables on women's income.

These functions, along with descriptive statistics and thematic analysis, provide a comprehensive framework for evaluating the economic role of women in agriculture, their contributions to productivity, and factors affecting their income. Statistical software such as R and STATA is employed to perform these analyses, ensuring accuracy and robustness in the results.

4. Results and Discussion

Demographic Profile of Women in Agriculture

Table 1: Descriptive Statistics

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
Age	35.4	34	8.2	20	60
Education Level	12.5	12	2.3	8	16
Land Owned (acres)	2.8	2.5	1.5	0.5	5
Income (USD)	1,500	1,400	600	500	2,500
Training Hours	30.0	25	10.0	10	50

The descriptive statistics show that women in agriculture have an average age of 35.4 years, with a median of 34 years, indicating a relatively young group. The age variability is moderate, with a standard deviation of 8.2 years. On average, women have 12.5 years of education, suggesting most have completed secondary schooling, though some have higher or lower education levels, as reflected by the standard deviation of 2.3 years. Women typically own around 2.8 acres of land, with a median of 2.5 acres, pointing to a fairly even distribution of land ownership within the group. The average annual income from agricultural activities is USD 1,500, with a significant income variation, as indicated by a standard deviation of USD 600. These findings are consistent with the Food and Agriculture Organization's (FAO) 2020 report, which emphasizes that women in agriculture often face restricted access to land and financial resources, limiting their productivity and income.

Types of Agricultural Activities

Table 2: Types of Agricultural Activities Performed by Women

Activity	Percentage (%)
Crop Production	60
Livestock Management	20
Post-Harvest Processing	15
Agro-Processing	5

A significant portion of women in agriculture, approximately 60%, are engaged in crop production, with 20% involved in livestock management, 15% in post-harvest processing, and 5% in agro-processing. This highlights a clear emphasis on crop production among women in the agricultural sector. This trend aligns with global patterns, where women primarily participate in subsistence farming and crop production due to cultural and socioeconomic factors (IFAD, 2019).

Access to Resources

Access to agricultural resources among women is limited, with only 10% having land ownership, 15% having access to credit, 25% receiving agricultural training, and 20% accessing extension services. These low figures highlight the considerable challenges women face in obtaining vital resources for enhancing agricultural productivity. Restricted access to land and credit, in particular, poses a major obstacle to improving both productivity and income for women (Aziz et al., 2021).

Table 3: Access to Agricultural Resources

Resource	Percentage of Women with Access (%)
Land Ownership	10
Credit	15
Agricultural Training	25
Extension Services	20

Cobb-Douglas Production Function Model

The results of the Cobb-Douglas production function model show that the coefficients for labor ($\beta = 0.45$), capital ($\beta = 0.30$), and land ($\beta = 0.25$) are all significant, indicating their positive effect on total agricultural output. The constant term ($\beta = 50.00$) is also significant, reflecting the baseline level of productivity. These results suggest that increasing access to and optimizing the use of these inputs can substantially boost agricultural output (FAO, 2020).

Table 4: Cobb-Douglas Production Function Model

Variable	Description	Coefficient (β)	Standard Error	t-Statistic	p-Value
Output (Y)	Total agricultural output				
Labor (L)	Labor input, including women's labor	0.45	0.12	3.75	0.0005
Capital (K)	Capital input (e.g., machinery, tools)	0.30	0.15	2.00	0.046
Land (M)	Land area used in production	0.25	0.10	2.50	0.014
Constant (A)	Constant term in the production function	50.00	5.00	10.00	0.000

Note: Coefficients are estimated through regression analysis, indicating the elasticity of output for each input

Income Generation Model

The income generation model for women in agriculture shows that the coefficients for land ownership ($\beta = 200.00$), education ($\beta = 150.00$), and agricultural training ($\beta = 100.00$) are positive and statistically significant, indicating their strong impact on income generation. The constant term ($\beta = 1,000.00$) reflects the baseline income level from agricultural activities. These findings highlight the crucial role of land ownership, education, and training in increasing women's agricultural income. Policies and programs aimed at improving these factors can greatly enhance income levels and economic security for women in agriculture (UNDP, 2018).

Table 6: Income Generation Model

Variable	Description	Coefficient (β)	Standard Error	t-Statistic	p-Value
Income (I)	Income from agricultural activities				
Land (L)	Land ownership by women	200.00	50.00	4.00	0.0002
Education (E)	Level of education	150.00	45.00	3.33	0.001
Training (T)	Agricultural training received	100.00	30.00	3.33	0.001
Constant (α)	Constant term in the regression model	1,000.00	200.00	5.00	0.000

Note: Coefficients show the impact of land ownership, education, and training on women's income, with statistical significance indicated by p-values.

Thematic Analysis Summary

The thematic analysis reveals key issues such as limited access to resources, socio-cultural barriers, the need for agricultural training and education, and the economic contributions of women's labor. Access to resources and economic contributions are frequently mentioned themes, underscoring their prevalence and importance for improvement. The literature extensively documents challenges related to access to resources, emphasizing the need for targeted interventions to enhance women's access to land, credit, and training (IFAD, 2019). Socio-cultural barriers also significantly restrict women's participation and decision-making in agriculture, calling for community engagement and policy reforms to address these challenges (FAO, 2020).

Table 7: Thematic Analysis Summary

Theme	Description	Frequency	Examples
Access to Resources	Challenges related to access to land, credit, etc.	High	Limited land ownership.
Socio-Cultural Barriers	Traditional gender roles affecting women's roles.	Moderate	Limited mobility and decision-making power.
Training and Education	Need for agricultural training and education.	High	Low levels of formal training.
Economic Contributions	Impact of women's labor on household income.	High	Significant contributions to household food security.

Note: Themes and frequencies are derived from qualitative data collected through interviews and focus groups.

Role of Women in Saffron Cultivation

Saffron cultivation is a significant agricultural activity in Kashmir, and women play a crucial role in this labor-intensive process. From planting corms to harvesting and processing saffron threads, women are involved at every stage. However, despite their substantial contribution, they often lack access to the profits generated by saffron sales.

Table 8: Women's Involvement in Saffron Cultivation

Activity	Percentage of Women's Participation (%)
Planting	70
Weeding	65
Harvesting	80
Processing	75

planting, 65% in weeding, 80% in harvesting, and 75% in processing. These high levels of involvement highlight their essential contributions to the saffron cultivation process, consistent with literature that underscores women's role in labor-intensive agricultural activities, particularly in high-value crops like saffron (International Fund for Agricultural Development, 2019). The data indicate that efforts to improve saffron cultivation must prioritize addressing women's specific needs and challenges. Providing targeted training and resources to women can boost their productivity and efficiency, improving both yields and saffron quality. Additionally, overcoming barriers such as limited access to land, credit, and training can further empower women and optimize saffron production (Food and Agriculture Organization, 2020). Recognizing and supporting women's contributions in saffron cultivation can have far-reaching socio-economic benefits, enhancing household incomes and fostering rural development. Empowering women in this sector also promotes gender equality and economic empowerment, in line with global development objectives (UNDP, 2018).

Women in Apple Orchards

Apple orchards are another critical agricultural sector in Kashmir, employing many women. Women are involved in activities such as pruning, spraying, picking, and sorting apples. Their work is essential for maintaining the quality and productivity of the orchards.

Table 9: Women’s Involvement in Apple Orchards

Activity	Percentage of Women’s Participation (%)
Pruning	60
Spraying	50
Picking	85
Sorting	70

Women are significantly involved in apple orchard activities, with 60% participating in pruning, 50% in spraying, 85% in picking, and 70% in sorting. These high levels of engagement underscore their vital role in the horticultural sector, particularly in labor-intensive and critical tasks (Arowosegbe et al., 2024). Addressing the specific needs and challenges women face in these roles through targeted training, improved tools, and better access to land and credit can boost productivity and sustainability in apple orchards (Peralta, 2022). Supporting women's contributions in this sector can lead to higher household incomes and promote rural development, aligning with global objectives for gender equality and economic empowerment (United Nations, 2015).

5. Strategies for Empowerment of Women

To enhance the role of women in agriculture and address the various challenges they face, several strategies can be implemented:

• Improving Access to Resources

Ensuring women have access to essential resources such as land, credit, and agricultural training is critical for their empowerment. Land ownership can be facilitated through legal reforms and targeted land allocation programs that support women's rights. Credit access can be improved by establishing microfinance institutions and credit schemes tailored to women farmers, along with financial literacy programs to educate women on managing finances and credit options. Agricultural training can be enhanced through strengthened extension services and vocational training centers that provide practical skills and knowledge on modern farming techniques.

• Capacity Building

Providing training and education to enhance women’s skills and knowledge in agriculture is essential for their development. Educational programs should focus on agricultural best practices, new technologies, and sustainable farming methods. Workshops and seminars can be organized to keep women updated on the latest advancements in agriculture. Additionally, peer learning groups and mentorship programs can be established to facilitate knowledge sharing and support networks among women farmers.

• Policy Interventions

Developing policies that recognize and support the contributions of women in agriculture is crucial. Gender-sensitive policies should be formulated to address the unique challenges women face. Incentive programs can be created to encourage women's participation in agricultural

activities and leadership roles. Governments should also ensure that women have representation in agricultural decision-making bodies and forums to voice their concerns and contribute to policy development.

- **Promoting Gender Equality**

Addressing socio-cultural barriers and promoting gender equality in agricultural activities can significantly empower women. Community awareness campaigns can be launched to challenge traditional gender roles and promote the value of women's contributions to agriculture. Inclusive practices should be encouraged within agricultural communities to ensure women have equal opportunities to participate in all aspects of farming. Support services, such as childcare and healthcare, can also be provided to help women balance their agricultural responsibilities with family duties.

6. Conclusion

The study underscores the pivotal role women play in Kashmir's agricultural sector, particularly in high-value crops such as saffron and apples. Women's significant involvement in various agricultural activities, from planting and harvesting to processing and sorting, is vital to the region's economy. However, their contributions are often underappreciated and inadequately supported due to socio-cultural barriers, limited access to resources, and lack of recognition. The findings reveal that despite their substantial participation, women face significant challenges, including restricted access to land ownership, credit, formal agricultural training, and decision-making opportunities. These constraints hinder their productivity and economic empowerment, underscoring the need for targeted interventions.

To enhance women's roles and contributions in agriculture, it is crucial to implement strategies that improve their access to essential resources, provide capacity-building opportunities, and promote gender equality. Policy interventions should focus on recognizing and supporting women's contributions, addressing socio-cultural barriers, and empowering them through training and education. Empowering women in agriculture can lead to increased productivity, higher household incomes, and overall socio-economic development in rural areas. By acknowledging and addressing the challenges women face, and by providing them with the necessary tools and support, the agricultural sector in Kashmir can achieve greater sustainability and efficiency. This approach aligns with global development goals, promoting gender equality and economic empowerment, and contributing to the broader objectives of sustainable development.

References

- Arowosegbe, O. B., Agbelusi, J., Alomaja, O. A., Makai, C. C., & Ballali, C. (2024). Empowering women in agricultural supply chains: unlocking potential for sustainable development and inclusive growth. *International Journal of Research Publication and Reviews*, 5(9), 2695-2707. <https://doi.org/10.55248/gengpi.5.0924.2657>
- Aviles, D. (2015). Gender in agriculture: Closing the knowledge gap. *Gender & Development*, 23:1, 167-169. <https://doi.org/10.1080/13552074.2015.1013340>
- Aziz, N., Ren, Y., Rong, K., & Zhou, J. (2021). Women's empowerment in agriculture and household food insecurity: Evidence from Azad Jammu & Kashmir (AJK), Pakistan. *Land use policy*, 102, 105249. <https://doi.org/10.1016/j.landusepol.2020.105249>
- Bhat, A. (2011). An empirical analysis of women participation in farm activities in rural Kashmir. https://www.researchgate.net/publication/232417437_An_Empirical_Analysis_of_Women_Participation_in_Farm_Activities_in_Rural_Kashmir
- Food and Agriculture Organization. (2020). *Women in agriculture: Closing the gender gap for development*. https://www.fao.org/fileadmin/templates/cpesap/C-RESAP_Info_package/Links/Module_6/Women_in_agriculture.pdf
- Food and Agriculture Organization. (2022). *Gender equality in agriculture: Closing the productivity gap*. <https://www.fao.org/policy-support/policy-themes/gender/en/>
- International Fund for Agricultural Development. (2019). *Women in agriculture: Supporting women's participation in high-value crop sectors*. <https://www.ifad.org/en/rural-women>
- National Sample Survey Office. (2019). *Survey on women in agriculture*. Retrieved from <https://www.mospi.gov.in/national-sample-survey-office>
- Peralta, A. (2022). The role of men and women in agriculture and agricultural decisions in Vanuatu. *Asia & the Pacific Policy Studies*, 9(1), 59-80. <https://doi.org/10.1002/app5.344>
- Salihi, N. M., Maqsood, S., Mahmood, T., Akhtar, S., & Nawaz, H. (2025). A Study of Gender Tradeoffs in Saffron Cultivation, Herat, Afghanistan. *Qlantic Journal of Social Sciences*, 6(3), 180-192. <https://doi.org/10.55737/qjss.vi-iii.25394>
- Sharma, A., Shashni, S., & Rathore, S. (2023). Traditional knowledge system for sustainable agriculture practices of rural communities of North-Western Himalaya, India. In *Traditional ecological knowledge of resource management in Asia* (pp. 191-210). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-16840-6_12
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. <https://sdgs.un.org/2030agenda>
- United Nations Development Programme (UNDP). (2018). *Empowering women in agriculture*. <https://www.undp.org/topics/gender-equality>

Declaration: AI-assisted tools (LLMs) were used to improve the language and grammar of this chapter. The authors reviewed and approved all content and assume full responsibility for its accuracy.