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Empowering women in agriculture for global food security and sustainability: A review

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Abstract

Women constitute a substantial proportion of the global agricultural workforce and play a crucial role in ensuring food security, rural livelihoods, and sustainable agricultural development. Despite their extensive involvement in agricultural production and food systems, women frequently face structural constraints such as limited access to land, credit, training, and decision-making opportunities. These gender disparities reduce agricultural productivity and restrict the potential contribution of women to sustainable food systems. This review synthesizes literature published between 2015 and 2025 to examine the role of women's empowerment in agriculture and its implications for global food security and sustainability. The review discusses women's participation in agricultural production, their contribution to household food security, involvement in sustainable agricultural practices, and the major challenges that limit their empowerment. Evidence from the reviewed literature indicates that empowering women farmers significantly improves agricultural productivity, enhances household nutrition, and strengthens the resilience of farming systems. However, persistent socio-economic barriers continue to limit women's participation in agricultural decision-making and control over productive resources. Strengthening women's empowerment in agriculture is therefore crucial for achieving sustainable food systems and global food security.

Keywords: Women empowerment, agriculture, food security, sustainability, gender equality, rural development

1. Introduction

Agriculture plays a fundamental role in sustaining global livelihoods and ensuring food security for the rapidly growing world population. In many developing countries, agriculture remains the primary source of employment and income for rural households. Within this sector, women contribute significantly to agricultural labor and participate in a wide range of farming activities including crop cultivation, livestock management, post-harvest processing, and food preparation. Women represent a large share of the agricultural workforce worldwide, particularly in developing regions where smallholder farming systems dominate agricultural production (Agarwal, 2015; Chebet, 2023; Chandrakar *et al.*, 2021; Majumder & Shah, 2017) [1, 13, 11, 29]. Their contributions are essential for maintaining rural economies and ensuring the stability of food systems. Women's participation in agriculture extends beyond farm labour. They play important roles in seed preservation, crop processing, food preparation, and management of household nutrition. These responsibilities place women at the center of household food systems and highlight their contribution to food availability and accessibility. In many rural communities, women are responsible for managing food resources and ensuring that family members receive adequate nutrition (Das & Singh, 2020; Gupta *et al.*, 2019) [16, 23]. Women also contribute to informal agricultural

markets and small-scale agribusiness activities, which further strengthen rural livelihoods.

Despite their extensive contributions, women farmers frequently face structural barriers that limit their productivity and economic empowerment. Unequal access to land ownership, financial resources, agricultural inputs, and extension services continues to hinder women's participation in agricultural development (Gupta *et al.*, 2017; Upreti *et al.*, 2018; Pattnaik *et al.*, 2018) [22, 43, 38]. Socio-cultural norms and gender-based discrimination often restrict women's mobility and decision-making authority within agricultural households and communities. These inequalities create a gender productivity gap that reduces the overall efficiency of agricultural systems. Over the past decade, the concept of women's empowerment has gained increasing attention in agricultural development policies and academic research. Empowerment refers to the process of improving women's ability to access resources, participate in decision-making processes, and benefit from economic opportunities. Research indicates that empowering women farmers can significantly increase agricultural productivity, reduce poverty, and improve household nutrition (Jemaneh & Shibeshi, 2023; Ammara *et al.*, 2025; Gupta *et al.*, 2019) [25, 4, 23].

Women's empowerment also contributes to sustainable agricultural development. Women farmers often possess

valuable traditional knowledge regarding biodiversity conservation, soil fertility management, and climate adaptation practices. Their involvement in sustainable farming systems can enhance ecological resilience and long-term agricultural productivity (Meena, 2021; Khatri-Chhetri *et al.*, 2020; Glazebrook & Opoku, 2020) ^[30, 27, 19]. Given the growing challenges of population growth, climate change, and resource scarcity, strengthening women’s participation in agriculture has become essential for achieving global food security and sustainable development.

2. Role of Women in Agricultural Production

Women play a multifaceted role in agricultural production systems across the world. Their participation spans several stages of the agricultural value chain including crop production, livestock management, post-harvest processing, and agricultural marketing. In many developing countries, women perform labor-intensive agricultural operations such as sowing, transplanting, weeding, harvesting, and processing agricultural products (Meena, 2021; Chebet, 2023; Chandrakar *et al.*, 2021; Patil & Babu, 2018) ^[30, 13, 11, 36]. Women also play a crucial role in maintaining agricultural biodiversity and supporting family-based farming systems in rural communities (Majumder & Shah, 2017) ^[29].

Women also play a critical role in livestock management and dairy production. They are responsible for feeding animals, maintaining livestock shelters, milking animals,

and caring for animal health. These activities contribute significantly to household income and nutrition through the production of milk, eggs, and meat products (Krishna *et al.*, 2020; Arce *et al.*, 2022; Pandey *et al.*, 2024) ^[1, 5, 32]. Livestock farming also provides opportunities for women to engage in small-scale income-generating activities that support household livelihoods. Allied agricultural activities such as backyard poultry and aquaculture further contribute to women’s economic empowerment and household nutrition (Kumar *et al.*, 2021; Bhattacharya *et al.*, 2025) ^[28, 9].

Post-harvest activities represent another important area where women contribute substantially to agricultural production. Women are often responsible for cleaning, drying, storing, and processing agricultural products before they are consumed or marketed. These activities help reduce food losses and improve the efficiency of food systems (Shah *et al.*, 2022; Meena, 2021) ^[40, 30]. Women also participate in agricultural marketing and rural entrepreneurship. In many rural regions, women sell agricultural products such as vegetables, milk, and processed foods in local markets. These marketing activities generate income for households and strengthen rural economies (Gupta *et al.*, 2017; Panchani & Tarpara, 2020; Saini & Sharma, 2024; Patel & Sethi, 2021) ^[22, 34]. Overall, women’s participation in agricultural production and marketing plays a vital role in sustaining food systems and rural livelihoods.

Table 1: Major roles of women in agricultural activities

Agricultural Activity	Description	Key References
Crop production	Sowing, transplanting, weeding, harvesting	Meena (2021) ^[30] ; Patel <i>et al.</i> (2019) ^[35]
Livestock management	Feeding animals, milking, disease management	Krishna <i>et al.</i> (2020); Pandey <i>et al.</i> (2024) ^[32]
Post-harvest processing	Cleaning, drying, storage and processing	Shah <i>et al.</i> (2022) ^[40] ; Meena (2021) ^[30]
Agricultural marketing	Local trading and sale of products	Gupta <i>et al.</i> (2017) ^[22] ; Panchani & Tarpara (2020)
Household nutrition	Food preparation and dietary management	Gupta <i>et al.</i> (2019) ^[23] ; Das & Singh (2020) ^[16]

3. Women Empowerment and Agricultural Productivity

Women’s empowerment has a significant impact on agricultural productivity and farm efficiency. When women have access to productive resources such as land, credit, training, and agricultural inputs, they are better able to adopt improved farming technologies and increase crop yields. Gender inequality in access to resources often results in lower productivity among women farmers despite their high levels of labor contribution (Agarwal, 2015; Gupta *et al.*, 2017) ^[1, 22].

Land ownership is one of the most important determinants of women’s empowerment in agriculture. Secure land rights encourage investment in agricultural improvements and provide economic security to women farmers. However, women’s land ownership remains limited in many rural societies due to legal restrictions and cultural norms (Gupta *et al.*, 2017; Pilgeram & Amos, 2015) ^[22, 39]. Access to credit

and financial services also plays a crucial role in enhancing women’s agricultural productivity. Financial inclusion enables women farmers to purchase agricultural inputs such as seeds, fertilizers, and irrigation equipment. Participation in self-help groups and cooperative organizations has been shown to improve women’s financial independence and agricultural performance (Kaiyum, 2023; Paramanandam & Packirisamy, 2015) ^[26, 33]. Agricultural training programs and extension services are essential for improving women’s knowledge and technical skills. Training in modern agricultural technologies, climate-smart practices, and farm management techniques enables women farmers to increase productivity and improve farm efficiency (Shahbaz *et al.*, 2022) ^[41]. Access to agricultural information and extension services further strengthens women’s capacity to adopt improved farming practices (Govil & Rana, 2017; Alvi *et al.*, 2021) ^[20, 3].

Table 2: Factors influencing women empowerment in agriculture

Empowerment Factor	Impact on Agriculture	Key References
Land ownership	Increases investment and productivity	Agarwal (2015) ^[1] ; Gupta <i>et al.</i> (2017) ^[22]
Access to credit	Enables purchase of farm inputs	Kaiyum (2023) ^[26] ; Panchani & Tarpara (2020)
Agricultural training	Improves adoption of modern practices	Shahbaz <i>et al.</i> (2022) ^[41] ; Meena (2021) ^[30]
Decision-making participation	Enhances farm management efficiency	Patel <i>et al.</i> (2017) ^[34] ; Das & Singh (2020) ^[16]

4. Women Empowerment and Household Food Security

Women’s empowerment is closely linked to household food security and nutritional wellbeing. Women play a central role in food preparation, dietary management, and allocation of household resources. Their control over income and participation in agricultural decisions significantly influence food consumption patterns and nutrition outcomes. Studies indicate that households where women have greater decision-making power tend to experience higher levels of food security and dietary diversity (Gupta *et al.*, 2019; Vemireddy & Pingali, 2021; Connors *et al.*, 2023)^[23, 44, 14].

Women are more likely to allocate resources toward nutritious food, healthcare, and education, thereby improving overall household welfare. Research has also shown that women’s participation in agricultural decision-making contributes to increased farm productivity and improved food availability (Vemireddy & Pingali, 2021)^[44]. Similarly, studies conducted in Ethiopia demonstrate that women’s empowerment significantly improves household food security and reduces vulnerability to food shortages (Jemaneh & Shibeshi, 2023; Das & Singh, 2020)^[25, 16].

Table 3: Relationship between women empowerment and food security

Empowerment Indicator	Food Security Outcome	Key References
Control over income	Improved food expenditure	Gupta <i>et al.</i> (2019) ^[23] ; Vemireddy & Pingali (2021) ^[44]
Participation in farm decisions	Higher productivity	Jemaneh & Shibeshi (2023) ^[25] ; Das & Singh (2020) ^[16]
Market access	Increased income and food availability	Gupta <i>et al.</i> (2017) ^[22] ; Shah <i>et al.</i> (2022) ^[40]
Education and awareness	Improved dietary diversity	Gupta (2024) ^[21] ; Vemireddy & Pingali (2021) ^[44]

5. Women and Sustainable Agriculture

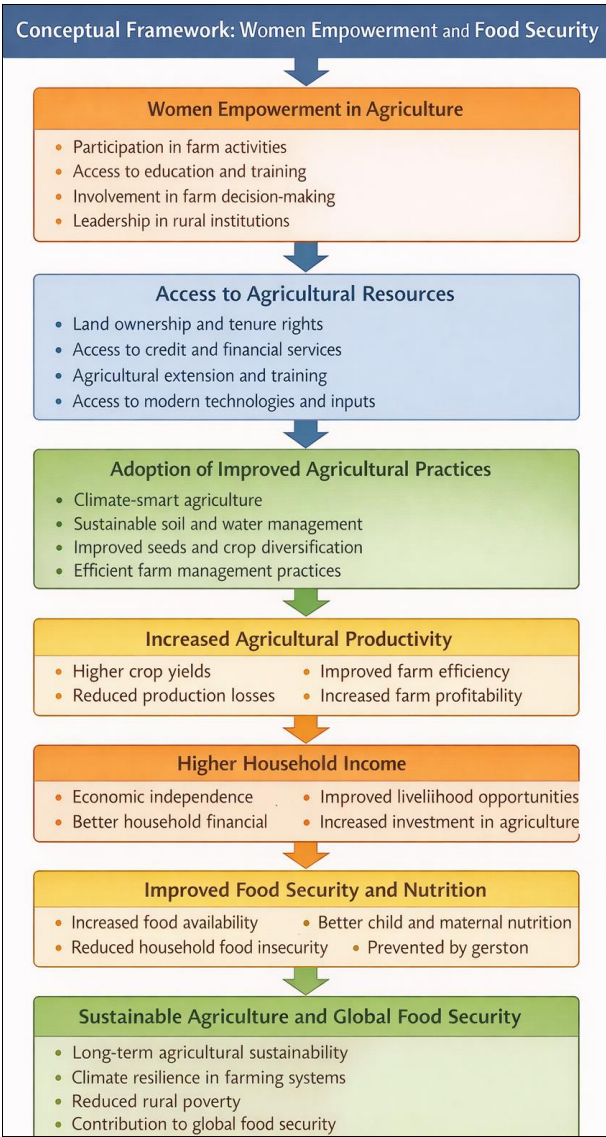
Women farmers contribute significantly to environmentally sustainable agricultural practices. Their traditional knowledge of crop diversity, soil management, and water conservation plays an important role in maintaining agricultural sustainability. Women often adopt practices such as crop diversification, mixed farming systems, and soil conservation techniques that improve farm resilience and reduce environmental degradation (Meena, 2021)^[30]. Sustainable agricultural practices and agroecological approaches have also been shown to create new opportunities for women’s empowerment and environmental conservation (Glazebrook & Opoku, 2020; Behl *et al.*, 2024; Muhaimin *et al.*, 2023)^[19, 6, 31]. Climate change poses major challenges to agricultural systems worldwide. Women farmers are particularly vulnerable to climate variability due to limited access to resources and information. However, research indicates that women’s participation in climate-smart agriculture programs can improve climate resilience and adaptation strategies in farming communities (Khatri-Chhetri *et al.*, 2020; Chanana-Nag & Aggarwal, 2020)^[27, 10].

6. Challenges Faced by Women in Agriculture

Despite their significant contributions, women farmers face numerous challenges that limit their empowerment and productivity. Limited access to land ownership remains one of the most significant barriers affecting women’s participation in agriculture (Gupta *et al.*, 2017)^[22]. Financial exclusion is another major challenge. Many rural women lack access to formal credit institutions and financial services, which restricts their ability to invest in agricultural inputs and technologies (Kaiyum, 2023)^[26]. Social and cultural norms also restrict women’s participation in agricultural leadership and decision-making roles. In many rural societies, men dominate farm management decisions even when women contribute significant labor to agricultural production (Shah *et al.*, 2022)^[40]. The increasing feminization of agriculture has also resulted in greater workloads and responsibilities for women farmers without corresponding access to productive resources (Pattnaik *et al.*, 2018; Pattnaik & Lahiri-Dutt, 2022)^[38, 37]. Women also experience heavy workloads due to their dual responsibilities in both household management

and farm activities. This labour burden reduces their productivity and limits opportunities for training and education (Hinduja *et al.*, 2022)^[24].

Conceptual Framework



7. Conclusion

Women play a vital role in agricultural production, rural livelihoods, and household food security across the world. Empowering women farmers through improved access to resources, education, financial services, and decision-making opportunities can significantly enhance agricultural productivity and sustainability. Evidence from recent studies demonstrates that women's empowerment contributes to improved nutrition outcomes, sustainable farming practices, and economic resilience. However, persistent gender inequalities continue to limit women's participation in agricultural development. Addressing these challenges requires gender-responsive policies, inclusive extension services, and institutional support mechanisms that promote equitable access to resources. Strengthening women's empowerment in agriculture is therefore essential for achieving global food security and sustainable agricultural development.

8. Way Forward

Empowering women in agriculture requires improving their access to land, credit, training, and modern agricultural technologies. Strengthening women's participation in agricultural decision-making, farmer organizations, and market activities can enhance productivity and rural livelihoods. In addition, gender-sensitive policies, capacity-building programs, and access to digital agricultural information can help women farmers adopt sustainable farming practices and improve food security. Overall, promoting equal opportunities for women in agriculture will contribute significantly to sustainable agricultural development and global food security.

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