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Women as catalysts of rural transformation: A systematic review of barriers, opportunities, and policies in the Global South

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Abstract

Women play a crucial role in rural transformation in developing countries, but they face significant socio-economic, cultural, and structural barriers that hinder their full participation. Despite their contributions to agriculture and rural development, systemic inequities in access to resources, education, and decision making limit their potential as agents of change. Our research aims to analyze the challenges women face in rural transformation, identify opportunities for their empowerment, and propose actionable policy recommendations for gender-inclusive rural development. A systematic literature review was conducted using the Scopus and Web of Science databases, focusing on peer-

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reviewed articles published between 2015 and 2025. Using the PRISMA framework, 166 studies were selected from 499 studies across South Asia, sub-Saharan Africa, and Latin America. These major developing regions have rural populations reliant on agriculture, in which women play crucial roles but face gender barriers. Women face obstacles such as limited access to land, technology, credit, and markets, hindering their full contribution to sustainable food systems. Enabling factors such as capacity building, digital literacy, cooperative farming, and gender-transformative policies enhance women's agency in food production. Empowering women through training, inclusive financing, and land rights improves productivity, food security, and sustainability. The findings highlight the need for inclusive rural policies, interdisciplinary collaboration, and gender-sensitive infrastructure to support women in agriculture. Integrating women into rural and food strategies is key to long-term sustainability. Future research should evaluate the impact and scalability of gender-inclusive policies in diverse rural contexts.

Keywords
rural transformation, women's empowerment, gender inequality, developing countries

Introduction

Rural transformation represents one of the most consequential pathways for reducing poverty in the Global South, offering the potential to shift millions of households from subsistence agriculture toward diversified, commercially integrated livelihoods. Transformation involves structural change through which rural economies transition to diversified production, commercialization, and non-farm employment (Huang & Shi, 2021; Wang et al., 2023). Underpinning this transformation are three interconnected dimensions with significant gender implications: (1) agricultural changes, including the adoption of high-value crops, mechanization, and sustainable practices; (2) employment diversification spanning on-farm and off-farm wage labor, and non-farm enterprises; and (3) institutional realignments encompassing land tenure reforms, market integration, and policy interventions. High-value agriculture—including horticulture, livestock, fisheries, and plantation agriculture—plays a particularly vital role in raising rural incomes (Rachmawati et al., 2025; Sudaryanto et al., 2023; Wang, Chen et al., 2025), while also supporting long-term sustainability through soil health, pest control, climate resilience, and dietary diversity (Food and Agriculture Organization of the United Nations [FAO], 2023).

Despite the transformative potential of these processes, their benefits are not uniformly distributed. Women, who constitute the majority of the rural agricultural workforce across South Asia, sub-Saharan Africa, and Latin America, are systematically excluded from the gains of rural transformation. In sub-Saharan Africa, women comprise approximately 60% of the farm workforce (Meinzen-Dick et al., 2019), and in South Asia, around 70% of women work in agriculture (FAO., 2023), yet their contributions remain undercounted, underpaid, and undervalued. This paper argues that understanding and addressing the gendered dimensions of rural transformation is both necessary and urgent: existing policies have proved insufficient in bridging structural inequalities, and a more targeted analytical framework is needed to enhance women's agency and improve food security and economic well-being (Kumar et al., 2018). This systematic review directly responds to that gap.

Women are not peripheral actors in rural transformation—they are its frontline managers. As primary stewards of biodiversity and soil health, women farmers play an indispensable role in the sustainability of agrifood systems, yet they consistently lack access to the resources, inputs, and markets necessary to fully realize their productive potential (FAO, 2023). Evidence from across the Global South illustrates both the scale of women's contributions and the impact of targeted interventions that recognize them. In India, women's horticulture groups have boosted yields and improved income and product quality through pluralistic extension interventions (Ramya et al., 2026); in Kenya, connecting smallholder women with certified seeds and markets improved productivity and reduced losses by 30% (Njuki et al., 2025); in Ethiopia, certifying land rights for over two million women enhanced agricultural productivity (Bezabih

et al., 2016); and in Bangladesh, training women in vegetable gardening improved both nutritional outcomes and women's control over household income (Rola-Rubzen et al., 2024). In Pakistan, women's education has driven the shift toward high-value crops in regions like Punjab and Khyber Pakhtunkhwa, and rising female labor force participation has been a significant driver of rural transformation, though gains in female off-farm employment remain regionally uneven (Naz et al., 2025), while in China, the Rural Revitalization Strategy's poverty-prevention goals depend on women's empowerment and social capital as a key mechanism, with women's agency significantly reducing household poverty in previously poverty-stricken rural counties (Wang, Gu et al., 2025). These examples underscore that women's full participation in rural transformation is not only an equity imperative but a prerequisite for sustainable agricultural development.

Despite their central roles, women in rural economies face deeply entrenched and intersecting challenges that constrain their participation in and benefit from rural transformation. Structurally, capitalist patriarchy and mechanization reinforce land inequality and limit women's access to productive resources (Njuki et al., 2025). Women in the Global South routinely lack formal land tenure, access to credit, and opportunities for market participation, while cultural and social norms, including discriminatory gender roles, unequal household labor burdens, and restricted mobility, further narrow their economic agency (Doss et al., 2019; Singh et al., 2023). In West Sumatra, women balance heavy household duties with agricultural labor (Mutiara et al., 2022); in Pakistan, cultural constraints confine many women to indoor economic activities (Akram, 2018); and in Northern Mozambique, only 30% of women control agricultural plots (de Brauw, 2015).

Gender gaps in rural organizations further undermine women's influence over decision making, rendering their contributions invisible in both policy and practice (Hejase et al., 2020). Challenges related to infrastructure, including inadequate irrigation systems, inequitable access to clean water, and limited market connectivity, compound these gendered disadvantages, highlighting the urgent need for government support and gender-sensitive policy design. Rural women are also disproportionately vulnerable to the effects of climate change: female-headed households lose 8% more of their income to heat stress and 3% more to floods than male-headed households, amounting to US$37 billion and US$16 billion in lost income annually across low- and middle-income countries—a gap projected to widen to 34% under a further 1°C of warming (FAO, 2024). This vulnerability stems from women's greater dependence on climate-sensitive natural resources and agriculture, restricted mobility and access to information, and unequal access to land, credit, and decision-making power (FAO, 2024); yet their critical roles in climate change mitigation and food security remain overlooked in mainstream policy frameworks (Asih, 2021; Ngo & Tran, 2024). These overlapping obstacles create a cycle of marginalization that limits women's economic potential and perpetuates their structural exclusion from rural transformation processes (Rola-Rubzen et al., 2024; Slavchevska et al., 2016).

Notwithstanding these challenges, emerging evidence identifies significant opportunities for advancing women's empowerment within rural transformation processes. Collective action has proven particularly effective: where women organize through cooperatives, self-help groups, and community-based organizations, they are better positioned to challenge patriarchal norms, access shared resources, and shift decision-making power toward the commercial sphere— increasing household income and resilience in the process (Ngo & Tran, 2024; Prihatiningtyastuti, 2020). Technological adoption and infrastructure investment also open new pathways for women's economic participation, provided that access is equitable and gender-responsive. Digital finance initiatives have shown promise in diversifying income sources for rural households (Huang & Rozelle, 2018), and future research into communal water governance may further mitigate the impact of climate-induced scarcity on smallholder women's productivity. At the institutional level, land tenure reform and inclusive policy design represent critical levers: when women hold formal land rights, their productivity, bargaining power, and investment behavior

improve significantly (Diiro et al., 2018). Gender-sensitive policies that ensure women's inclusion in policy processes, rather than treating empowerment as an add-on, are essential for unlocking the full productive potential of rural women and making rural transformation genuinely inclusive (Doss et al., 2019; Kumar et al., 2018). While agricultural entrepreneurship empowers rural women, significant barriers remain, however, including policy environments that inadequately support women's land rights, credit access, and market participation, as well as deeply rooted social and structural obstacles such as discriminatory norms, unequal workload burdens, and restricted mobility that limit opportunities for women's engagement in rural economic activities. Gender gaps in rural organizations continue to undermine women's contributions to development, with negative consequences for both household welfare and the broader rural economy. Initiatives must therefore address these systemic imbalances and explicitly recognize the multifaceted challenges faced by rural women (Singh et al., 2023).

Despite a growing body of research on gender and rural development, the existing literature remains fragmented, with few studies offering a systematic analysis of how the multiple dimensions of rural transformation—agricultural change, employment diversification, and institutional realignment—simultaneously shape barriers and opportunities for women. Identifying barriers alone has proved insufficient; what is needed is an integrated framework that examines these processes together and identifies the conditions through which transformation genuinely empowers women. This paper addresses that gap through a systematic review of relevant studies conducted in accordance with PRISMA guidelines, using the Women's Empowerment in Agriculture Index (WEAI) and the Rural Women's Empowerment framework as theoretical anchors. The WEAI, developed in 2012 by the International Food Policy Research Institute (IFPRI), the Oxford Poverty and Human Development Initiative (OPHI), and the Feed the Future program, led by the United States Agency for International Development (USAID), measures agricultural empowerment across five dimensions (productivity, resources, income, leadership and time) and gender parity (Quisumbing et al., 2023). Section 2 outlines this theoretical framework. Section 3 details the systematic methodology. Section 4 presents findings across three dimensions—well-being, employment, and empowerment—analyzing barriers, opportunities, and policies. Section 5 discusses policy implications and cross-cutting themes. Section 6 addresses limitations and future research directions. By providing a structured analysis, this review aims to offer clear, evidence-based guidance for researchers, policymakers, and development practitioners seeking to make rural transformation work for women.

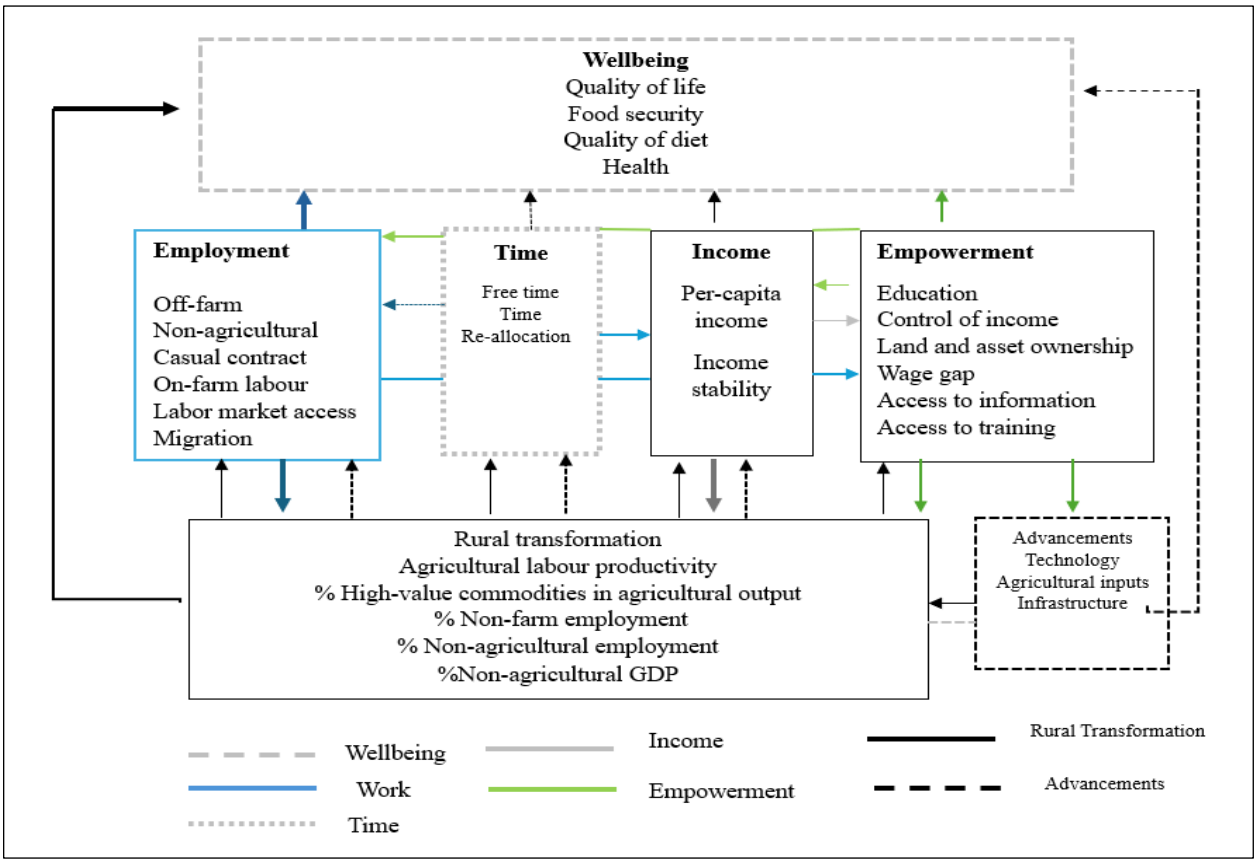
Theoretical Framework

Women in South Africa, sub-Saharan Africa, and Latin America exceed the global average in agri-food sector involvement, with over two-thirds participation (FAO, 2023), underscoring women's crucial agricultural role and potential for productivity. The focus on women as economic drivers gained significant momentum following the World Bank' report, *Gender Equality and Development* (2012). That foundational report established a clear macroeconomic case for gender parity. Earlier estimates from FAO suggested that closing the gender gap in access to agricultural resources could boost total agricultural output in developing countries by 20 to 30 percent (2011). Recognizing women's crucial role in global food systems, FAO declared 2026 the International Year of the Woman Farmer (2026), responding to 2023 data urging gender-transforming policies to empower women in the agri-food sector. Research has found that productivity, food security, nutrition, and climate resilience improve when women have decision-making autonomy in agricultural production and household resource allocation (Dar & Waza, 2026; Dessie, 2025; Ghosh et al., 2021; Mataka et al., 2023). Our research uses the Rural Women's Empowerment framework (Rola-Rubzen et al., 2023) to analyze these dynamics. This framework uses a multidimensional lens to examine how rural transformations, such as technological adoption and market integration, affect women's well-being through employment, time allocation, income, and empowerment. Technology, such as mechanized farming tools and high-value inputs, boosts women's labor

productivity. Infrastructure improvements, such as electrification and clean water access, reduce the time women spend on chores, enabling them to focus on income activities or training. Digital technologies connect rural women to market resources, providing real-time access to information and financial services (Figure 1). The Rural Women's Empowerment framework also assesses how institutional shifts can hinder or facilitate women's agency in sustainable rural development by contextualizing barriers, such as time poverty and patriarchal norms.

Women's role in agriculture is vital for food security in the Global South, which is increasingly transitioning from subsistence farming toward active stewardship of sustainable agricultural systems, encompassing soil health management, biodiversity conservation, and climate-adaptive practices. Women who adopt such sustainable practices often challenge prevailing gender roles by innovating within their productive environments, thereby forging important links between economic growth and ecological resilience (Vuciterna et al., 2024). Sarita Devi's organic farm in India exemplifies how women's agricultural leadership can catalyze broader community change (Chinmaya Organization for Rural Development, 2023). Operating as a collectively managed enterprise, the farm integrates high-value organic production with community outreach, providing neighboring women farmers with training, market linkages, and organizational support—demonstrating that women-led agricultural enterprises can function as scalable models of rural transformation. Women agricultural entrepreneurs of this kind simultaneously boost household incomes and advance sustainable land management practices, offering replicable pathways for improved

Figure 1. Theoretical Framework of Rural Women's Empowerment



Source: Rola-Ruben et al., 2023. Reproduced under CC BY-NC-ND 4.0 license,

nutrition and economic resilience in rural communities (van Gelderen, 2016).

Women allocate income to family well-being, including food, education, and healthcare. Investments in gender equality create jobs and promote development. Structural and socio-cultural constraints, such as limited land ownership, lack of formal credit, and traditional norms hinder progress (Kegnide et al., 2024). Addressing inequality requires expanding employment opportunities and access to resources for women (Dula, 2019). Sustaining and scaling women's entrepreneurship in rural communities require the convergence of three enabling conditions: access to financial capital, targeted skills and business training, and a supportive institutional and policy environment that reduces structural barriers to market participation. When these conditions are present, rural women are better positioned to establish and grow enterprises that not only enhance household economic security but also contribute to broader rural economic development.

Women face systemic barriers such as limited access to finance, land, and education, which constrains their entrepreneurial potential. Sociocultural factors further compound these inequalities by restricting opportunities for women's economic participation (Kegnide et al., 2024). Addressing financial exclusion requires tailored financial products designed around women's realities, such as micro-loans with flexible repayment schedules aligned with harvest cycles, or credit models that leverage social collateral rather than requiring formal assets. Complementing these financial mechanisms, gender-sensitive policies are essential to dismantle structural barriers and create an enabling environment in which women entrepreneurs can fully participate in agricultural and rural development (Kowalewska, 2023). Employment diversification and rural-to-urban labor migration for seasonal work provides additional income streams, enhancing economic stability (Che et al., 2015).

Access to extension services and development activities helps equip women for rural development. Extension services offer technical training in horticulture and seed management, as well as offering digital tools for market data and financial literacy. Development activities include, for example, land rights certification in Ethiopia, a government-led program that issues land-holding certificates to rural households, including women, formally recognizing their rights to use and transfer land. Women's access has been shown to increase women's tenure security and bargaining power (Melesse et al., 2018). These interventions connect rural women with necessary resources. Cultural norms must also be considered, as prioritizing household duties over income-generating activities can hinder women's empowerment. Cultural factors and resource availability affect women's participation in income-generating activities (Wenda & Fon, 2021).

Empowerment indicators such as income, resource control, and decision-making power reflect program success. Empowerment activities have been shown to increase women's income and financial independence (Alkire et al., 2013). Women's increased decision-making power from these initiatives reflects broader economic and social shifts, as women gain greater control over resources, ultimately contributing to the well-being of rural communities.

Methodology

Our search strategy, developed by a lecturer from the University of Indonesia, Francisia Saveria Sika Ery Seda (Professor of Sociology, Faculty of Social and Political Sciences, specializing in development studies and social exclusion), Mia Siscawati (lecturer, Gender Studies Graduate Program and Department of Anthropology, specializing in gender and development policy), and Hariati Sinaga, (lecturer, Gender Studies Graduate Program, School of Strategic and Global Studies, specializing in feminist political economy and gender-labor relations), was designed to locate relevant literature for a systematic review. The search used the following terms: rural development, rural transformation, women's and rural development, women in rural areas and institutions, policy and investments (IPIs), opportunities and barriers for rural women, structural transformation in agriculture, off-farm employment, gender equality, gender inclusiveness, impacts, disadvantages, problems, constraints, strengths, and advantages. The literature search was conducted from January to March

2025. We used Boolean operators 'AND,' 'OR,' and 'NOT' to refine our search results.

The search aimed to create a comprehensive literature map of rural transformation (RT) and its effects on gender across disciplines. The search terms in the Scopus and Web of Science databases included agricultural sciences, multidisciplinary, environmental sciences, women's studies, business, fisheries, forestry, social science, and other relevant areas. From 499 initial Google Scholar records, 225 were excluded based on specific criteria: 34 non–peer-reviewed journals, seven duplicates, 149 records outside of our desired range of years (2015–2025), 58 studies irrelevant to rural transformation or gender inclusivity, 44 in which full texts were inaccessible, 31 records restricted to high-quality, peer-reviewed literature published in journals ranked within the Q1 to Q4 quartiles, 17 non-English papers, 30 without IPI linkages or developing-country focus, and four records lacking abstracts. These exclusions ensured that only high-quality studies were included in the Systematic Literature Review (SLR) framework.

Criteria for Inclusion and Exclusion

Our systematic literature review followed PRISMA guidelines for transparency, reproducibility, and rigor (Moher et al. 2009). Inclusion criteria used a modified PICO(S) framework: Population—women in rural transformation in developing countries; Intervention/Exposure—structural, cultural, economic barriers and opportunities (including IPIs); Comparator—not applicable; Outcomes—impacts on women's empowerment, wellbeing, productivity, and food security; and Study designs—peer-reviewed articles in English 2015–2025, with full-text access and clear links to gender/rural transformation dynamics. Restricting our study to include only English language papers ensured socio-cultural concept interpretation, while the 2015–2025 period captured post-Sustainable Development Goals (SDG) trends.

Extraction, Screening, and Review of Records

The screening process had three stages: (1) removing duplicates and initial screening of 499 records from Scopus and Web of Science, leaving 274 for full evaluation and excluding 225; (2) full-text assessment of 196 articles, excluding 78 for language (including 17 not in English); and (3) confirming eligibility of 184 articles, retaining 166 after excluding 18 misaligned with gender/rural transformation/IPIs. Two authors screened the articles independently, resolving conflicts with a third reviewer. The search used Boolean operators (AND/OR/NOT) with terms like "rural transformation OR rural development AND women OR gender OR empowerment AND barriers OR opportunities OR IPIs". Database searches were conducted from January–March 2025. This process enhances the validity of the study for replication and bias assessment per the PRISMA standard.

Data Extraction

A literature review was conducted to compile indicators related to rural transformation (RT), effects, gender inclusivity, and outcomes. Table 1 presents barriers to women and rural transformation outcomes. The identification method involved assessing the eligibility of full-text articles. Of the 184 full-text papers evaluated, 18 were excluded because they did not address women's roles and institutions, investments, and policies (IPIs) in developing countries. The remaining 166 papers were selected for their relevance to gender, rural transformation, and indigenous experiences (Figure 2). This screening ensured that the papers provided insights into gendered rural transformation.

Quality Appraisal

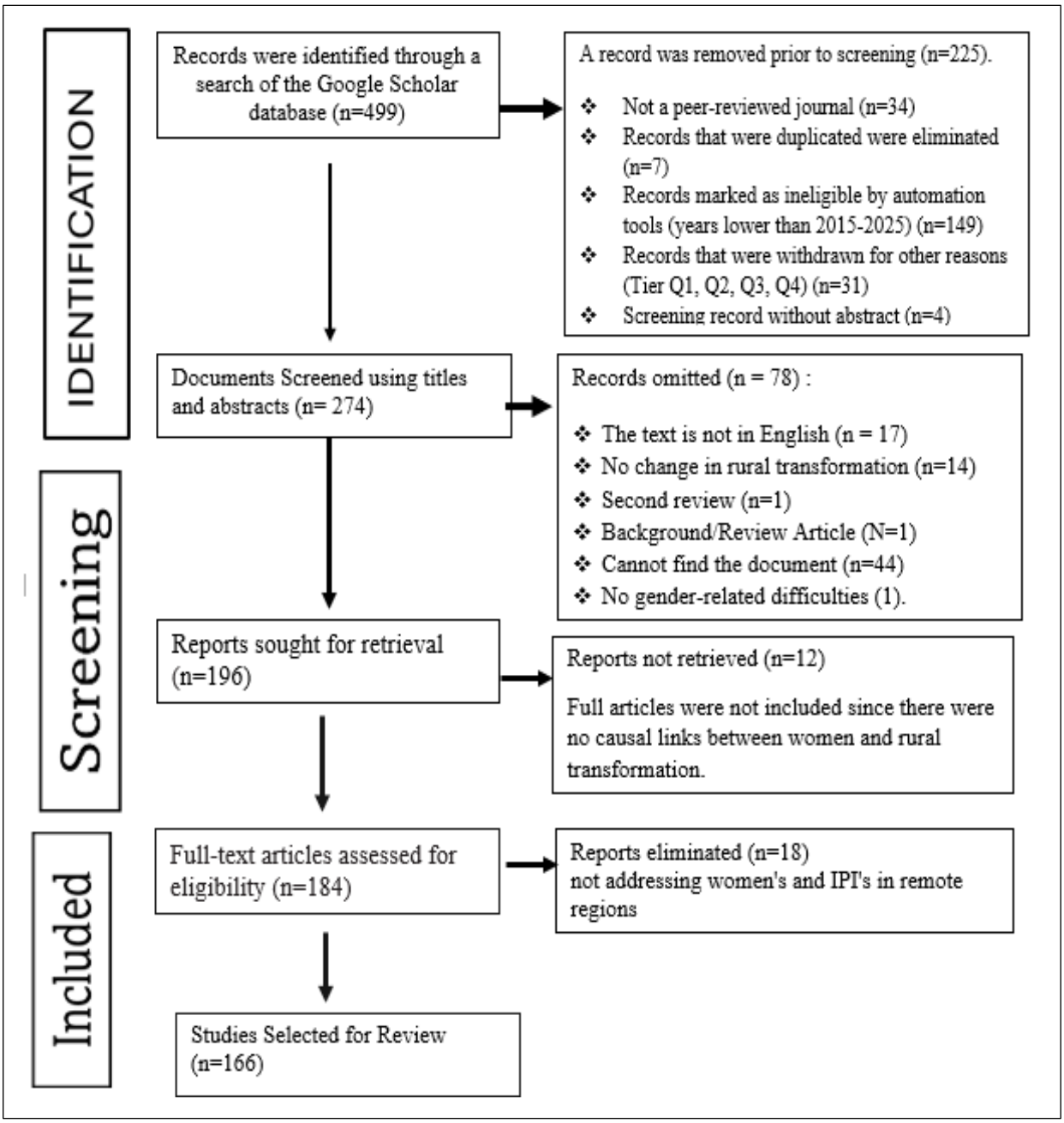
The methodological quality of the studies was evaluated for validity and reliability using PRISMA guidelines. Two reviewers independently appraised each study using the Covidence software, resolving discrepancies through consensus or a third reviewer. The Cochrane Risk of Bias tool, customized for diverse designs, assessed selection, performance, detection, attrition, and reporting bias, rating each as low, high, or unclear risk. Only high-quality evidence was included, retaining studies with a minimum quality score of 70%, and ensuring the final 166 papers provided robust insights into gender dynamics and rural transformation.

Results and Discussion

One hundred sixty-six articles were selected in

order to analyze the role of women in rural transformation in developing countries, organized by year (Figure 3). The first publication year was 2015, with significant growth in scholarly output from 2020 to 2024, surpassing earlier years. Fewer publications in 2018 indicate maturation after the 2015 Sustainable Development Goals and precede intensified research on gender-transformative rural development. Fluctuations in 2023 likely resulted from journal cycles or indexing lags by early 2025, demonstrating the growing focus on women's empowerment in developing nations.

Figure 2. Preferred Reporting Items for Systematic Reviews and Meta-Analyses



Set of reporting protocols that clearly outlines the steps undertaken in systematic reviews and meta-analyses.
https://www.prisma-statement.org/

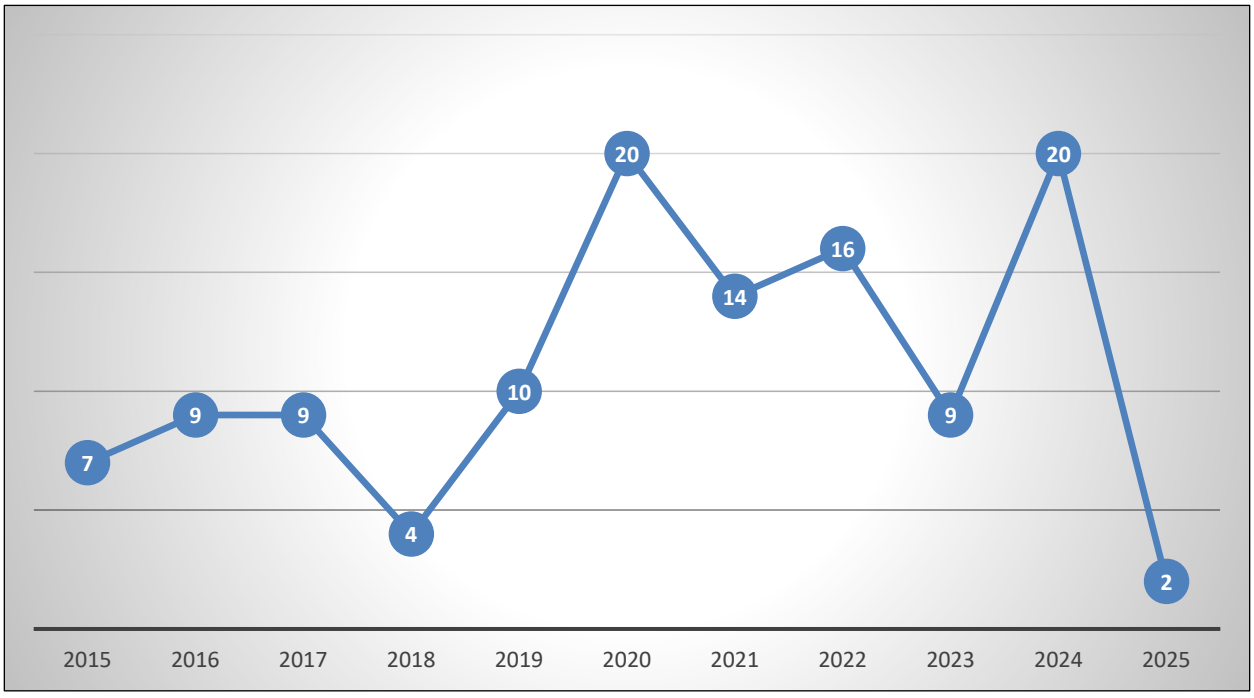
The synthesis of 166 studies shows overall that rural transformation increases women's labor participation in agriculture but often exacerbates inequalities. In South Asia, sub-Saharan Africa, and Latin America, women generally work 10–12 hours daily, balancing domestic and farm tasks. This coincides with a wage gap, women earning 20–30% less than men for similar work in regions such as India and Sub-Saharan Africa (McCarthy & Kilic, 2015). Technological interventions also present contradictions. While labor-saving technologies in Eastern Africa and Bangladesh reduce domestic burdens, evidence from Nepal shows that women's time poverty remains (Ghimire et al., 2024) without changes in gendered labor division. Non-farm sectors, such as Bangladesh's garment industry, offer more income stability, but cultural constraints and safety concerns limit women's access to urban labor markets (Stillman et al., 2020). These findings indicate that the success of rural transformation varies based on how local institutions address patriarchal norms.

Figure 4 shows the geographical distribution of studies across countries based on where they were conducted. Significant contributions from South America, Asia, and sub-Saharan Africa are highlighted. Notably, India (26), Bangladesh (18), Ethiopia (13), and Indonesia (12) have made substantial contributions. In addition, countries such as Nepal and Kenya (9) and Nigeria (8) demonstrate the global reach of this research.

A growing body of literature has linked gender and rural transformation: the 166 studies show the need to reconnect barriers and opportunities to their origins and consequences in agriculture. Barriers that affect women—limited access to land, credit, and technology—lead to lower yields, reduced crop diversity, inefficient use of inputs, and weaker value chain integration, all undermining sustainable food production. For example, without formal land titles —legal documents that prove ownership and enable access to credit and investment—women cannot secure climate-smart loans or make long-term soil-conservation investments, thereby undermining food system sustainability. Conversely, opportunities such as cooperative farming, digital services, and secure property rights enhance women's resource agency, thereby improving farm productivity and food security.

Through a gender-inclusive analytical framework, this paper examines well-being, employment, time allocation, and income as key dimensions

Figure 3. Year That the Studies on Women and Rural Transformation Were Published



through which barriers and opportunities shape women's agricultural outcomes. This paper evaluates how each barrier reduces farm productivity, how each opportunity strengthens value chains, and how policy contributes to building a resilient, equitable agri-food system. This helps keep discussions of women's empowerment grounded in agricultural development and sustainable food production goals.

Women's Wellbeing in Rural Transformation

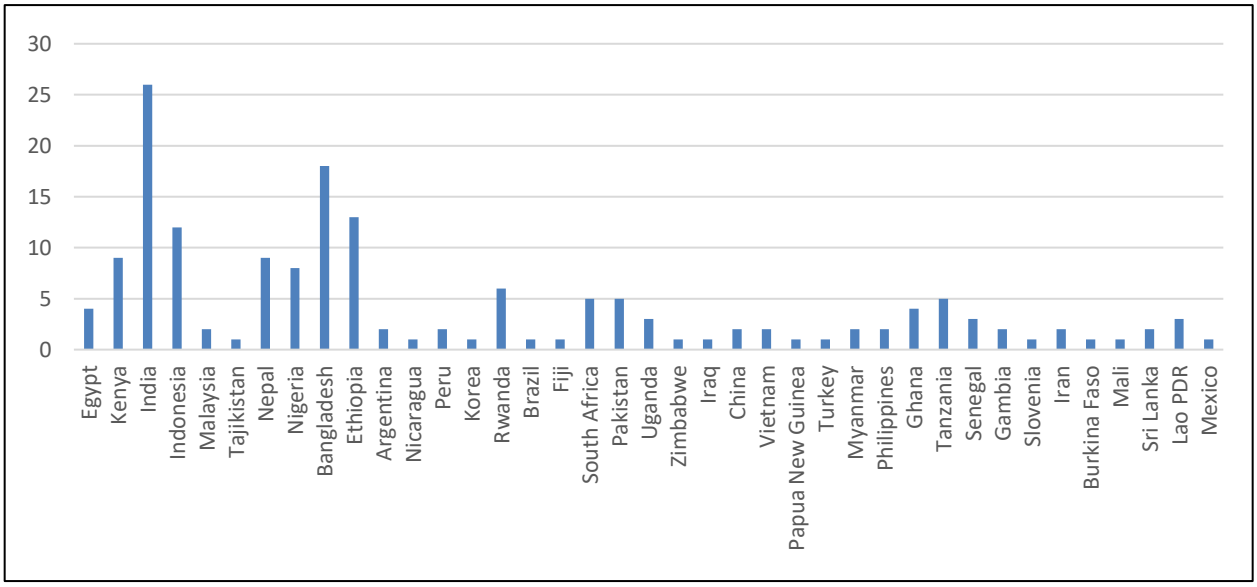
Rural transformation processes carry profound implications for women's overall wellbeing, extending beyond income and productivity to encompass health, safety, and quality of life. This section examines the specific barriers that constrain women's wellbeing within these processes, and the pathways through which transformation can support more holistic gains.

Barriers Faced by Women in Enhancing Well-being

Women's wellbeing in rural transformation is not just about economic growth or agriculture. It is affected by three constraints: limited access to healthcare, restricted control over resources, and cultural norms that affect mobility and decision making. These constraints reinforce each other, trapping women in poor health and food insecurity. For example, ethnic minority women in Vietnam have high childbirth rates but inadequate prenatal care due to transportation costs, language barriers, and the need for male accompaniment (Lotwel et al., 2021). These issues are common in South Asia, where traditional beliefs requiring male chaperones limit access to healthcare for women (Akram, 2018).

Women in rural areas are affected by limited control over agricultural resources by restricted access to resources such as fertilizer and extension services. Women often lack financial capital and are bypassed by extension services due to gender bias and household duties. In rural Sub-Saharan Africa, limited land control restricts crop diversity and causes food insecurity (Egger et al., 2022). Women's limited access to agricultural inputs leads to nutrient-deficient diets (FAO, 2023). Agricultural extension services are male-biased, focusing on women's household roles and thus limiting yield improvements (Biswas et al., 2022), a barrier undermining sustainable food production. Exclusion from technical training delays adopting sustainable practices such as pest management, crop rotation, and soil conservation. Transitioning to sustainable agricultural systems is delayed without equitable access to climate-resilient and ecological farming techniques. Cultural norms, particularly patriarchal traditions, restrict women's access to

Figure 4. Geographical Distribution of Case Studies in Developing Countries



education and healthcare and prioritize sons' education, and domestic duties pull girls from school early. Women lack decision-making autonomy in healthcare and fund allocation. As shown in Table 1, traditional South Asian beliefs frequently discourage women from seeking outside healthcare, especially when male accompaniment is required (Akram, 2018).

Thirty identified barriers in the surveyed literature fall into four domains: economic (credit, land, technology), socio-cultural (patriarchal norms, mobility limits, time poverty), institutional (discriminatory laws, weak services), and psychological (low confidence, lack of awareness). These domains reinforce each other: time poverty (socio-cultural) worsens wage disparities (economic), limiting women's ability to challenge discriminatory laws (institutional). Table 1 lists all barriers, with time poverty, land tenure insecurity, and wage discrimination especially significant.

From Barriers to Empowerment: Rethinking Well-Being

Previous studies reveal that wellbeing improves when interventions address multiple constraints simultaneously. For instance, access to land alone is insufficient. A study in sub-Saharan Africa showed that equal land access for women increased yields by 20–30% but only with additional investments in extension/technical services, access to credit and legal literacy (Njuki et al., 2025). Without these, women with land titles lacked the knowledge or status to use land effectively. Similarly, women's empowerment is linked to household nutrition improvements. When women control food production, nutrition improves as they prioritize children's dietary needs, not because they are more nutrition-conscious, but because they control resources (Rola-Rubzen et al., 2024). This suggests that resource transfers to women without enhancing decision-making authority may not meet nutritional goals.

Technology presents a mixed picture. Digital literacy programs in Kenya have successfully provided rural women with tools to access health information, improving their ability to navigate health challenges (Sánchez-Riofrío et al., 2024). However, it has been found that technology adoption alone, without changes in gendered labor division, rarely reduces women's time poverty. Simply giving a woman a smartphone does not automati cally give her the time or resources to use it. This tension between technological potential and social reality recurs throughout the literature and will be explored further in the following sections.

Policies to Enhance Women's Well-Being

Improving women's well-being is linked to socio-economic interventions, including food security, diet quality, and health. Nutrition and women's empowerment policies show promise across regions. In Bangladesh, training women in vegetable gardening improved household nutrition and income control (Rola-Rubzen et al., 2024). Similarly, Ethiopia's land rights program for over two million women enhanced vegetable production and resource agency (Diiro et al., 2018). Women Farmers Groups (Kelompok Wanita Tani) in rural Indonesia enhance food security by increasing women's control over agriculture and income: Control over agriculture is achieved through direct involvement in food production activities, while control over income comes through women's groups organizing collective marketing of agricultural products, which channels earnings directly to members rather than through male-headed household intermediaries (Mudatsir & Sumarni, 2025). To empower women in food production impacts household nutrition (Prihatiningtyastuti, 2020). Such initiatives provide women with tools to improve family health (Mutiara et al., 2022). Access to women's healthcare, especially reproductive services, is crucial. In regions with healthcare barriers, enhancing reproductive health services can be transformative (Anderson et al., 2021). In Ethiopia, reforms to maternal and child health access have improved outcomes for rural women and children (Bhorse et al., 2024). Women's wellbeing in rural transformation depends less on economic growth and more on investments in healthcare access, nutrition-sensitive agricultural policies, and domestic labor redistribution.

Participation of Women in Rural Transformation

Transforming rural areas for women involves removing barriers to their agency and decision

Table 1. Barriers to Women in Rural Transformation

No.	Barriers to Women in Rural Transformation		
1	Gender-Specific Challenges Women face unique challenges in labor force participation that require targeted policy beyond general economic measures (Islam et al., 2022).	16	Economic Dependency Women often work informally or unpaid on family farms, limiting their household decision-making power, as they usually work only to meet basic needs and lack economic empowerment (Akram, 2018).
2	Limited Access to Resources Women often work informally in family farming, thereby limiting their household decision-making power, as they are employed solely for basic needs (FAO, 2023; Mutiara et al., 2022; Njuki et al., 2025; Rola-Rubzen et al., 2024).	17	Employment Opportunities Women face barriers accessing paid employment. Societal perceptions against women working outside the home and safety concerns about transportation and workplace harassment limit opportunities. (Akram, 2018).
3	Cultural Norms and Social Norms Gender roles and cultural norms restrict women's engagement with technology, discouraging digital literacy and limiting opportunities. Taboos prevent women from seeking employment outside homes (Akram, 2018; Chimerah, 2018; FAO, 2023; Kumar et al., 2024; McGuire et al., 2022; Mutiara et al., 2022; Rola-Rubzen et al., 2024).	18	Awareness of Rights Due to limited education many women are unaware of their legal rights and lack access to the legal system, restricting their self-advocacy (Alemu et al., 2018).
4	Underrepresentation in Decision-Making Women are underrepresented in decision-making, which limits their influence on policy (Pattnaik & Lahiri-Dutt, 2020).	19	Access to Social Networks Lack of supportive social networks hinders women's empowerment. While self-help groups help share experiences, they often face resistance in conservative settings (Bhattacharjee, 2016).
5	Economic Disparities Women have less access to economic resources than men. Female farmers and entrepreneurs face limited access to land and credit, restricting their livelihoods and development. This is the consequence of market failures and institutional biases that favor men (Mutiara et al., 2022). Policies that promote gender equality often fail. They must improve women's ownership rights and correct institutional biases. Women's minimal participation in political decision making limits their power and economic involvement (Chimera, 2018; FAO, 2023).	20	Social and Political Participation While women participate in social and political groups, their influence in decision making may be limited, affecting their ability to advocate for community needs (Mulema et al., 2019). As women take on more agricultural roles due to feminization, they face increased workloads without improved well-being, limiting their economic engagement (Rubzen et al., 2023).
6	Gendered Digital Gaps Significant gender disparities exist in access to digital technology. Women face barriers to accessing digital skills and tools, contributing to a broader divide (Vuciterna et al., 2024).	21	Dependency on Male Labor When husbands work in wage labor, women take on agricultural tasks, becoming overburdened and unable to pursue opportunities (Mutiara et al., 2022).
7	Limited Learning Opportunities Women in rural areas have fewer educational resources and opportunities for digital training, which limits their digital literacy (Kumar et al., 2024).	22	Time Poverty Women face time constraints from household and agricultural duties, hindering their ability to attend training to enhance farming knowledge (Hanafiah et al., 2022).
8	Psychological Barriers Women may experience low confidence in using technology due to societal perceptions and exclusion, deterring them from seeking digital literacy training (Kumar et al., 2024).	23	Wage Disparities/Limited Control Over Income Women earn less than men for the same work. Men earn ₹300–350 (US$3.24–$3.78) daily, but women earn ₹200–250 (US$2.16–$2.70). This gap undervalues women's agricultural work. Although women increasingly engage in paid agricultural and non-farm work, their earnings often go to male household members, limiting financial independence (Singh et al., 2023).

Continued

Table 1 continued

Barriers to Women in Rural Transformation			
	Limited Access to Education and Health Services		Limited Access to Extension Services
9	Girls and women face barriers to education and healthcare. Ethnic minority women in Vietnam often experience childbirth without prenatal care, demonstrating the access limitations (Akram, 2018; Lotwel et al., 2021; Mutiara et al., 2022b; Petesch et al., 2022; Rola-Rubzen et al., 2024).	24	Agricultural extension services show male bias, focusing on women's household roles rather than productive roles. This limits women's ability to improve agricultural yields (Biswas et al., 2022).
	Legal and Institutional Barriers		Increased Workload
10	Discriminatory laws limit women's ability to own assets by restricting inheritance rights to land and property, hindering their economic independence (Akpan, 2015).	25	Rural transformation nevertheless can increase women's domestic responsibilities as they juggle work and household duties, straining their well-being (Rubzen et al., 2023).
	Lack of Supportive Policies		The Feminization of Agriculture
11	Policies that promote gender equality often fail. They must improve women's ownership rights and correct institutional biases. Women's minimal participation in political decision making limits their power and economic involvement (Chimera, 2018; FAO, 2023).	26	As women take on more agricultural roles due to feminization, they face increased workloads without improved well-being, limiting their economic engagement (Rubzen et al., 2023).
12	Resistance to Gender Equality		Religious Barriers
	The agricultural sector resists gender equality and feminist principles, which are crucial for women's empowerment (Njuki et al., 2025).	27	Religious beliefs restrict women's mobility and decision-making. In some Kenyan Muslim communities, women need male accompaniment outdoors, limiting economic activities (Chimerah, 2018).
	Vulnerability in Employment		Limited Access to Finance
13	Women in informal employment face lower wages and job insecurity, limiting their ability to invest in skills or businesses for advancement (Briliyanto & Harsanti, 2022).	28	Gender bias and limited technology access make financing barriers for women traders, hampering market competition and information access (Mohapatra, 2016).
	Impact of Climate Change		Mobility Constraints
14	Climate change significantly challenges rural and indigenous women reliant on traditional agriculture, disrupting practices and affecting livelihoods (Ngo & Tran, 2024).	29	Poor infrastructure in rough terrain, such as in the Hindu Kush Himalaya (HKH) region in Pakistan, restricts women's mobility. Poor transportation and inadequate roads can disrupt trade during adverse weather (Petesch et al., 2022).
	Lack of Technological Adoption		Safety Concerns
15	Women face barriers in agriculture due to limited access to information and resources, hindering their use of technologies that could enhance productivity (FAO, 2023).	30	Violence and harassment deter women traders from formal cross-border trade, leading to a preference for informal markets (Petesch et al., 2022).

making. The Rural Women's Empowerment framework illustrates how transformation impacts women's well-being through employment, income, and empowerment. Agricultural shifts, such as moving to high-value crops and mechanized farming, can alter labor demands, thus easing physical burdens but also increasing time poverty if women manage farms without changing their domestic roles. Non-farm diversification offers alternative income, such as off-farm labor and rural enterprise. However, the ability of women' to seize these opportunities is limited by household duties and cultural mobility restrictions. Transformation impacts empowerment through education, assets, and information access, affecting well-being and food security.

Barriers to Women's Employment in Agriculture

Rural women face significant barriers in employment. Studies in India show that many women farmers perform unpaid labor on family farms, increasing economic dependence on male household members (Akram, 2018), limiting labor market participation. In Kenya, cultural norms confine women to the home, restricting agriculture and paid employment (Tavenner et al., 2019). Women face barriers to formal employment due

to household management expectations. FAO (2023) and Mutiara et al. (2022) note safety concerns, such as workplace harassment in male-dominated industries, vulnerability during transportation to distant labor markets (Akram, 2018), and violence in cross-border trade (Petesch et al., 2022). These concerns tend to confine women to low-wage agricultural work near their homes. A Bangladesh study shows that cultural expectations constrain women's labor migration (Amirapu et al., 2022). When migrating for work, women face additional risks such as harassment and exploitation, hindering their economic prospects (Petesch et al., 2022). These constraints prevent rural women from accessing stable employment outside home.

Time Poverty as a Structural Barrier and the Limits of Technological Fixes

Among the 30 barriers in Table 1, time poverty is uniquely pernicious as it undermines women's health, limits economic participation, and blocks empowerment access. Across South Asia, sub-Saharan Africa, and Latin America, women in rural households spend 10–12 hours daily on domestic chores such as cooking, cleaning, fetching water, and childcare, and the agricultural tasks of planting, weeding, and harvesting. The double burden leaves little time for income-generating activities, skill-building, or community leadership (Hanafiah et al., 2022; Mulema et al., 2019).

Time poverty has gendered roots. The feminization of agriculture, as men move to urban jobs and women manage farms, increases women's workloads without transferring resources or decision-making power (Rola-Rubzen et al., 2023). Female-run households face severe time poverty, due to having to juggle farm and domestic duties by themselves. Exhausted women miss empowerment training and labor-saving technologies, perpetuating time poverty. Can technology help? Evidence is mixed that technology can alleviate time poverty. In Eastern Africa, mechanized tools like motorized threshers reduce women's agricultural task time, allowing them to free up hours for trade or rest (Njuki et al., 2025). In Bangladesh, digital tools that provide market prices and weather updates save time and boost incomes (Sánchez-Riofrío et al., 2024). Despite these promising technologies, a Nepal study indicated that women's work remained high despite time-saving technologies, due to unchanged gender norms (Paudel et al., 2020). Men have not taken on domestic tasks, reallocating the time women saved to additional duties, making technology actually a labor intensifier. This indicates that technology alone is insufficient; interventions must redistribute domestic labor by promoting men's caregiving roles, investing in childcare and water infrastructure, and challenging norms equating women's worth with productivity. Two strategies can help address the problem: infrastructure investments that reduce domestic workload, such as clean water, electricity, and childcare, positively affect women's time; and collective approaches, such as cooperative farming and shared childcare, allow resource pooling and responsibility rotation (Koolwal, 2021; Levien, 2017). Collective efforts create slack that individual households cannot achieve (de Hoop et al., 2023). Both strategies address structural roots of time poverty, rather than just symptoms. In general, time poverty among women is not an inevitable outcome, but rather a structural condition that can be addressed through deliberate policy choices and institutional investment. Where governments and organizations invest in gender-sensitive infrastructure, labor-saving technologies, social norm change, and collective support systems, women's time poverty decreases. Without these, even the best technologies fail to empower. This lesson—that technical fixes need social complements—will recur in the next section on income and empowerment.

Difficulties Facing Women's Income

Income stability is a major issue for rural women in the informal agricultural sector and unpaid farm work. In rural India, women rely on seasonal crops and face income fluctuations hindering investment in sustainable farming. They often perform unpaid or informal labor on family farms, which does not provide enough income (Akram, 2018). This insecurity increases dependence on male household members, limiting decision making over farm inputs, crop choices, and food sales. Women in agricultural work face a wage gap, a disparity salient in male-dominated settings, despite equal contribu-

tions by women (Singh et al., 2023). The wage gap restricts their income stability, with male members often controlling women's wages. Studies from Southeast Asia and Sub-Saharan Africa show rural women entrepreneurs struggle to secure loans due to gender bias in financial institutions (Mohapatra, 2016). Without access to credit, women cannot expand businesses or access better opportunities, perpetuating gender inequality.

Barriers to Women's Empowerment

Women's empowerment is influenced by education access, income and asset control, and gender roles. A study in rural Pakistan showed cultural beliefs prioritize male education, limiting women's education access (Malik et al., 2025). Many rural women lack skills for economic activities or leadership roles (Kumar et al., 2024). Educational opportunities, such as vocational training and agricultural programs, focus on domestic skills over digital literacy or business management, limiting economic empowerment (Akpan, 2015). A study in rural India found women in agriculture receiving lower wages than men, with women earning approximately ₹200–250 (US$2.16–$2.70) per day compared to men's ₹300–350 (US$3.24–$3.78) per day—a gap that undervalues women's agricultural labor, with male household members often controlling their income (Briliyanto & Harsanti, 2022). This financial dependence limits independent decision-making (Singh et al., 2023). Wage gaps restrict women's economic status improvement. Absence of supportive social networks hinders empowerment in conservative cultures (Bhattacharjee, 2016).

Opportunities for Women's Participation in Rural Transformation

Women's participation in rural and urban areas is key to sustainable development, offering socio-structural, economic, and cultural opportunities. Effectively harnessed, participation can address systemic inequities and foster inclusive growth. Consistent with the Women's Empowerment in Agriculture Index (WEAI) framework, opportunities are categorized into five domains: productivity, resources, income, leadership, and time. The domains demonstrate how interventions target empowerment dimensions, with potential to transform women's lives and benefit society (Table 2).

Employment Opportunities for Women

Labor market access is critical for women's economic empowerment. A Bangladesh study shows the impact of increasing employment in non-farming sectors: from 2005 to 2016, women's employment participation increased 10%–28%, labor market identifies the expansion of the ready-made garment (RMG) export sector as a primary driver of rising non-agricultural employment for women (Islam & Islam, 2015). This employment shift has been linked to genuine empowerment gains: Female garment workers report increased economic autonomy, confidence in household decision-making, and self-esteem, though critical constraints including workplace harassment and limited control over earnings continue to limit the extent and sustainability of this empowerment (Al Mamun & Hoque, 2022). However, women's access to agricultural resources remains limited, affecting their productivity (Islam et al., 2022). In rural India, women often work unpaid on family farms. Studies show women receiving training in technical agricultural skills, digital literacy, financial management, and leadership increase productivity and engage in more diverse activities (Armbruster et al., 2019). In Nepal, women using efficient farming technologies, such as mechanized tools and high-value inputs, saw increased profitability. However, due to gendered labor divisions, these technologies did not reduce total work hours. In Kenya, cultural norms prevent women from accessing urban jobs, and migrant women face harassment in male-dominated industries (Petesch et al., 2022). In China, areas with stronger maternity policies have reported higher participation in formal labor markets (Shen et al., 2024).

Time Allocation and Women's Empowerment

Time allocation significantly hinders women's economic advancement. Women in rural areas spend long hours on domestic and agricultural tasks. A South Asian study found that rural women work 10–12 hours daily on household and farm labor,

limiting income-generating activities (Petesch et al., 2022). Labor-saving agricultural technologies can reduce this burden. In Eastern Africa, mechanized farming tools have helped women reduce the time spent on farming, thereby enabling economic activities (Njuki et al., 2025). Interestingly, while digital technologies in Bangladesh reduced time poverty, similar interventions in Nepal failed to do so, suggesting that technology alone is insufficient without shifts in gendered labor norms (Sánchez-Riofrío et al., 2024). In Nepal, despite time-saving technologies, women's work burdens remain high due to entrenched gendered labor divisions that limit women's access to and adoption of the technologies (Paudel et al., 2020). This reflects a broader global pattern: rural transformation does not automatically translate into gender equity without deliberate policy interventions addressing time management and shared responsibilities (Rubzen et al., 2023).

Table 2. Opportunities for Women's Empowerment in Agriculture

No.	Productivity	Resources	Income	Leadership	Time
1	Enhanced healthcare access for women in developing regions correlates with improved productivity and economic participation (Langer et al., 2015).	Equal access to productive resources such as land elevates agricultural yields and mitigates global hunger (Chimera, 2018; Njuki et al., 2025).	Direct access to financial services such as credit enables investments in children's health and education (Chimerah, 2018).	Training programs build women's human capital, enhancing nutrition outcomes and community respect (Chimerah, 2018).	Labor-saving technologies free women's time for market participation (Armbruster et al., 2019).
2	Agricultural technologies boost farming productivity and livelihoods in the Global South (Njuki et al., 2025).	Policy interventions eliminate discrimination in resource access (Armbruster et al., 2019).	Digital literacy fosters economic independence through remote work and entrepreneurship (Kumar et al., 2018).	Farm group participation strengthens social capital in agriculture (Quisumbing et al., 2023).	Maternity leave policies balance work-family demands (Shen et al., 2024).
3	Expansion into garment sectors diversifies women's roles beyond agriculture (Suyatno et al., 2021).	Women's organizations advocate for equal program participation (Rola-Rubzen et al., 2023).	Skill development via vocational training improves workforce competitiveness (Kumar et al., 2018).	Household resource access amplifies women's decision-making voice (Dula, 2019).	Technological tools reduce time burdens in farming (Njuki et al., 2025).
4		Natural resource management leverages women's traditional knowledge for sustainability (Hanafiah et al., 2022).	Networking systems support employment and market access (Ojo & Baiyegunhi, 2023).	Education enhances leadership in cooperatives (Hanafiah et al., 2022).	Legal reforms secure inheritance rights, enabling time flexibility (Arceño & Sarino, 2024).
5			Cooperative memberships overcome barriers to market resources (de Hoop et al., 2023).	Media and nongovernmental organizations (NGOs) raise awareness for rights advocacy (Kumar et al., 2018).	
6			Training in digital skills boosts employability (Sánchez-Riofrío et al., 2024).	Feminist scholarship recognizes women's agency in development (Rubzen, 2024).	
7			Reforms in property rights promote economic autonomy (Shen et al., 2024).	Information access via digital literacy informs decisions (Petesch et al., 2022).	
8			Trade initiatives facilitate market entry (Achatz et al., 2022).	Self-help groups develop entrepreneurial skills (Rola -Rubzen et al., 2023).	

Note: Cells are sequentially assigned to the WEAI dimension that best reflects their primary conceptual alignment. Items relevant to more than one dimension are classified under the most salient category, while empty cells indicate no additional distinct items were identified for that dimension.

Enhancing the Earnings Capacity of Women

Income stability is essential for women's empowerment in rural areas, where women rely on informal, seasonal work. A study in Bangladesh found that women in the garment industry, a major employer, with increased female employment from 2005 to 2016 (Arceño & Sarino, 2024), earned more stable incomes than those in agriculture (Suyatno et al., 2021). This stability enables women to improve their household's economic conditions and invest in education and healthcare. While the garment sector in Bangladesh has provided a pathway to stable income for women (Suyatno et al., 2021), the same cannot be said for agricultural labor in India, where a 20–30% wage gap persists despite equal productivity. Women often have little control over earnings, as wages are managed by male household members (Singh et al., 2023). Addressing these disparities through policy reforms is critical for improving women's economic independence. A study in Sub-Saharan Africa found that women with access to financial services were more able to invest in businesses, thereby increasing income stability (Chimerah, 2018). Future research should evaluate the scalability of interventions to expand women's access to financial services. This includes assessing tailored financial products, such as credit models that use social collateral and harvest-aligned repayment schedules, to reduce dependence on informal markets. Financial inclusion empowers women to manage their income and invest long-term.

Opportunities for Women's Empowerment in Agriculture

Education and skills development are vital for women's empowerment. A rural Kenya study found that women provided with vocational training expanded their economic opportunities and became more active in household decision making (McKenzie & Puerto, 2021). Digital literacy programs in Uganda have shown how technology enhances women's access to employment and financial services (Sánchez-Riofrío et al., 2024). Furthermore, cooperative memberships, which increase women's bargaining power more than individual interventions, provide women with better market access, helping them overcome barriers through collective action (de Hoop et al., 2023)'. Control over income and assets is critical for empowerment. In South Asia, women's access to land ownership rights has improved their financial independence and decision-making power (Akpan, 2015). Women with property rights have the ability to secure loans and start businesses (Shen et al., 2024). Cultural barriers, however, remain challenging. In Kenya, patriarchal norms have restricted women's access to land, even as primary agricultural workers (Padmaja et al., 2020). Legal reforms that ensure women's property rights would help secure their economic futures. Studies by women's organizations in rural Africa, such as agricultural cooperatives in Uganda and Self-Help Groups (SHGs) in Ethiopia, show that including women in decision making leads to equitable outcomes in agriculture and resource management (Pattnaik & Lahiri-Dutt, 2020. These organizations help women advocate for their rights and pressure governments to implement inclusive programming. To expand, they need resource pooling, responsibility rotation, and funding to overcome household constraints. Collective action through memberships significantly strengthens women's bargaining power and market access compared to individual interventions (Fay et al., 2023).

Implications for Policy and Practice

The 30 policy interventions in Table 3 share a common weakness: Most are designed to address single barriers in isolation. Yet the evidence synthesized in this review points to a different conclusion—effective policy must treat gender inequality as a system of mutually reinforcing constraints rather than a collection of independent problems. We distill the literature into three cross-cutting policy priorities, each with concrete mechanisms and caveats.

Policies to Support Women's Employment

Policies improving women's access to diverse employment opportunities are fundamental for gender equality in the labor market. In Ethiopia, family law reforms have empowered women with the legal right to work outside the home. This reform, requiring both spouses' consent to administer family property, has enabled women to engage

in off-farm employment (Mulatu, 2020), enhancing women's economic autonomy and contributions to household income. Programs promoting women's entrepreneurship and access to formal labor markets are key to addressing gender inequalities. Conditional transfer programs targeting women in sub-Saharan Africa have improved their labor market participation by supporting educational and health needs. In Uganda, these programs have increased women's participation in formal labor markets (Diiro et al., 2018). Policies should target the structural barriers women face. Market access can be improved through initiatives such as border markets and international fairs. Policies should pro-

Table 3. Policies for Women's Empowerment in Agriculture

No.	Policies for Women's Empowerment in Agriculture		
1	Understanding Specific Issues Policymakers need to understand issues in order to design effective interventions. Developing tools to address barriers to women's nutrition and empowerment is essential. Policies using household-level approaches can promote gender equality (Kelkay, 2022).	16	Reconciliation of Legal Systems In countries with multiple legal systems, aligning customary and statutory laws is crucial. Laws that comply with constitutional rights can eliminate inconsistencies that disadvantage women's economic autonomy (Akinola, 2018).
2	Conditional Transfer Program Policies should focus on reducing gender inequalities by promoting girls' education and women's health interventions. Conditional transfers to women have improved education, health, and nutrition (Diiro et al., 2018).	17	Mentoring and Training Programs Mentoring and training initiatives help women develop the skills and confidence necessary for leadership roles, thereby supporting their career advancement (Njonge, 2023).
3	Influencing Economic Incentives and Social Norms Policies shape economic incentives and social norms that determine women's labor force participation, types of work, and pay (Tiwari & Joshi, 2016).	18	Leadership Development The development of policies on women's leadership skills is crucial, including training programs for decision-making roles (Nurdin, 2022).
4	Gathering Sex-Disaggregated Data Sex-disaggregated data are crucial for policy design, helping to understand gendered impacts and ensure employment quality for all (Heckert et al., 2021).	19	Regular Reviews of Gender Equality Efforts Governmental bodies, agricultural cooperatives, and development NGOs should review gender equality policies and frameworks regularly to align with women's empowerment goals (Mutiara et al., 2022a; Ngo & Tran, 2024).
5	Promoting Decent Work The United Nation's "Decent Work" agenda focuses on employment, social protection, labor standards, and social dialogue to achieve productive employment for all (Christiaensen & Maertens, 2022).	20	Gender-Transformative Approaches Gender-transformative approaches are vital for changing social norms. They are cost-effective but need development for large-scale implementation (Kristjanson et al., 2017).
6	Inclusive Digital Literacy Programs Governments should develop programs providing digital skills training for women to ensure equal access to technologies and the internet, bridging the gender digital divide (Shenbei et al., 2023).	21	Education and Training Gender-transformative messaging can shift societal norms. Training programs that address gender stereotypes and promote women in agriculture are vital. Policies to expand women's education access through scholarships and safe institutions are essential (Bhandari, 2017).
7	Providing Access to Technology Policies should ensure gender-inclusive digital access by providing affordable internet access and devices to rural women, enabling digital participation (Issa, 2019).	22	Involvement of Men Encouraging men's involvement in caregiving and household duties can redistribute gender roles, improving gender relations and women's empowerment (Theeuwen et al., 2021).
8	Awareness Campaigns Campaigns to raise awareness about women's empowerment and digital literacy can change societal attitudes and encourage support for women's participation in digital spaces (Wulandari et al., 2017).	23	Inclusive Policy Design Policies must target gender equality and women's empowerment. Despite inclusive policy designs, implementation is challenging. Policies should integrate gender perspectives into rural development by ensuring women's access to resources, markets, and decision making, empowering them economically and socially (Andersson et al., 2022).

Continued

Table 3.

No.	Policies for Women's Empowerment in Agriculture		
	Targeted Interventions		Economic Empowerment Programs
9	Initiatives should promote women's digital skills acquisition, including NGO and community partnerships to deliver rural women-tailored training and resources (Chintakindi, 2019).	24	Programs supporting women's entrepreneurship with microloans, business training, and networks can boost women's economic status. Low-interest, collateral-free credit and social protection help women entrepreneurs mitigate trade risks (Abbott et al., 2015).
	Infrastructure Improvements		Health and Reproductive Rights
10	Enhancing infrastructure, such as access to water and electricity, can reduce women's time spent on domestic work, thereby increasing their labor force participation. (Levien, 2017).	25	Access to healthcare, including reproductive services, is vital for women's empowerment. Policies should prioritize healthcare and education (Bhorse et al., 2024).
	Childcare Services		Community Support Programs
11	Providing affordable childcare services, such as Mobile Creches in India, supports women in the informal sector, helping them balance domestic duties with work, enabling fuller workforce participation (Koolwal, 2021).	26	Community programs and women's groups, such as Selembar Daun in rural Indonesia, facilitate collective action and provide training in agriculture, business, and leadership to increase women's control over income (Mutiara et al., 2022a).
	Property Rights		Equal Pay for Equal Work
12	Legal reforms securing women's property rights are fundamental. Eliminating discriminatory laws allows women to control assets and gain independence. Women's rights to agricultural land affect empowerment and food security. In matrilineal societies such as Nagari Indudur in West Sumatra, Indonesia, policies should ensure that women inherit property (Mutiara et al., 2022).	27	Implementing equal pay for women who perform the same work as men is crucial. Despite anti-discrimination clauses, women continue to face wage discrimination. Addressing this gap can improve women's economic status and agricultural participation (Singh et al., 2023).
	Employment Rights		Encouragement of Women's Participation in Governance
13	Legal frameworks that support women's entrepreneurship by expanding access to credit and simplifying business registration can facilitate their entry into businesses and enhance their opportunities (Mulatu, 2020).	28	Policies should facilitate women's participation in governance to ensure that their needs are addressed in community plans (Mulyoutami et al., 2012).
	Legal Frameworks for Business		Incorporation Into Formal Businesses
14	Legal frameworks that support women's entrepreneurship by facilitating access to credit and business registration can streamline startup processes and enhance economic opportunities (Kasim et al., 2024).	29	Policies should integrate female traders into formal businesses, especially in high-value sectors such as horticulture, livestock, fisheries, and non-farm enterprises. This helps women access better resources and markets (Njonge, 2023).
	Protection Against Discrimination		Systematic Dialogues
15	Legal reforms against workplace discrimination create equity and encourage women's workforce participation through legal recourse (Addinsall et al., 2023).	30	Dialogue between border agencies and countries can address bureaucratic challenges women traders face at borders (Pécot et al., 2024).

mote financial products such as low-interest, collateral-free credit, and microloans with flexible repayment. Training barriers can be addressed through vocational programs and digital literacy initiatives, equipping women with the necessary skills for agri-food leadership.

Policies Reducing Domestic Burden for Women

The reconciliation of domestic duties with income-generating activities involves various factors beyond infrastructure. Improved electricity and water services reduce time on chores, increasing workforce participation. For example, electrification in rural sub-Saharan Africa boosts women's

labor force involvement by reducing time spent on firewood and water collection (Koolwal, 2021; Levien, 2017). However, these benefits vary, and depend on factors such as cultural norms, childcare availability (e.g., India's Mobile Creches), task-sharing cooperatives, and technology adoption, which without normative changes may increase workloads. Future research should employ intersectional longitudinal designs to examine how age, ethnicity, and household structure influence infrastructure interventions across regions. These studies should include evaluations of digital tools and green innovations aimed at reducing time poverty. At the policy level, global interventions should expand gender-responsive infrastructure through frameworks like the Sustainable Development Goals (SDGs) and the FAO '2026 International Year of the Woman Farmer. Infrastructure investments must include legal reforms of property rights, gender data monitoring, and partnerships among governments, NGOs, and cooperatives to ensure systemic change.

Policies to Increase Women's Income

Income instability challenges rural women due to reliance on seasonal agriculture and informal labor. Unlike urban or non-farm industries which offer stable, year-round wages, rural agricultural work fluctuates with harvest cycles and weather. Additionally, mobility and safety constraints limit women's access to urban labor markets, perpetuating economic dependence. Policies that enhance women's access to income-generating opportunities are crucial for economic empowerment. Microfinance has been pivotal in improving women's income stability. The Grameen Bank in Bangladesh, for example, has provided small loans to rural women, enabling them to start businesses and improve their incomes (Grameen Bank, 2026). This model has a positive impact on countries such as Bangladesh, Kenya, Ethiopia, and Ecuador (Abbott et al., 2015; Chimerah, 2018; Mulatu, 2020; Sánchez-Riofrío et al., 2024). Tailored financial products, such as micro-loans with flexible repayment aligned with harvest cycles, have enabled women to start businesses and stabilize household income.

Long-term success requires removing barriers like limited market access. Policies must secure property ownership and income growth to enhance women's economic independence. Legal reforms granting women equal land rights, as in Ethiopia, enable investment. As in the production of candlenut oil in Indonesia's Nagari Indudur, policies should protect traditional female property rights (Mutiara et al., 2022). Financial institutions should offer micro-loans with social collateral and flexible repayments to reduce informal market dependence. Financial stability can be bolstered through cash transfer programs, simplified business registration, and gender audits to address wage disparities (Akinola, 2018). Secure property rights enable women to invest in agriculture and businesses, leading to sustainable incomes. Policies enforcing equal pay and transparency are essential. Gender audits in countries like Uganda have helped address wage disparities (Singh et al., 2023). Legal reforms granting women equal rights to own, inherit, and control land and assets enhance economic independence. In matrilineal societies, like regions of Indonesia, reforms ensuring women's property rights have increased economic security and autonomy (Mutiara et al., 2022)

Policies for Women's Empowerment in Agriculture

Macro-level policies should address employment rights and wage parity. Despite equal pay laws, wage gaps of 20–30% persist in agriculture in India, Bangladesh, and sub-Saharan Africa (McCarthy & Kilic, 2015; Singh et al., 2023). Effective measures include payroll audits, wage transparency, and minimum wage enforcement (Arceño & Sarino, 2024; Suyatno et al., 2021). Policy must harmonize legal systems and provide affordable paralegal services. Gender-responsive infrastructure reduces women's time poverty. Electrification in rural sub-Saharan Africa increases women's labor force participation (Koolwal, 2021; Levien, 2017). However, infrastructure alone is insufficient. In Nepal, time-saving agricultural technologies did not reduce women's work hours due to unchanged gender norms, indicating the need for norm-changing interventions with infrastructure projects (Rola-Rubzen et al., 2023). For example, Mercy Corps' BRIGE program in Nepal used a "house-

hold dialogue" curriculum, a facilitated intervention pairing married couples to jointly reflect on and renegotiate the gendered division of labor in their households. This was found to increase women's participation in household and community decision-making (Mercy Corps, 2018).

Agricultural extension services need gender mainstreaming. Women farmers often miss training due to scheduling conflicts or male-focused sessions (Biswas et al., 2022; Mulema et al., 2019). Reforms should include quotas for female agents, gender-sensitive curricula, mobile platforms in local languages, and participatory video approaches. For example, the Ethiopian Digital Literacy Initiative trains rural women to use tablets, though impact evaluations are pending (Shenbei et al., 2023). Collective action institutions such as SHGs, cooperatives, and women's farming groups are called for. Women's cooperative membership enhances market bargaining, peer learning, and access to bulk purchasing (de Hoop et al., 2023; Quisumbing et al., 2023). The Selembar Daun (women' farmers) group in Indonesia exemplifies cooperative initiatives, with rotating leadership and shared labor for organic vegetable production and marketing, training in financial literacy and nutrition, and sustainable farming. Participants report increased income control and decision making (Mutiara et al., 2022).

Digital literacy and financial inclusion are crucial. Mobile money and agent banking improve rural women's access to savings, credit, and insurance, reducing reliance on informal moneylenders (Chimerah, 2018). In rural India, informal lenders charge 12–150% annual interest, compared to 6–20% from formal banks (Hoffmann et al., 2021). However, women in low-income countries are less likely to own smartphones or use mobile internet (Deichmann et al., 2016). Policies should include subsidized devices, digital skills training, and gender-targeted financial products.

Conclusion

Despite adhering to a rigorous protocol, this study has limitations. The literature search used only Scopus and Web of Science for articles 2015–2025, possibly excluding relevant "grey literature" or insights from emerging, unindexed journals. Restricting publications to English may have omitted significant regional research in languages such as Spanish, Portuguese, or French. The focus on South Asia, sub-Saharan Africa, and Latin America limits the generalizability of the findings to other developing regions with different sociopolitical dynamics.

This review of 166 studies reveals the global shift in agriculture management toward women as men migrate to urban markets. This shift occurs within constraints like time poverty, land tenure insecurity, and wage discrimination, marginalizing women. Addressing these issues is a strategic necessity; implementing gender-transformative infrastructure and legal harmonization, as in Nagari Indudur, can boost agricultural output by 20–30%. Meaningful change requires moving from symbolic acts to concrete strategies securing property rights and enforcing equal pay, ensuring that rural transformation strengthens food systems and provides a sustainable future.

This systematic review synthesizes the literature on barriers to the participation of women. Persistent barriers such as unequal access to resources, education, and decision-making, along with patriarchal norms, can be overcome by implementing gender-transformative policies that ensure equal access to resources and strengthen women's agency. The contribution of this study lies in its systematic synthesis of barriers that hinder women's potential. The present analysis offers insights for policymakers designing gender-sensitive interventions. The findings emphasize holistic approaches that address the root causes of gender disparities. 'Women can be empowered to drive rural transformation through targeted interventions that address the structural barriers to their participation. The most effective strategies include ensuring equal access to productive resources, such as land, credit, and agricultural inputs; expanding access to training, extension services, and digital literacy; promoting cooperative farming and women's organizations; and implementing gender-transformative policies that strengthen women's decision-making power. Ultimately, transitioning from fragmented interventions to holistic, inclusive rural strategies that secure property rights and enforce equal pay is fundamental to achieve resili-

ency. Furthermore, these strategies directly address pressing global issues, including chronic food insecurity, rural poverty, and climate change.

Policymakers must prioritize gender-responsive infrastructure and community initiatives. Partnerships among governments, NGOs, and communities can foster environments in which women are change agents. Empowering women in rural transformation is both a moral and strategic necessity. By dismantling barriers, stakeholders can unlock the transformative potential of women. While this review highlights critical empowerment pathways, future research must shift from broad assessments to nuanced, localized studies. An intersectional, holistic lens should examine how age, ethnicity, and marital status interact with gender to affect resource access, especially for rural youth. Longitudinal research is needed to track the socioeconomic impact of legal reforms, such as family law and land inheritance, on women's decision making in households. In addition, future inquiries should assess the efficacy of digital agricultural tools in reducing time poverty, exploring whether technology adoption alters domestic labor division or simply increases workloads. Finally, with the move toward sustainable food systems, research should examine the roles of green innovation and circular economy practices in creating formal employment for women beyond low-wage agricultural work.

To effect meaningful change, stakeholders must shift from isolated fixes to aligning policy and social norms. This involves prioritizing gender-responsive infrastructure, such as clean water and affordable childcare, such as India's Mobile Creches, to reduce women's burdens. Technology, such as the Ethiopian Digital Literacy Initiative tablets, is insufficient without community dialogues and action groups like Selembar Daun that challenge patriarchal norms. Empowering women is vital for resilient global food systems. Moving from symbolic declarations to strategies that secure property rights and equal pay is crucial in the 2026 International Year of the Woman Farmer, unlocking the potential of half the world's population.



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