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Caroline Muchiri, Els Lecoutere and Nicoline de Haan, GENDER Impact Platform – CGIAR, Kenya




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1 Introduction

The United Nations Sustainable Development Goal (SDG) 2 focusing on Zero Hunger aims to end hunger, improve nutrition and promote resilient and sustainable agricultural systems by 2030. This is important because having reliable physical, social and economic access to sufficient, safe and nutritious food at all times is a fundamental human right for every individual (CFS, 2023).

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This food should meet the dietary needs and food preferences of people so they can lead active and healthy lives (IFPRI, 2021).

Global food security accounts for the efficient flow of food resources through agricultural production, trade, distribution, consumption, policy and governance both nationally and internationally, and significantly influences the food security status of individuals and households. The *Global Food Security Index 2022* report indicates that food security is also vulnerable to negative disruptions caused by global crises including climate change, natural disasters, economic shocks, violence and social conflict leading to displacement, and the lingering socioeconomic impacts resulting from pandemics (Economist Impact, 2022). These undesirable disruptions are increasingly impeding the achievement of global food security through the pervasive vulnerability to hunger, food insecurity or malnutrition inequalities across all regions and countries (FAO, IFAD, UNICEF, WFP and WHO, 2023; FSIN, 2023; FAO, 2022).

The *Global Report on Food Crises* (2023) showed that the number of people experiencing acute food insecurity and requiring urgent food, nutrition and livelihood assistance rose from 193 million people in 53 countries in 2021 to nearly 258 million in 58 countries in 2022. Evidence shows that the challenge of food insecurity is also gendered. According to the *State of Food Security and Nutrition in the World* by FAO (2022), food security among men improved in all global regions except Africa, while it worsened among women in all regions except Asia. It also suggests that unless immediate and effective strategies to address this gender gap in food insecurity are implemented, approximately 670 million individuals around the world will still be grappling with hunger by the year 2030.

This underscores the critical link between gender equality and global food security, as the gender gap in food insecurity reflects disparities in access to resources, opportunities and decision-making power between women and men. By ensuring the equal participation and decision-making power of women smallholder farmers in farming, food processing, marketing and ensuring household food security and nutrition, we can create more equitable and sustainable food systems that support their role in achieving global food security.

The agricultural sector has proven to be two to four times more impactful in increasing incomes and reducing poverty compared to other sectors, with women smallholder farmers playing a pivotal role in fostering its growth (World Bank, 2015). This is because more women than men participate in and rely on agriculture as an important means of livelihood, with women smallholder farmers and adolescent girls constituting well over half of the global agricultural labour force (FAO, 2023).

Due to structural gender inequalities, women face higher vulnerability to climatic shocks and stressors than men do, which limits the women farmers'

capacity to respond, adapt to, or mitigate subsequent impacts (FAO, 2021b). While this heightened vulnerability is highly contextual, it is attributed to reliance on rain-fed agriculture and natural resources prone to fluctuations and environmental degradation and less-diversified livelihoods (Koo et al., 2022).

Women's vulnerability is also impacted by the out-migration of men in farming households to urban cities and industrial centres in search of remunerative off-farm employment (FAO, 2021c; UN Women, 2019; HLPE, 2020; Choithani, 2020). In this regard, valuing the diverse roles women smallholder farmers play, listening to their concerns and needs and ensuring they are involved in finding food security solutions is crucial for improving their well-being and that of their families and communities. It is also essential in the design and implementation of targeted policies and interventions aimed at enhancing women's access to resources and financial services, building their capacity through knowledge and securing more acceptable equitable opportunities and outcomes (FAO, 2021c; IFPRI, 2021).

In this chapter, we provide a synthesis of the critical role of women smallholder farmers in achieving global food security. It draws on recent research and scientific evidence to provide an overview to address these four research questions:

- What roles do women smallholder farmers play in agriculture and food systems and their contribution to global food security?
- What are the existing inequalities that limit their contribution?
- What potential strategies can be implemented to address these inequalities and constraints, leading to improved global food security outcomes?
- How do aspirations and motivations influence women smallholder farmers' roles in achieving food security?

Ways of approaching these questions are discussed in the next section.

2 Analysing the role of women smallholder farmers and global food security

We acknowledge that women smallholder farmers are not confined to rural areas whereby they engage in food production only for home consumption and local markets; they are also present in peri-urban or urban areas, cultivating small backyard plots or gardens to support their families or generate income. However, for this chapter, we will consider women smallholder farmers as rural participants in agriculture and focus on the pivotal roles they play that advance the achievement of global food security through their efforts at the household and community level.

While our criteria to guide the literature search for this overview were not rigid, they served as a strategic framework to ensure the relevance and quality of the literature sources. We used various search terms relating to women smallholders in agriculture and their contributions to food security, including 'smallholder women', 'women farmers', 'women's roles in agriculture', 'women's roles in agrifood systems', 'women's roles in food security', 'gender and food security', 'women's participation in agriculture', and 'gender and food security'. Then, we screened electronic publications retrieved from web search engines and scholarly databases, including Google Scholar, ScienceDirect, the CGSpace Repository and CAB Abstracts, prioritising those dated between 2013 and 2023. We focused on including studies that explored or directly addressed the involvement of women smallholder farmers in agriculture, the challenges and opportunities they face and the potential strategies to empower and support women in achieving food security at the national or local level.

It is important to note that this overview may not cover every perspective or study conducted around the roles and contributions of women smallholder farmers to global food security. The conceptual framework presented in Fig. 1 which presents the overarching synthesis of the literature review on the role of women smallholder farmers in achieving global food security.

The conceptual framework structuring our overview explains the relationships between the roles that women smallholder farmers play in the larger agriculture and food systems and their contributions to individual, household and global food security and nutrition outcomes (Fig. 1). The framework also illustrates how inequality, gender and social norms as well as aspirations may determine the extent to which the roles of women farmers in agriculture and food systems and the ensuing food security outcomes are impacted.

The conceptual framework lays out how addressing constraints that collectively hinder rural women's full and equal participation can transform existing agriculture and food systems into agriculture and food systems that enhance women's potential and contribution to global food security (as shown by the blue dotted arrows in Fig. 1). The green dotted paths show how gender-responsive agriculture and food systems influence women-empowerment outcomes and ultimately enhance the roles of women smallholder farmers.

In what follows, we address the research questions based on the results of our review of selected literature. We structured our discussion accordingly and first addressed ways in which women smallholders participate in agriculture and food systems as shown in the conceptual framework. Secondly, we lay out the prevailing constraints and drivers of women smallholder farmers' roles in achieving food security. Thirdly, we discuss potential strategies to address constraints and enable drivers for women's roles in agriculture and food systems.

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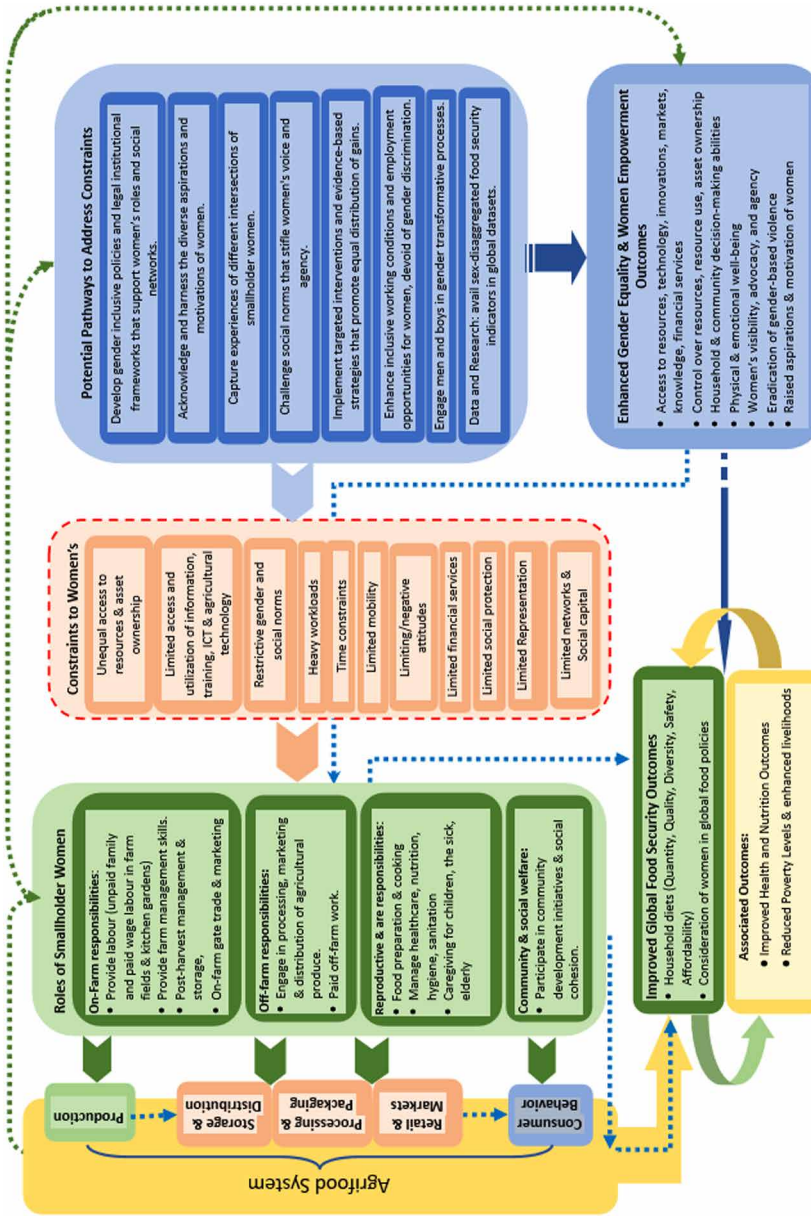

Figure 1 Conceptual framework: the role of women smallholder farmers in global food security.

3 Roles of women smallholder farmers in agriculture and food systems for global food security

Through their multiple roles as food producers and traders of agricultural produce, women smallholder farmers actively contribute to the foundational dimensions of global food security including the availability, accessibility, utilisation and stability of food in households and local communities. Women smallholder farmers are also decision-makers in their households' dietary choices and food consumption, and they play the role of managing the stability of food supplies during crises that decrease food availability (FAO, 2021a; Akter et al., 2020). While these multiple roles contribute to achieving food security, women smallholder farmers encounter challenges across the interrelated and mutually reinforcing dimensions of food security.

Regarding availability, opportunities for cultivating food are often limited. Regarding access, gendered norms can lead to reduced financial means to purchase food and limited transportation options for market access. Regarding use, women's nutritional requirements vary, especially during pregnancy and breastfeeding, and regarding stability, they bear a disproportionate burden during food shortages, frequently reducing their intake more significantly than others (Glazebrook et al., 2020). Women living in rural, remote, conflict-prone and climatically vulnerable regions face greater challenges in these aspects of food security, making up 60% of the chronically hungry global population (FAO, 2020a; HLPE, 2020).

The extent and nature of women smallholders' participation in agriculture and food systems vary worldwide, across different communities and regions, and depend on the structure of the economy and gender norms (Quisumbing et al., 2021). Usually, participation includes growing and managing crops, tending kitchen gardens, rearing livestock, obtaining food from farms or markets, preparing and cooking food, ensuring food safety and hygiene, processing and storing farm produce and trading and retail marketing of farm produce, as well as working on-farm or off-farm for wages (FAO and UN Women, 2021; Malapit et al., 2020).

In parts of sub-Saharan Africa, women smallholder farmers are responsible for growing more than three-quarters of the region's food, managing two-thirds of marketing farm produce and overseeing at least one-half of food storage and livestock-rearing activities (Faiez, 2018). As agriculture and food systems evolve, women smallholders are increasingly assuming decision-making responsibilities in the daily management of farms and households, cultivating crops and taking on tasks traditionally assigned to men. They are exploring diverse roles within the agriculture and food system by venturing into off-farm work, which offers better returns and opportunities than traditional agricultural labour.

Women farmers who are not self-employed crop or livestock producers may provide unpaid labour on farms belonging to their spouses or other family members without receiving direct remuneration for their efforts (Kabeer, 2018). Additionally, women in indigenous communities concurrently hold pivotal roles as custodians and transmitters of traditional knowledge, which not only contributes to their livelihoods and resilience but also plays a fundamental role in ensuring the survival and integrity of their culture (ILO, 2019).

The roles and decision-making of women smallholder farmers regarding household food security are significantly influenced by gender norms, which vary across different contexts (Qanti et al., 2022; Galiè and Kantor, 2016; Twyman et al., 2015). Detailed case studies conducted by Gennovate (https://gennovate.org) and Align (www.alignplatform.org) show that within agricultural and fishing communities in sub-Saharan African and Southeast Asian countries (Bergman-Lodin et al., 2019; Locke et al., 2017), as well as across both rural and urban communities in low- and middle-income countries (Boudet et al., 2013), prevailing social norms continue to designate men as primary earners and household heads while assigning women the responsibility for domestic tasks.

In such communities where male household heads are the primary earners responsible for providing money for food and other necessities, the decisions of women to purchase and prepare food are closely tied to the amount and frequency of financial support received from their husbands. This affects household dietary choices and nutrition outcomes. Despite often facing insufficient financial support, some of these women empower themselves by leveraging their own enhanced purchasing capacity through selling agricultural products or earning income from off-farm activities (Farnworth et al., 2023).

Other women may prefer to take a back seat in decision-making around expenditure for food to avoid potential marital conflicts with the men who fund and provide food for the home. Still, the women are expected to make nutrition-related decisions based on the food made available to them by their husbands (Galiè, 2019). Such gendered customary norms that impose or normalise limitations on decision-making for women ultimately hinder their ability to fulfil the role of providing proper nutrition for their families.

3.1 Care responsibilities that nurture households and communities

Women smallholders in most regions of the world spend a disproportionate amount of time carrying out the socially ascribed responsibility of unpaid care and reproductive duties in households. These gendered responsibilities include primary caregiving roles for children, the elderly and sick members in the household and community, as well as tasks such as breastfeeding, complementary feeding of infants, managing health care and many other

domestic chores essential to human well-being (CFS, 2023; Seedat and Rondon, 2021; UN Women, 2020; Kabeer, 2018).

Although the demanding nature of these tasks and their associated drudgery vary greatly, these activities can constrain women's time, movement and physical and emotional energy to fully participate in agricultural and related income-generating activities. This reduced participation diminishes their productivity and decision-making influence. Research indicates that globally, the unequal allocation of care and domestic work results in women working longer hours than men, as women dedicate nearly three times the daily hours to unpaid care and domestic work compared to men (Data2XILO, 2020; UN Women, 2020).

However, evidence shows that although income-related differences within countries exist, women in low- and middle-income countries devote more time to unpaid work than women in high-income countries. It also suggests that although the demanding nature of unpaid work among poorer women may cause substantial fatigue and stress, the relational aspect of unpaid work, for example playing with children, could be stress reducing and provide a sense of fulfilment (UN Women, 2020).

Surprisingly, although these unpaid responsibilities contribute significantly, amounting to about 35% of Gross Domestic Product in 90 countries, they are often not officially recognised as work in national and global datasets (UN Women, 2020). Addressing these disparities by equitably redistributing care work within families remains a prerequisite for realising substantial gender equality. It allows women smallholder farmers to allocate more time and resources to agricultural activities, thereby fostering increased food production, household income and overall well-being.

3.2 Life cycle and aspirations: link to roles of women smallholder farmers

Women smallholder farmers come from a variety of backgrounds and have fundamentally different experiences, desires, ambitions and aspirations as they move through the different stages of their lives. The homogenisation of women farmers and their roles can lead to inaccurate assumptions because it does not capture intragender differences such as age and marital status, which create power relationships that, in turn, influence women's participation in production and decision-making processes (Tavenner and Crane, 2019; ISF et al., 2020).

The influence of life cycle-related responsibilities is evident from studies by UN Women (2020b) indicating significant disparities in time and income poverty rates based on gender and age, with women between the ages of 25 and 34 being the most affected. This age range represents a critical phase in women's lives when they commonly establish families and undertake childcare

responsibilities. This period is also associated with higher household expenses related to childcare (education, health care and other essential needs of children).

This explains why young adult and middle-aged women smallholders aspiring to have greater control over the income they earn need the flexibility to balance their productive, reproductive and childcare roles. This flexibility allows them to pursue seasonal on-farm or off-farm paid employment opportunities that can be easily combined with unpaid care and domestic work responsibilities. Often, these part-time employment opportunities available to rural women are mostly informal, lower-quality and lower-wage work (FAO, 2020b; UN Women, 2020).

As women's care responsibilities reduce over the course of their lives, they may regain some time and flexibility to engage in other economic opportunities such as growing and managing a business (Halim et al., 2021; ILO, 2019, 2020; Van den Broeck and Kilic, 2019). A study on cross-border bean trade in Kenya revealed that older women, whose children need less attention, were more actively involved and experienced in the trading business compared to men and younger women. These women mentioned that during their younger years, they prioritised caring for their young children. As they advanced in age and experienced reduced family obligations, they gained more flexibility and opportunities to participate in cross-border trading activities (Odera et al., 2016).

The attitudes and perceptions of women smallholder farmers about their roles and possibilities in achieving food security vary and are shaped by their upbringing, education, exposure to agriculture, gender norms and their stage of life. These factors play a crucial role in shaping women's aspirations and values concerning their future work in agriculture. Crossland et al. (2021) found that the aspirations of rural women who perceived limited prospects in unpaid or low-wage farm work were to seek employment in other segments of the agricultural supply chain.

Understanding the highly contextual, complex and multifaceted aspiration nuances of women smallholders is necessary because they are central to their sense of having a fulfilling life. Aspirations and motivations also directly influence women's decisions on agricultural resource use, investment in technology, engagement in other segments of the value chain and use of agency to engage in other future-oriented behaviours to achieve well-being (Hernandez et al., 2023; DeJaeghere et al., 2022; Nandi and Nedumaran, 2021; Crossland et al., 2021).

Aspirations also matter for women's agency in agriculture and food systems. In Kyrgyzstan, for example, women smallholders with higher aspirations for their agricultural work exhibited greater agency. These women were more actively involved in decision-making about their responsibilities, had increased control

over their earnings, had a stronger voice in household matters and were less likely to experience domestic violence (Kosec et al., 2018).

However, few studies are focusing on the aspirations for success and growth for women smallholder farmers, how they may shift during the different stages of their life cycle and their significance for food security outcomes. This is because women experience dynamics in their household structure and family responsibilities. This influences their physical capacity to undertake certain roles, and consequently their level of engagement in agricultural activities (Kosec et al., 2018; Verkaart et al., 2018).

These shifts can be influenced by factors such as age, life experiences, education, family socioeconomic status, belief in their capabilities and skills, desire for recognition and improved social status through agricultural work. Other external factors that influence aspirations and ambitions can either fuel their drive to thrive or dampen their enthusiasm. These factors include cultural norms and social relations deeply rooted in gendered informal and formal institutions, access to resources, the presence of economic opportunities, capabilities to move freely, local agro-ecological conditions and the extent of out-migration within agriculture (Lecoutere et al., 2023; Nandi and Nedumaran, 2021; Elias et al., 2018).

According to Rietveld et al. (2020), young women in Uganda rarely expressed aspirations to make farming their primary livelihood strategy, even if they engaged in various farming activities. Their involvement in farming was primarily driven by the social obligation to provide food for the households. Similarly, a global comparative study conducted by Elias et al. (2018) found that, whereas some young men aspired to engage in knowledge-intensive or 'modern' agriculture, young women did not express such interest.

Studies conducted by Nandi et al. (2022) in South India and Verkaat et al. (2018) in rural Kenya showed that in both regions some parents held agricultural aspirations for themselves but discouraged their sons and daughters from considering careers in agriculture. Despite this lack of agricultural aspirations for their children's future, there was a significant gap in outcomes, particularly among young women, who ultimately found themselves working on their family farms.

Other findings showed that increased male out-migration and the persistence of social norms restricting women's movement out of rural life led women smallholders in Makueni County in Kenya to increasingly take on the roles of farm managers. This change in the agricultural opportunities and the new realities for women shifted their aspirations towards commercialising their farm activities (Crossland et al., 2021). These examples indicate that the aspirations of different women smallholders evolve throughout their life cycle, ultimately influencing how they engage in agriculture. Elias et al. (2018) suggest that while aspirations may not always align realistically with the

available opportunities, thereby creating an aspiration-attainment gap, this gap can offer valuable policy insights, shedding light on the personal and structural constraints faced by young women and men in rural areas.

4 Constraints on women smallholders' roles in achieving global food security: structural gender inequalities

The goal of achieving global food security with sustainable and equitable food security outcomes is hindered not only by insufficient food production but also by inefficient connections between production and consumption, often compounded by gender biases and barriers. According to the 2023 *FAO Status of Women in Agricultural Food Systems Report*, women smallholder farmers are increasingly transitioning away from full-time agricultural primary production and participating in other segments of agricultural value chains, including value-adding processing, storage and marketing of agricultural products.

Like in primary production, women smallholders face barriers that block access to virtually every aspect of their off-farm roles because of prevailing structural gender inequalities. These inequalities include unequal access and control rights over productive resources such as land, natural resources and physical capital. Women smallholders also face constraints related to accessing complementary resources, technologies and services such as networks and social capital, information and communication technology, agricultural technology, training, extension and advisory services, financial services and social safety nets. Societal norms further restrict women's decision-making and leadership, confining them within traditional roles. The lack of time-saving infrastructure and market access also hinders their potential contributions to food security.

These constraints collectively hinder women from fully engaging and realising their potential in enhancing food and nutrition security outcomes (Kosec et al., 2023; Njuki et al., 2023; Quisumbing et al., 2021). Literature suggests that empowering women smallholders and increasing their participation in decision-making processes can improve food security and other associated welfare outcomes such as health, nutrition and education (Kosec et al., 2018).

Women smallholder farmers around the world encounter multifaceted dimensions of gender inequalities that significantly undermine their capacity to fully engage in agricultural activities and benefit from their contributions towards food security (Botreau and Cohen, 2020; FAO, 2020b; UN Women, 2020). These structural inequalities are deeply rooted in discriminatory social norms and gender-blind policies, laws and institutions that shape and prescribe societal expectations, gender roles and aspirations (FAO, 2023).

Unequal access to essential resources and services challenges women smallholder farmers' ability to engage effectively in productive activities and seize economic opportunities. Additionally, prevailing power imbalances lessen the voice and agency of women within decision-making processes by marginalising their participation in shaping policies and strategies and making life choices that directly affect them. Gender-based violence also undermines women's potential contributions to food security and sustainable livelihoods by compromising their safety and well-being, both within and outside their domestic and agricultural activities.

Structural gender inequalities encountered by women smallholders in their roles carry economic, environmental and social costs (HLPE, 2023). Addressing these inequalities and the associated costs not only contributes to enhanced food security and improved nutrition outcomes but also fosters healthier, more resilient and empowered communities (CFS, 2023; FAO, 2021a).

4.1 Discriminatory social and gender norms

The extent of roles, opportunities and capacities available to women smallholder farmers in different communities and countries can be determined by contextual social institutions such as cultural gender roles, practices and beliefs. These informal social institutions can also reinforce and mould the privileged positions held by men in formal institutions (FAO, 2023, 2020). Recent research suggests that the slow progress in achieving gender equality in agriculture and food systems is partly due to unsupportive policies, institutions and discriminatory social norms.

In this context, discriminatory norms profoundly affect food security outcomes, as they restrict the avenues through which women smallholder farmers can enhance agricultural production and increase their incomes, thereby perpetuating their vulnerability. This often occurs by assigning women to roles in unpaid care and domestic work, placing restrictions on their mobility and participation in public spaces and constraining their access to markets and control over assets and income (Lecoutere et al., 2023; Petesch and Badstue 2020). Such gender norms contribute to women accounting for a larger share of labour at the low-skilled and labour-intensive nodes of agricultural value chains, as the opportunities for value-added agricultural activities such as processing and marketing and secure off-farm economic opportunities are severely limited. Their exclusion from segments where more value is generated and earned persists due to discriminatory social norms, barriers to knowledge, assets, resources and social networks, and pervasive gender discrimination in wage employment (Van den Broeck and Kilic, 2019).

While development interventions focusing on household food security and nutrition have a proven potential to improve dietary diversity and decrease

undernutrition among women and young children (Akter et al., 2020; Ragasa et al., 2021; Rakotomanana et al., 2020), disregarding gender norms that may undermine their effectiveness is detrimental to improving diets and nutrition. Solely improving women's access to nutrition education may not translate into changes in feeding practices if gender norms and relations, such as the decision-making roles of husbands, grandmothers and community members and the associated power imbalances, are disregarded (Ulaya, 2021; Ragasa et al., 2019; HKI, 2015; Bezner Kerr et al., 2013).

Food insecurity crises arising from climatic, economic, humanitarian or systemic shocks are globally becoming more intense and frequent. Rural women smallholder farmers, particularly those dependent on rain-fed systems and who function as net food buyers, are mostly impacted by food stresses linked to prices and market access rather than by production shocks (Botreau and Cohen, 2020). During and after these stresses, structural barriers compound the underlying gender inequalities by further limiting the capacity of women smallholders and girls to respond to shocks and cope with food crises (CFS, 2023; Koo et al., 2022; FAO, 2020b).

These women and girls are more likely to be burdened with additional care work, lose economic opportunities, be forced to deplete assets and forego meals to feed their children. They are also more exposed to increased insecurity, restricted mobility, sexual exploitation and abuse, as well as gender-based violence (Busingye and Ibrahim, 2021; FAO, 2020b). Placing substantial care obligations alongside other primarily unpaid agricultural and domestic responsibilities imposes heavier workloads and time constraints on women smallholders and girls, negatively impacting their physical and emotional wellness. It also leaves them with limited time for education and training and reduces their participation in decision-making and opportunities for economic empowerment (FAO, 2023; Lecoutere et al., 2023; AGRA 2021; ILO, 2019; HKI, 2015).

4.2 Unequal access to physical, financial and social resources

A recent report by the World Bank found that despite women producing over half of the world's food, they are still significantly disadvantaged in securing equal legal rights to own land and control its use because of discriminatory inheritance laws and social norms that prioritise male inheritance (World Bank, 2021; ISF et al., 2020). Studies have demonstrated that countries with inclusive and well-defined state policies and legal frameworks that advance equal land rights through women's involvement in land-policy reforms have increased access to land for rural women (Santpoort et al., 2021; FAO, 2020b).

Increased access to land has been found to have positive implications for food security at the household level. Quisumbing et al. (2021) found that

wage-earning households, typically without any land of their own, tend to have the least wealth or assets compared to other households. Women smallholder farmers from such households often resort to providing cheap labour for landowners, which hinders their ability to purchase or produce food (Galiè, 2019).

Women's access to income and financial services, including the full benefits of social transfers tend to be constrained as well. Discriminatory norms and policies are the most common barriers to women's access to income and financial services (Kosec et al., 2023; Galiè, 2019). Improving women's access to financial services has often been seen as an approach to support their economic empowerment by facilitating substantial investment in agricultural technology, allocation of more resources to nutrition, health care and education, and breaking intergenerational poverty cycles (FAO, 2020b; Kabeer, 2018).

There is evidence that providing women smallholders with access to financial services has a positive effect on their contribution to household food security. Van den Bold et al. (2013), however, note that, in some cases, women who access rural microfinance are burdened with repaying money that is often controlled by other family members or is used for food and other household expenses. In such cases, women often shoulder the consequences of defaulting payments by themselves.

Women's access to networks and social capital outside the household through producer cooperatives, self-help groups and community organisations is limited by care and domestic workloads and mobility constraints. The ability to move freely varies across contexts and may be exacerbated by poor infrastructure, societal norms and disapproval from family members, particularly within the household. Barriers to free movement can discourage women from joining or actively participating in networks in ways that improve their access to productive and complementary resources. Consequently, women's ability to contribute towards achieving food security may be hindered (Kosec et al., 2023).

4.3 Limited voice and agency

Women smallholder farmers can exercise agency as individuals, collectively, within the family and through their participation in markets, politics and other formal and informal networks. These aspects of agency allow them to effect the changes they want, shape and achieve their own goals and achieve food security for themselves and their communities (Quisumbing et al., 2023; Elias et al., 2021).

Sociocultural biases that limit individual agency embedded within can cause women smallholders to lack a strong sense of self-worth and confidence about their capabilities to choose what they do (FAO, 2020b). They also dampen their

aspirations and motivations for agricultural and non-agricultural work. According to Lecoutere et al. (2023), these dampened aspirations can both indicate and serve as structural barriers to women's agency at the individual level. Such internal barriers hinder the participation of women smallholders in agricultural and market activities, active engagement in intrahousehold decision-making and strategic life choices that enable them to achieve food security.

Similarly, the absence of instrumental agency – which unlocks external resources, opportunities, knowledge, skills and capabilities that give women smallholder farmers the power to exercise choice, take control over their lives and accomplish their goals – limits their capacity to enhance productivity and respond and adapt to shocks that impact food security outcomes. Moreover, weak women's collective agency prevents women smallholder farmers from leveraging group-based social networks to achieve common food security goals (Elias et al., 2021).

It is more pronounced in contexts where civil society is weak or there are restrictions on civic spaces that support women in claiming their rights (UN Women, 2020). Women's ability to join in, actively participate, publicly voice their opinions, and acquire meaningful social and leadership influence, particularly in mixed-gender groups and networks, is also hindered by the inadequate representation of women's leadership in resource management and governance and insufficient consultation of women in decision-making processes.

These and other institutional barriers (such as identification requirements and fees) increase their exclusion from strategic actions that facilitate greater access to markets and inputs and hampers their ability to advocate for policy changes and initiatives that could improve food security for themselves and their communities (FAO, 2023).

4.4 Gender-based violence

Gender-based violence presents a widespread threat impacting women's autonomy, choices, overall well-being and that of their children. It manifests in different forms (physical, sexual, economic and psychological) that are rooted in discriminatory, exploitative and coercive gender norms and power imbalances. In many food-producing communities in the global South, this extreme human rights violation acts as a catalyst for individual, household and community-level food insecurity. Studies indicate that the physical and psychological distress caused by gender-based violence weakens the ability of women smallholder farmers to focus on food production, as well as the capacity of mothers to offer adequate care for their children.

Additionally, gender-based violence might threaten women's ability to access higher-value markets as it makes it difficult for them to travel freely

and safely to markets. Where this happens, women are more likely to grow crops that can be sold locally, thus remaining in lower-value markets. These disruptions undermine the access, consumption and utilisation of affordable, culturally appropriate and nutrient-dense food (Okpara and Anugwa, 2022; Botreau and Cohen, 2020).

However, Galiè (2019) found that increasing women's decision-making power and control over assets and income positively impacts their intrahousehold bargaining power and reduces their vulnerability to domestic violence. In addition, reducing time-consuming tasks such as fetching water and fuelwood for domestic purposes in areas with limited infrastructure reduces the exposure of women and girls in many low-income countries to the risk of violence and sexual abuse (CFS, 2023).

5 Constraints on women smallholders' roles in achieving global food security: life cycle-related constraints

Life cycle-related constraints affect the roles and responsibilities of women smallholders, negatively impacting their ability to contribute to easing the severity of the prevailing food insecurity. Women's roles evolve throughout their life cycle from childhood to adolescence, early adulthood, middle age and later adulthood.

In many low- and middle-income countries, patriarchal gender norms disproportionately restrict the agency, opportunities, aspirations and social networks of adolescent girls more as compared to boys. Alwab et al. (2022) demonstrate that while institutional and structural barriers may have gradually eased in Ethiopia, persistent gender- and age-related challenges, some stemming from beliefs, norms, traditions and relational dynamics, continue to hinder the advancement of adolescents' achievement of capabilities and aspirations. This hindrance is consistently more pronounced for girls than boys.

These patriarchal gender norms also impose increased household responsibilities and caregiving duties, along with early marriage and childbearing. It has been shown that the experiences of adolescent girls in both their productive and reproductive domains significantly influence their experiences in their adulthood and old age (ISF et al., 2020). To prevent young women from experiencing poverty and unachieved aspirations in later life, effecting policies that enhance economic rights, capabilities and opportunity spaces during their younger years is critical (Nandi et al., 2022; ISF et al., 2020; Kabeer, 2018; Elias et al., 2018).

Insecure land rights, coupled with increased family and care responsibilities, constrain the participation of women of reproductive age in productive and off-farm income-generating activities, more so than of older women with

more secure land rights and fewer family responsibilities (UN, 2019; Kabeer, 2018). Evidence shows that women of reproductive age (15–49 years in most surveys) suffer from macronutrient and micronutrient deficiencies with long-term negative developmental impacts, as well as physical and sexual violence (Botreau and Cohen, 2020; Kabeer, 2018; FAO, 2023). According to ISF et al. (2020), the time-consuming and resource-intensive care burden seems to stall the ability of rural women to move up the resilience and agency ladder during this life stage.

As adult women transition to older age, they may assume more decision-making responsibilities on the farm and within their communities and aim to secure autonomous use of land for agricultural production. However, in situations where customary norms and laws discriminate against women inheriting property, those who experience separation, divorce or the death of a spouse in their old age face the risk of being marginalised by their in-laws. This can leave them voiceless and destitute, particularly if their livelihood solely relies on their farms (ISF et al., 2020).

Additionally, the economic capabilities of elderly people, including women smallholders in later adulthood, may be affected by age-related physical limitations, reducing their capacity for labour-intensive farming activities. Depending on the context, elderly women in good physical health may opt to remain economically active to provide financial support for their families or themselves. On the other hand, some women smallholders may find themselves compelled to keep working due to limited alternatives.

Overcoming these life cycle-related constraints that negatively impact the potential of women smallholders to contribute to easing the severity of the prevailing food insecurity (CFS, 2023; Lecoutere et al., 2023; Data2X and ILO, 2020) could also lead to increased global economic benefits that lift millions of people out of food insecurity (FAO, 2023). Policy interventions to support the processes of ending hunger and achieving global food security must also recognise and target constraints at specific stages of women smallholders' life cycles. This can create inclusive and supportive environments that empower and uplift women smallholder farmers, allowing them to fully participate in their roles, rather than being marginalised (Galiè, 2019; ISF et al., 2020).

5.1 Women's attitudes towards their roles

The roles of women smallholder farmers in agriculture may be influenced by internalised psychological constraints arising from their preferences, attitudes, values and beliefs (Kosec et al., 2023). With the rarity of role models of successful women agricultural producers and entrepreneurs, women engaged in agriculture might not necessarily identify themselves as producers or entrepreneurs (Farnworth et al., 2021). Limiting beliefs about their self-efficacy

can vary widely among women, depending on factors such as social-cultural context, education, exposure and individual experiences. For example, Kosec et al. (2023) note that women believing that they have nothing useful to contribute to social groups or that it is inappropriate for them to pursue social networks prevents them from forming rich networks that support their roles in achieving food security.

Women smallholders are aware of the importance of their contributions to food security and their role in sustaining their households and communities. This is why they are more likely than men to invest in producing food for the household and to use their income to purchase food for their families (Reynolds et al., 2020; Galiè, 2019). However, those who consistently experience sociocultural constraints, limited opportunities or lack of recognition by others may develop negative attitudes towards their roles and capabilities, limiting their engagement in certain activities.

In Bangladesh, for instance, women and men in rural societies perceive that women are primarily confined to reproductive and domestic roles and that they cannot make substantial contributions beyond these domains. In many cases, men exclude women from crucial decisions concerning agricultural and livestock production, marketing and purchases. However, some women refrain from actively participating in household decision-making, expressing uncertainty regarding their capacity to independently make important decisions or engage in household-level choices (Galiè, 2019).

Additionally, women often find it challenging to engage in conversations with their husbands and other family members about the heavy domestic responsibilities that place time limitations on them (Yosef et al., 2015). This challenge is often tied to internalise social norms that affect women's bargaining power in households regarding these roles and ultimately hinder them from adopting optimal production and nutrition practices that contribute to overall household food security and well-being (HKI, 2015).

6 Potential strategies to address constraints: strengthening agency of women smallholders to achieve food security

Efforts to address the prevailing constraints faced by women smallholder farmers are of paramount importance for realising equitable and sustainable global food security. These constraints, rooted in gender-based norms, resource disparities and limited agency, undermine the full potential of women's contributions to food security and economic prosperity. Implementing targeted strategies to overcome these barriers not only promotes gender equality but also harnesses the untapped capacities of women in agriculture.

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Strengthening the individual and collective voice and agency of women smallholders plays a crucial role in driving change and addressing the constraints to their participation towards improved food security outcomes and socioeconomic well-being. However, there are still insufficient efforts that enhance women's visibility and voice, given their significant contribution to food and nutritional security (FAO, 2020a; Onyalo, 2019; Klugman et al., 2014).

6.1 Challenging discriminatory gender norms

Intervention efforts towards improving food security outcomes should offer both women and men as well as influential people such as power holders and traditional and religious leaders the opportunities to critically examine and challenge the customs, stereotypic values and beliefs, power relations, and exclusionary practices, laws and policies prevalent within their society that continue to restrict women's agency and opportunities (Lecoutere et al, 2023; FAO, 2020b; Galiè, 2019). For instance, achieving a more equal distribution of care and domestic tasks and childcare requires that men and boys are actively engaged in changing harmful gender norms that put a disproportionate burden of unpaid care and domestic work on women.

Addressing discriminatory gender norms enhances women's agency and bargaining power, fosters equitable time allocation, improves redistribution of unpaid care and domestic responsibilities, and inclusion in decision-making processes at the household, local community and national level (Lecoutere et al., 2023; Botreau and Cohen, 2020). This empowerment extends to women's ability to make agricultural production decisions, strategic livelihood choices, and engage in income-earning opportunities and market transactions (Bryan et al., 2022).

Relaxing or changing discriminatory norms over time can lead to positive gender norms that support the equal distribution of resources and decision-making power in agriculture and food systems. To support the role that women smallholders play in safeguarding household food and nutrition security in their households, development efforts focus on providing skills in dietary diversity and enhancing economic capacities to produce or purchase nutritious food. These efforts must strive to address prevailing harmful norms that disempower women smallholders by limiting their ability to produce and purchase sufficient and nutritious food. This in turn is essential for improving optimal health and nutrition outcomes for women and their families (Lecoutere et al., 2023; IFPRI, 2021; Mulema et al., 2019; Galiè and Kantor, 2016; Twyman et al., 2015).

6.2 Enhanced bargaining power through increased access to resources and services

Enhanced bargaining power in various aspects of agricultural production is an important empowerment outcome for women, as it positively impacts household food security (Botreau and Cohen, 2020). It facilitates women's improved access to resources, information and services, increased asset ownership, improved mobility, access to markets, and improved time use and agency. Improving women's education in nutrition alongside enhancing the voice of their bargaining power and agency in making food-related decisions within the household has been proven to increase control over budget allocations for household food expenses (Botreau and Cohen, 2020).

A review of women's land rights as a means to alleviate poverty by Meinzen-Dick et al. (2019) found that improved women's land rights were associated with increased bargaining power and decision-making capacity. It also discovered a strong correlation between women's land rights and favourable outcomes in agriculture and food systems, including food security and consumption. However, evidence on the connection between women's land rights and certain other outcomes, such as access to credit and technology, agricultural productivity and non-agricultural livelihoods, remains inconsistent and inconclusive (World Bank, 2021; Meinzen-Dick et al., 2019). Addressing the gender disparities in land rights requires raising awareness among both women and men about equal rights to land ownership, advocating for communities to extend land titles or tenure rights to women and ensuring that legal frameworks protect those rights (FAO, 2023).

Enhancing control over food budget allocations leads to improved food and nutrition security for women and their households. However, Tavenner et al. (2019) show that women's authority over agricultural and livestock production and marketing is reduced when intervention efforts primarily focus on increasing market-oriented smallholder production. This diminished control extends to activities that may have previously been within their control, yet concurrently strengthens men's influence over production benefits. Conversely, efforts that promote increased diversification of crops and livestock are likely to have a more favourable impact on women's control. As these are household-level decisions, gender-responsive approaches should recognise how gender norms and dynamics influence the implementation of household-level strategies by considering the roles of all household members, including men and boys (Galiè, 2019).

6.3 Participatory development of agricultural technologies and food policies

Research underlines the significance of allocating ample time for women smallholder farmers to engage and leverage their knowledge, skills and

experiences in the early design, development and scaling of agricultural innovations (Thakur, 2023; Reynolds et al., 2020), as well as in the design of food and agricultural policies that promote gender-equitable outcomes (Botreau and Cohen 2020). However, without an enabling inclusive and supportive environment devoid of gender-based discrimination, women's ability to publicly advocate for their needs and influence decisions that affect their livelihoods and contributions to sustainable global food security is greatly hindered (Margolies et al., 2023).

The adoption of agricultural technologies has been shown to present a distinct gender dynamic influenced by the differing priorities of women and men. For instance, women smallholders with limited resources at their disposal and time constraints imposed by their domestic and caregiving roles often prefer food crops or crops that are easy to grow and demand less cooking time. They also prioritise nutritional value and palatability, reflecting their integral role in providing nutrition within their households (Reynolds et al., 2020).

For development programs that have the potential to effectively prevent and reduce time and income poverty among women to be inclusive and gender-responsive, they need to be aligned to address the distinct time, labour and mobility constraints that women smallholder farmers face (Van de Velde et al., 2020; UN Women, 2020). Similarly, efforts to enhance women smallholders' agency by growing their networks and social capital, creating leadership spaces or disseminating group training programs focused on agricultural skills, technologies and innovations should follow this approach while addressing the associated barriers in the civic space (UN Women, 2020). Inclusive approaches not only amplify women smallholders' voice and agency and increase productivity and incomes, but they also promote women's roles as agents of change in achieving better food security, overall well-being and more secure livelihoods (ISF et al., 2020).

Finally, while women smallholders and adolescent girls in low- and middle-income countries may face varied vulnerability to crises, we should avoid portraying women smallholders solely as victims, incapable of significantly contributing to solutions that address the complex shocks and stressors they encounter. Instead, we should acknowledge their agency in driving positive change through active participation and empowerment (IFPRI, 2023; Bryan et al., 2022; Quisumbing et al., 2008).

7 Potential strategies to address constraints: tailoring interventions to aspirations and life cycle of women smallholders

Addressing the constraints faced by women smallholder farmers requires a comprehensive approach that recognises the evolving roles and aspirations

throughout their life cycle and considers the negative impact of harmful social and gender norms on those roles and aspirations. Policy and development initiatives aiming to empower women smallholders in agriculture should consider raising the aspirations that women set for themselves, their families and their communities.

Lecoutere et al. (2023) propose the inclusion and support of female role models who challenge gender stereotypes in influential roles such as mass communication campaigns, extension programs, leadership, school programs, academia and research bodies. This approach holds the potential to elevate the aspirations of women and girls while diminishing the aspirational gaps in various agricultural stages of their lives. It promotes their active involvement in realising global food security and empowers them to make informed decisions regarding how they allocate and invest their time and limited resources within various segments of the agriculture and food system.

Understanding the present socioeconomic context, aspirations in agricultural work and future desires of women smallholder farmers is crucial. This understanding facilitates the effective tailoring of food security policies and programs and supports targeted interventions that acknowledge and tackle the specific challenges experienced by women in different life stages (Kosec et al., 2021; Nandi et al., 2022). Such interventions can support their agency and reduce gender inequality in households (DeJaeghere et al., 2022; Kosec et al., 2021, 2018).

This could be done by providing women with relevant information about agricultural opportunities, knowledge and skills, and the supportive environments they need to achieve their aspirations (Nandi and Nedumaran, 2021) as well as developing markets for crops that women tend to produce (Botreau and Cohen, 2020). Moreover, the economic successes or failures related to their engagement in agriculture can influence their children and future generations to continue the agricultural family legacy or move away from it (Nandi et al., 2022). To achieve global food security, it is crucial to cater to the unique requirements of different women in various contexts, and stakeholders must be held accountable to women at every level of the food system (FAO, 2020b; Botreau and Cohen, 2020).

8 Potential strategies to address constraints: providing data to support women smallholders' roles towards global food security

In the past decade, progress has been made in availing sex- and age-disaggregated qualitative and quantitative data and research tools to measure gender equality and women's empowerment. However, significant challenges and gaps persist in the availability and utilisation of both quantitative and

qualitative data to effectively measure and analyse gender equality and women's empowerment over time and across the various segments of agriculture and food systems.

Adopting an intersectional perspective to fill these gender equality and women's empowerment data gaps is useful for designing more rigorous evidence-based research and targeting effective gender-responsive food security programs and policies (Lecoutere et al., 2023). It involves the explicit recognition of multiple and often overlapping and intersecting aspects such as age, gender, ethnicity, health, disability and socioeconomic, marital and migration status, and how they combine to create different modes of discrimination, social exclusion and privilege. This data could provide useful insights that help us understand the impact of overlapping sources of discrimination on women smallholders' empowerment. With data, we can also challenge the implementation of policies and interventions that continue to perpetuate inequality around the roles of women smallholders in achieving global food security by monitoring whether women benefit from them or not (Tavenner and Crane, 2019).

Recognising and quantifying the economic value of women's unpaid work and ensuring its inclusion in national statistics can provide the evidence needed to address the persistent gender inequalities undermining the untapped potential of women smallholder farmers to enhance food security and nutrition outcomes (CFS, 2023). This data can support the scope for mobilising additional resources and implementing gender-responsive budgeting to alleviate the burden of unpaid care and domestic work on women. Investing in time-saving public services such as childcare, enhanced transport and other basic infrastructure, including household-level access to water and energy, can help reduce and redistribute the responsibilities of unpaid care and domestic work within communities (UN Women, 2020; ILO, 2019).

While the importance of measuring women smallholders' work and contribution towards food security is significant, empirically quantifying and verifying the share they produce can be complex due to the limitations in data collection. This is particularly apparent in households where food production is a venture among household members, both male and female, and involves a range of joint resources and inputs that cannot be readily assigned by gender (Doss et al., 2018). Nevertheless, the implementation of rigorous gender-research methods and data-collection tools can provide valuable insights for effective recognition of the actual contributions of women smallholders in food production, storage, marketing and consumption. It can also provide legitimate data for evaluating the impact of interventions on women smallholder farmers and for monitoring the progress on gender equality and women's empowerment around their roles in achieving food security (FAO, 2023).

A continuing data weakness is the absence of consistency in the capture, analysis and publication of accurate data on the gender-based dimensions of food security and nutrition (FAO, 2020b). Widely used global food security datasets lack detailed sex-disaggregated food indicators and have inadequate representations of women smallholder farmers. Statistics on women's yields and trade volumes along agricultural value chains are dispersed in many different microlevel studies but are rarely reported globally.

To address these data needs, methods of collecting and incorporating sex-disaggregated data in national and global datasets must make the challenges that women encounter in their roles visible. Otherwise, food security policies will overlook the need to include specific measures to address gender equality and women's empowerment issues around food security. This is illustrated by a recent agricultural policy assessment by FAO (2023) that revealed that while more than 75% of the policies recognised roles and/or challenges of women in agriculture, only 19% had explicit objectives to achieve gender equality and/or enhance women's rights in agriculture.

Another data-gap concern in global datasets is the absence of comprehensive sex-disaggregated data on secure land tenure. It creates an obstacle to fully appreciating the participation of women smallholder farmers in the agricultural workforce as it diminishes women's 'visibility', voice and support systems. Recognising women smallholders as independent farmers rather than mere labourers with limited decision-making power is crucial. Dismantling institutional barriers that render women smallholders 'invisible', including the lack of secure, documented land rights, will enhance their access to other essential productive resources (Van de Velde et al., 2020). This data gap results in inadequate monitoring of women's land rights and resource availability, presenting challenges to designing effective food security programs and policies that cater to the needs of these often overlooked 'invisible farmers'.

9 Conclusion

Women smallholders fulfil the roles of producers, traders of agricultural goods and decision-makers in shaping their households' dietary preferences and consumption patterns. These roles play an integral part in supporting the fundamental aspects of global food security – food availability, accessibility, utilisation and stability within households and local communities. To effectively support and harness their full potential in these significant roles, we must recognise and value their contribution by prioritising efforts that ensure equitable access to agricultural resources, services, technologies, output markets, off-farm income opportunities and increased decision-making.

Addressing the formal and informal structural constraints faced by women smallholders and implementing gender-responsive policies and institutions

are priorities on the agenda for achieving global food security. This will foster an enabling environment where women can voice their needs and preferences and participate in changing discriminative social norms into positive norms. Engaging men, boys and community leaders in challenging discriminatory norms and practices also fosters women smallholders' ability to participate in advocating for inclusive policies, enhanced access to resources and stronger agency.

Moreover, it is crucial to recognise the life cycle of women smallholder farmers and understand how it influences their diverse roles and aspirations. The aspirations and motivations in agriculture among women farmers directly influence women's decisions on agricultural resource use, investment in technology and engagement in other segments of agriculture and food systems value chains, as well as how they use agency to engage in other tasks to achieve well-being. Roles and aspirations may evolve as women age and experience changes in their family dynamics, making it necessary to promote different empowerment strategies tailored to different women.

To improve our collective understanding of what women smallholders need, we have to shift away from generalising women and instead identify distinct typologies of women according to their aspirations and life stage. This approach focuses on understanding the constraints they face through listening to their concerns and building on their knowledge and practices, which provides insights into how they participate in agriculture. This recognition also nurtures effective policy planning and the delivery of tailored interventions that empower and support women smallholders in achieving their goals at the various stages of their lives as they contribute to global food security.

10 Where to look for further information

The CGIAR GENDER Impact Platform hosts a resource hub - https://gender.cgiar.org/. The hub features cutting-edge studies on women smallholder farmers, gender-responsive agricultural innovations, and inclusive food system governance. Researchers, policymakers, and practitioners can leverage these resources to deepen their understanding of gender dynamics in global food security and drive impactful change. It also provides toolkits and methodologies that are useful for analytical research.

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