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The U.S. Government's Global Hunger & Food Security Initiative

Gender, Climate Change and Nutrition Integration Initiative (GCAN)

EVIDENCE BRIEF

GENDER GAPS IN AGRICULTURAL GROWTH AND DEVELOPMENT

Opportunities for Improving Gender-Responsive Programming

In addition to identifying gender gaps and other challenges and opportunities for entrepreneurship in agricultural growth and development, this brief focuses on potential for improvement in the key areas of (1) seed systems, (2) finance and market access, and (3) production and value chains. While gender norms and challenges are inherently context-specific, the underlying intention of this evidence brief is to provide an overview of research findings from low- and middle-income countries, to address key questions and challenges that can be generalized across contexts, and to offer suggestions of promising approaches and best practices.

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GENDERED CHALLENGES IN AGRICULTURAL GROWTH AND DEVELOPMENT

High-quality sex-disaggregated data are scarce, and agreement on the definitions of key concepts and measures is limited. It is thus challenging to accurately estimate the extent, magnitude, and impact of gender gaps in agricultural growth and development. Interventions to address gender gaps need to incorporate such factors as the local context, household power dynamics and socially constructed roles and responsibilities, and gendered labor practices and trends.

The body of literature on gender in agriculture is growing, but development practitioners and researchers need to be mindful of and deliberate about the data they use to inform gender-focused policy and programs. Some widely circulated data on agriculture-related gender gaps are not based on empirical evidence, which diminishes their credibility and impedes true progress on gender equality (Doss et al. 2018).

It is challenging to measure complicated gender concepts; moreover, they tend to be context-specific. Further, gender analyses that conceptualize gender only as sexual categories of male and female, rather than as a dynamic social construct, hinder the attainment of a more profound understanding of how gender affects agriculture (Doss et al. 2018; Wekesah, Mutua, and Izugbara 2019). Higher quality data– meaning data that are adequately measured, conceptually sound, and statistically representative–are "essential for programming that targets and engages the right people, designs goods and services appropriate to their needs, is adaptive to change, and manages risk to avoid harm and unintended consequences" (Doss et al. 2018, p. 73).

Although the development community is beginning to gain a better understanding of the types of interventions that could help close the gender gap in agriculture productivity, there remains a significant need for high-quality sex-disaggregated data that also takes a deeper dive into localized gender constructs, gender relations, and institutional structures (Peterman, Behrman, and Quisumbing 2010; Quisumbing et al. 2014; Doss 2018; Malapit, Quisumbing, and Hodur 2020; Pyburn and Kruijssen 2020). Recent research indicates that the environment in which female farmers are trying to operate plays a more important role in their ability to increase productivity than any individual sense of empowerment or agency (Pyburn and Kruijssen 2020). To understand the enabling environment, researchers and practitioners need better data to be able to "identify the conditions under which women have higher productivity and which factors systematically constrain women's output" (Doss 2018, p. 48).

Studies therefore require a range of sex-disaggregated data to enable these complex dynamics to be captured accurately. This includes sex-disaggregated data on plot ownership and management, other assets, time use, and decisionmaking (Peterman, Behrman, and Quisumbing 2010). While special attention is needed for female-headed households, which face particular challenges in accessing resources, including labor, it is also important to focus on the majority of women, who live in dual-adult households. What is ultimately needed is an understanding of the intersection of different social categories (age, ethnicity, sex, race, socioeconomic standing, and so on), the dynamics of joint decisionmaking and resource ownership, and the impact of sexual

harassment and gender-based violence on women's and men's ability to engage safely at different stages of the agricultural value chain (Huyer 2016, Pyburn and Kruijssen 2020, Vos and Pyburn 2021).

Common gender gaps across seed systems, markets and finance, and production and value chains involve differences in mobility, in available time, and in access to resources (land, labor, seed, fertilizer), credit, information, and new technologies. Helping women to increase their access to a range of resources and services is an important step, but it will not guarantee women's ability to make use of such resources and services.

As producers, food managers, and consumers, women play a central role in household food security, yet they face significant production constraints compared with their male counterparts (Agarwal 2018). Women encounter more obstacles than men when they try to access and utilize agricultural inputs (land, labor, seed, fertilizer), credit, markets, new technologies (for example, irrigation technology), and other services (Banerjee et al. 2014; Blackmore, Lesorogol, and Iannotti 2018; Theis et al. 2018; FAO 2019). Social norms, power imbalances, and intrahousehold dynamics can limit women's decisionmaking power on resource allocation and food spending within the household. These factors also contribute to the significant amounts of time women spend caring for children and undertaking household chores (Blackmore, Lesorogol, and Iannotti 2018; FAO 2019).

The substantial cultural, structural, and institutional inequalities that female subsistence farmers face can result in gaps in the productivity of agricultural plots of up to 66 percent (FAO 2019). In an effort to adapt to climate change and increase household resilience, many female farmers "shift to less labor intensive but also less biodiverse or nutritious crops, even as the importance of nutrition-sensitive agriculture is becoming increasingly evident" (Agarwal 2018, p. 28). Increasing women's access to land, financial and natural resources, and new technology could have a positive impact on their ability to produce and gain access to food, and ultimately on the nutritional status of the entire household (Lodin, Paulson, and Jirström 2014; Agarwal 2018).

Having access to resources does not ensure that women have agency over their use. It is therefore important to differentiate access from benefits and empowerment (Theis and Meinzen-Dick 2016).

The evidence of linkages between agricultural commercialization and gender is mixed. To support women's increased involvement in production systems and value chains, more attention needs to be paid to such tradeoffs as workloads, food security, individual and household wellbeing, and availability of assets.

Commercialization of agriculture could further marginalize women's agency in agriculture–or improve it. According to Banerjee et al. (2014), in Malawi, northern Nigeria, and Uganda, female farmers' returns from commercial agriculture are higher than male farmers' returns. Other research suggests that commercialization of agriculture can reduce women's tenure security (Ghebru 2019) and have no implications—or even negative implications—for food and nutrition security and other indicators of wellbeing, given women's role in producing food crops for household consumption and their preference for spending income on food, healthcare, and education. Carletto, Corral, and Guelfi (2017) find that female farmers in Malawi, Tanzania, and Uganda appear to participate less in market activities but sell larger shares of production under their control when they do. They find no strong relationship between overall increased commercialization and improved nutritional status, and a weak negative relationship between the share of commercialization accruing to women and short-term nutritional indicators. This could be because commercialization reduces the time women spend on childcare and other domestic activities, suggesting the need to assess the tradeoffs involved in commercialization.

Gender-sensitive programming should consider how men and women relate, along with the societal and institutional structures that could serve as key facilitators or barriers to effective implementation and sustainability. Preferably, gendered projects should work with both female and male farmers.

Although significant disparities exist between men and women in agriculture, gender-sensitive programming is not just about reaching and empowering women (Kramer and Galiè 2020). Focusing solely on the needs of women, without considering how men and women relate and the influence of societal structures, ignores the impact of household norms and power dynamics, which serve as important facilitators or barriers to effective programming (Doss et al. 2018; Kramer and Galiè 2020).

Focusing primarily on the needs of women also "overlooks the contributions of men and the prevalence of 'jointness' and negotiation within a household" (Doss et al. 2018, p. 73). Another important consideration is women's time. Projects that work exclusively with women run the risk of increasing women's already heavy work burden by not fully exploring complementary resources, systems, and dynamics within the household (Doss et al. 2018).

SEED SYSTEMS

A seed system encompasses an associated network of stakeholders and the pathways by which farmers access seed for a certain crop in a specific area. The functioning of seed systems is dependent on three key dimensions: (1) seed availability, (2) seed access, and (3) seed quality. Applying a gender lens to these dimensions involves examining the type and extent of differences that exist between women and men, and the way in which these differences affect individual and household wellbeing.

This discussion, and most of the literature, focuses on crop seed, but the reproduction of trees, fish, and livestock also requires seed. Women's roles are likely to differ slightly from men's roles based on the type of seed involved, but many of the gender gaps stem from similar overlapping (and hence often compounding) challenges.

A seed system incorporates a network of associated stakeholders, and the pathways by which farmers access seed for a certain crop in a specific area (Munyi and De Jonge 2015; Bentley et al. 2018). The functioning of seed systems is dependent on three key dimensions: (1) seed availability, (2) seed access, and (3) seed quality (Bentley et al. 2018; Puskur et al. 2021). Applying a gender lens to these dimensions involves examining the type and extent of differences that exist between women and men, and the way in which these differences affect individual and household wellbeing.

Table 1. Key dimensions of a functioning seed system

Dimension	Definition
Seed availability	Farmers have enough locally acceptable seed of the right quality at the right place and time
Seed access	Farmers have money or other resources in order to obtain seed. Access is affected by the following three factors:
1. Awareness	Information is available about different seeds, their uses, and where to get them
2. Delivery	Seed is available at the point of purchase or use
3. Affordability	All farmers who could benefit from the seed are able to purchase the seed
Seed quality	This encompasses the following four factors:
1. Genetic quality	Genetic purity, varieties, and biodiversity (such as local crop varieties)
2. Health level	Pests and diseases fall below specified threshold levels
3. Physiological quality	Seed is of the appropriate physiological age
4. Physical quality	Seed is of appropriate size and shape, without mechanical damage
Use and control	Farmers can apply seed for positive benefits and control seed application and related production factors
Benefits from use, and control over benefits	Farmers can obtain benefits from selling the produce they grow from the seed and control the benefits or income they generate from production

Source: Adapted from Bentley et al. (2018), p. 603), with additional questions on use and control over seed and the benefits of the harvest from Puskur et al. (2022).

Examples of gendered questions to ask include the following:

- How does women's and men's ability to obtain seed when and where they need it differ (availability)?
- Do women and men have the same ability to obtain seed, and do they have the agronomic knowledge to use it effectively (access and use)?
- Within the household or community, who decides what seed is used (use/control)? Who controls complementary inputs linked to the seed (use/control)? Is the available seed responsive to the needs of both men and women in terms of taste, production level, disease resistance, and so on (quality)?
- Who makes the decisions on the sale of the resulting production and the control of the generated benefits and incomes (benefits)?

In many developing countries, the informal sector remains the primary system by which smallholder farmers acquire seed (McGuire and Sperling 2016; Puskur et al. 2021). Although often diverse and not well-documented, informal seed systems typically include individual farmers saving seed; exchanging seed with their neighbors; or obtaining seed through local markets, social networks, community-based initiatives (such as cooperatives or seed banks), and seed aid programs run by nongovernmental organizations (Munyi and De Jonge 2015; Bentley et al. 2018).

Gendered Gaps and Challenges in Seed Systems

It is difficult to provide estimates of the gender gap in seed systems due to a lack of reliable sex-disaggregated data, but disparities are known to persist along the entire pathway.

Gender gaps are associated with seed development, production, distribution, and use, along with who ultimately benefits from the production (Quisumbing et al. 2014; Ashby, Polar, and Thiele 2018; Kramer and Galiè 2020; Puskur et al. 2021). Many seed-improvement efforts focus on cash crops (rice, wheat, corn, soybean, barley) due to their economic importance. This largely ignores local varieties that have lower market value but are highly important for smallholder farmers' food and nutrition security and for genetic diversity (Chataway 2005; Glover, Sumberg, and Andersson 2016; Lammerts van Bueren et al. 2018; Puskur et al. 2021).

Women often play key roles in localized informal seed systems, including facilitating seed exchanges, selection, multiplication, and storage (Puskur et al. 2021). Because informal systems function within local networks of family, friends, neighbors, and community, women are likely to have better access to and control over local varieties that they can afford, but more limited access to improved varieties developed by international research institutions (Puskur et al. 2021).

The focus on improving and promoting cash crops increases farmer dependency on a limited number of crops, diminishes food and seed sovereignty, and can affect women's production potential (Lammerts van Bueren et al. 2018; Puskur et al. 2021).

Primary drivers of the gender gap in seed systems are restrictions on women's mobility, combined with other norms and beliefs about women's ability to engage in the system.

A key factor limiting women's ability to access high-quality seed is mobility. Local gender norms that determine whether and how women can leave their homes can make it difficult for them to travel to research centers and to access formal seed sectors that distribute certified seed (Kramer and Galiè 2020; Puskur et al. 2021). This lack of mobility forces women to rely on what they can save and store themselves or obtain from informal systems, which means they may not be able to obtain enough high-quality seed at the appropriate planting times (Kramer and Galiè 2020). Older women's mobility is often less restricted by gender norms, which may increase their access to information and resources in the public sphere (Puskur et al. 2021).

Other norms and beliefs that can play a role in gender gaps in seed systems include biased community attitudes that (1) exclude women from leadership roles in the management and governance of seed banks, (2) limit women's agency and decisionmaking power within the household and (3) potentially constrain the varieties women are permitted to plant, manage, and sell. Some of these factors reflect men's fear of competition and losing power and standing within the household and community if women take on more prominent roles in agricultural production (Puskur et al. 2021).

A major constraint is the availability of gendered access to knowledge and information on seed.

Access to knowledge and information, which is often shaped by norms and beliefs about women's roles and capabilities, affects women's ability to access and use new seed technologies (Puskur et al. 2021). In cultures where women frequently receive less education, they may not have the confidence to engage with agro-dealers in the formal seed sector (Puskur et al. 2021). Because seed information channels are often gendered, men are more likely to get information from outside sources, such as extension agents, whereas women rely on more localized family networks. The fact that men often have greater mobility means that the size and extent of men's networks are often more expansive (Puskur et al. 2021).

The gap in knowledge and information access is often exacerbated by extension services that tend to focus on training men. Additionally, if the extension agent is male, women may not be able to freely interact due to the potential negative repercussions of being seen with a man who is not a family member. Even if women receive information and knowledge, they may not have the resources or power within the household to implement what they have learned (Puskur et al. 2021). Women may also be hesitant to try a new seed variety for fear of being blamed by their husbands or partners if the seed does not produce well (Puskur et al. 2021). This dynamic can result in women only trusting seed that they acquire from people they know, likely from within their own community (Puskur et al. 2021).

Other major constraints are seed affordability, and access to resources to purchase complementary inputs.

Although this is a challenge that all smallholder farmers face, female farmers generally face more constraints in purchasing seed and the complementary inputs needed to ensure that more advanced seed technologies achieve their yield potential. Constraints arise from gender norms that restrict women's involvement in income-generating activities and hence their ability to control their incomes.

A lack of funds to purchase seed and complementary inputs affects the quality and quantity of seed that female farmers are able to purchase, which increases their dependence on informal seed systems (Puskur et al. 2021). To overcome limited financial resources women will often utilize informal seed exchanges, labor exchange, loans, gifts, and deferred payment plans (Puskur et al. 2021).

Seed development, production, selection, and distribution often do not respond to the differing needs and preferences of women and men.

Crop-improvement efforts often do not recognize gender inequality as a limiting factor on seed development, uptake, and use (Ransom and Bain 2011; Tufan, Grando, and Meola 2018). The positive impact of plant breeding and development efforts can be hindered by issues of control over and access to improved seed at the household, community, and national levels. This suggests a need for greater intentionality when considering whose needs and preferences are being valued and prioritized, and who is likely to benefit (Tufan, Grando, and Meola 2018). Seed-development initiatives need to focus beyond creating seed with better yields, tolerance, and resistance to include consideration of the "actual demands, needs, and local market opportunities of women and men smallholder farmers, in diverse backgrounds and contexts (affected by, for example, access to inputs, machinery, labor, credit, information, etc.) and that takes into account their life circumstances (e.g., age, ability to work off-farm, mobility, etc.)" (Tufan, Grando, and Meola 2018, p. 109).

Opportunities for Improving Gender-Responsive Programming in Seed Systems

1. Spearhead inclusive breeding opportunities and greater involvement of small-scale farmers in the crop development process

Expanding gender-responsive participatory plant breeding is a key way to create more inclusive breeding opportunities and develop improved crops that take the needs and preferences of both genders into account (Ashby, Polar, and Thiele 2018; Kramer and Galiè 2020; Puskur et al. 2021). Within gender-responsive breeding, it is important to consider how women's needs, constraints, and knowledge differ from men's, and to understand how crop-development processes may affect or influence women's time, resources, and opportunities (Ashby, Polar, and Thiele 2018). Because women and men may prioritize different crops and different traits, more research is needed to understand the implications for crop adoption and productivity, and the best methods for incorporating trait preferences (Ashby, Polar, and Thiele 2018; Kramer and Galiè 2020). All breeding initiatives would benefit from more sex-disaggregated data and program assessments that examine effective and inclusive use and control of high-quality seed (Ashby, Polar, and Thiele 2018; Kramer and Galiè 2020).

2. Highlight and prioritize traditional knowledge about seed selection and storage

In some cultures, women have a long history of involvement in seed selection, conservation, and exchange, particularly for local varieties that may be better adapted to local conditions. In these cases what is needed is not new information, but strengthening and protecting the traditional knowledge that already exists (Padmanabhan 2008). Highlighting and prioritizing this knowledge can increase women's agency within their cultures and local contexts, and elevate their positions. Improving the understanding of traditional seed saving and exchange practices can also illuminate existing gendered rules and norms around reciprocity, trust, and reputation. Without this knowledge, outside institutions and organizations run the risk disrupting local practices and negatively affecting women's involvement (Padmanabhan 2008).

3. Facilitate women's mobility so they can access formal seed systems and distribution networks

Addressing women's mobility challenges necessitates providing more ways to access high-quality seed. Approaches could include (a) offering seed subsidies or seed voucher programs targeting women, (b) leveraging local transportation for mobile seed shops, (c) establishing demonstration plots by women that can be easily accessed by other women, and (d) providing smaller, more easily transportable packaging that would require less initial investment (Kramer and Galiè 2020; Puskur et al. 2021).

4. Facilitate investment in postharvest seed storage and infrastructure

Because of the important role women play in localized, informal seed systems, helping women to save and preserve seed from their own production through improved postharvest storage could expand seed access to other women as well. Women who are able to save their own seed are more able to ensure diversity in the crops planted and hence in the food available for their families, while at the same time building seed capital and bargaining power (Puskur et al. 2021).

5. Strengthen linkages between formal and informal systems by developing an integrated seed system

A growing number of initiatives promote integrated seed-system development (ISSD) and management, which typically involves a blend of formal and informal seed systems. The goal is to increase farmers' access to improved varieties while building on familiar existing networks and practices (Munyi and De Jonge 2015). Gender-responsive ISSD adds the additional element of identifying and addressing the gaps in access that exist between female and male farmers (Kramer and Galiè 2020). Integration efforts involve a range of approaches (McGuire and Sperling 2016):

- ✓ Building on existing nonseed networks, such as rural "mom and pop" stores
- ✓ Facilitating/encouraging smallholder farmers to try new varieties by offering smaller seed packet sizes
- ✓ Selling some modern varieties in bulk
- ✓ Increasing investments in good seed storage and infrastructure
- ✓ Increasing engagement with local seed/grain trader networks
- ✓ Improving seed-related information systems
- ✓ Increasing farmer participation in variety selection
- ✓ Encouraging farmer inclusion on variety-release committees

Including information about existing, varied seed-system channels used by smallholder farmers would likely enhance these efforts. Specifically, programs and projects need a better understanding of where female and male farmers get their planting material, including for which crops, under what conditions (purchased, loaned, exchanged, gifted), and at what scale (McGuire and Sperling 2016).

Gaps in knowledge and information about improved seed varieties and cultivation techniques can be addressed through localized participatory approaches, such as field demonstrations, farmer-to-farmer exchanges, farmer field schools, and an inclusive approach to variety selection (Puskur et al. 2021). Training and deploying female extension agents could help women get advice tailored to their specific circumstances, while avoiding any potentially negative perceptions of their interacting with male extension agents.

6. Support community-based seed initiatives, such as seedbanks, seed cooperatives, and seed enterprises led by women

Gender considerations in seed systems are not only limited to whether women can access formal seed systems, but also to how they can participate—and earn income—as suppliers of certified seed or as dealers. Increased attention is being paid to strengthening local seed banks, coops, and small-scale seed entrepreneurs with a particular focus on involving more women in seed production and management (Kramer and Galiè 2020). Supporting women to become community seed entrepreneurs is viewed as an opportunity to help women generate income, expand their economic participation, and strengthen their role in seed systems (Puskur et al. 2021). Promoting seed entrepreneurship has the potential for positive impacts, but programs need to take into account a range of gendered challenges that could decrease effectiveness and sustainability. Key among these is women's time. Women typically have a wide range of care responsibilities within the home, so encouraging and supporting collaboration among family and community members is likely necessary to give women the flexibility they would need to start a seed business (Puskur et al. 2021). Additional constraints include women's small networks, mobility challenges, limited assets that can be leveraged to invest in starting and maintaining an enterprise, and declining willingness-to-pay for seed if people are able to get it from friends and neighbors (Puskur et al. 2021). Intrahousehold power and decisionmaking dynamics, which can affect women's ability to control how the business is run, also have an impact on women's effectiveness as seed entrepreneurs (Puskur et al. 2021).

Strategies to support women's involvement in seed entrepreneurship include (Puskur et al. 2021, p. 92):

- ✓ Supporting gender-specific laws and strategies
- ✓ Running integrated loan and training programs
- ✓ Offering alternative credit-assessment strategies
- ✓ Building management capacity
- ✓ Providing production inputs and marketing advice
- ✓ Developing and expanding seed-system infrastructure
- ✓ Building capacity to produce certified seed

FINANCE AND MARKET ACCESS

Gaps and Challenges in Finance and Market Access

Women face greater challenges when trying to access markets and improved agricultural inputs due to their more limited education and knowledge in many contexts.

Many rural women in low- and middle-income countries continue to receive less education compared with men, both in general and in terms of financial education (Banerjee et al. 2014). This can result in weaker technical proficiency in managing resources and credit (FAO 2020). Due to limited knowledge of financing options, low trust in formal systems, and risk aversion women are often reluctant to introduce new technologies or approaches that could increase production efficiency or allow them to expand their cultivation or agricultural enterprises (Powers and Magnoni 2010; Njuki et al. 2019; FAO 2020). As a result, women face greater challenges when attempting to access markets and improved agricultural inputs, such as fertilizer, pesticide, and improved seed varieties.

1.1 billion women are excluded from the formal financial system, resulting in a lack of access to basic financial services. In addition, (female) smallholder farmers are generally less likely to have access to digital tools and a reliable Internet service.

Across the globe, women often have greater difficulty than men in accessing financial resources and services. Some estimates suggest that over 1 billion women are "excluded from the formal financial system, lacking even the most basic financial services which are essential for their economic empowerment" (FAO 2020, p.1). Although the overall availability of accounts at formal financial institutions in developing countries has been improving, the 9 percent gap in access between men and women has largely remained unchanged (FAO 2020). The disparities are greatest in the Middle East/North Africa region (a 17 percent gap) and in Africa south of the Sahara (a 12 percent gap) (FAO 2020).

The growth in digital and cell-phone banking has provided more options for both women and men, but gender gaps persist even with these technologies, especially in South Asia and Africa south of the Sahara (FAO 2020; Kramer and Galiè 2020). Moreover, smallholder farmers are much less likely to have access to digital tools and reliable Internet, which adds additional challenges to closing the existing digitally based finance gaps (Kramer and Galiè 2020; Mehrabi et al. 2020). Recent estimates suggest that across much of Africa fewer than 40 percent of farming households have Internet access due to a lack of coverage, the prohibitive cost of data, or both (Mehrabi et al. 2020).

Many women face discriminatory and exclusionary credit criteria and legal barriers when trying to open bank accounts.

The reasons for the financial inclusion gaps mirror those that exist in seed systems. Sociocultural norms often constrain women's time and mobility, which can make it challenging to access financial institutions (FAO 2020; Heckert, Myers, and Malapit 2020). Perceptions of what women's roles should be can mean they are viewed as less desirable clients by banks and other institutions, resulting in discriminatory and exclusionary credit criteria (Njuki et al. 2019; FAO 2020). These institutions may also lack experience working with smallholder farmers and prioritize lending to larger clients (FAO 2020).

Significant legal barriers to opening bank accounts and accessing credit can also exist. In some cultures women may have no rights or severely restricted rights to inheritance, which limits their access to land or property for use as collateral (Huyer 2016; FAO 2020). In many cases, husbands need to co-sign documents, which can be an additional hurdle for many women. Gender inequality in the availability of and access to collateral is one of the leading causes of loan rejection (Powers and Magnoni 2010). Another legal hurdle is that women frequently do not have the necessary identification documents, such as national ID cards or passports (FAO 2020). This challenge may be tied to norms restricting mobility or access to needed documentation, lack of time to visit government offices (which can have very bureaucratic processes), or a lack of knowledge about how and where to request what is needed.

The gap in credit access means that, relative to their male counterparts, female farmers are restricted in their ability to start and invest in a business.

Gender disparities in access to credit can result in female farmers having reduced capacity to start and invest in a business relative to their male counterparts. The inability to obtain financing also limits women's access to improved agricultural inputs (fertilizers, pesticides, improved seed varieties), markets, and new economic opportunities (FAO 2020; Kramer and Galiè 2020).

While women play key roles along value chains and in markets in some geographies, in others, local norms and traditions severely restrict their mobility, including their access to markets.

Local norms and traditions prevent many women from accessing local markets and businesses (FAO 2020; Heckert, Myers, and Malapit 2020) reducing their potential to acquire agricultural inputs and benefit from the sale of agricultural produce. Hill and Vigneri (2014) provide an example of female cocoa farmers in Ghana who face barriers in accessing input markets, which reduces their choices of production technology. The second example, from Uganda, shows how female coffee farmers' marketing channels are limited to those with low transaction costs, but also lower prices received.

Opportunities for Improving Gender-Responsive Programming in Finance and Market Access

1. Address structural constraints to women's participation, as well as strengthening their capacity to participate

Gender-transformative reforms should consider how to make systems "women-able" rather than making women "bankable" (Vossenberg, Rappoldt, and D'Angou 2018). This includes gender analysis of the entire entrepreneurial ecosystem, building the capacity of service providers, and increasing women's ability to use services effectively. This requires diverse strategies and interventions targeting multiple levels of society and institutions (Njuki et al. 2019).

2. Promote alternate forms of collateral to increase access to credit

A key approach for expanding access is allowing the use of alternative forms of collateral that women may have more control over, such as moveable assets (livestock or personal possessions of value), inventories, or rights in contracts (FAO 2020).

3. Assist governments in developing or expanding their financial infrastructure and provide incentives to financial institutions to offer products tailored to the needs of female farmers and rural women

Supporting the development and expansion of financial infrastructure, with a specific focus on increasing the availability of accounts for women at formal financial institutions, could help begin to address the persistent gap in financial access between men and women. This could be done by providing incentives for financial institutions to strategically target and offer products tailored to female farmers (FAO 2020).

4. Increase access to digital finance and high-quality financial information and mechanisms

Increasing women's access to digital finance by helping them acquire and utilize the appropriate technology and expanding the interactions of existing networks could help close the finance and market- access gap. Digital finance mechanisms may also help to address women's concerns with safety when carrying cash (Njuki et al. 2019).

5. Expand women's access to a range of financial instruments

Expanding women's access to a range of financial instruments (secure savings accounts, credit, insurance) increases their economic resilience, control over financial resources, and household bargaining power (FAO 2020; Kramer and Galiè 2020). Access to diverse financial tools can also help women manage risk, have agency over resource-allocation and strategic financial decisions, smooth consumption in the event of shocks, obtain high-quality inputs, and decrease vulnerability to price fluctuations (Brune et al. 2015; FAO 2020; Kramer and Galiè 2020). A study that examined the effectiveness of several different financial products in improving farmer productivity and wellbeing in Burkina Faso and Senegal found that female farm managers were less likely to purchase agricultural insurance and more likely to invest in savings for emergencies than their male counterparts (Delavallade et al. 2015). The authors concluded that this was likely because women

face additional sources of life-cycle risk, particularly health risks associated with fertility and childcare. These findings suggest the need to tailor insurance offerings more specifically to women's needs, taking into account their tendency to prioritize saving.

6. Support reform and enforcement of asset ownership regulations, establish concrete policy objectives to advance women's financial inclusion, and facilitate knowledge-sharing about financial services and potential risks (including predatory lenders)

To address the legal barriers that many women face governments should reform asset ownership regulations and enforce regulations that already exist (FAO 2020; Vos and Pyburn 2021). Moreover, more concrete policy objectives are required to advance women's financial inclusion with specific targets to enhance women's access to diverse financial services, such as credit, savings, and insurance (FAO 2020; Vos and Pyburn 2021). Finally, programs to increase financial literacy can increase knowledge-sharing about financial services and potential risks, such as predatory lenders, thereby enabling women to make sound financial decisions (FAO 2020; Njuki et al. 2019).

PRODUCTION AND VALUE CHAINS

Gaps and Challenges in Production and Value Chains

Cultural, structural, and institutional inequalities have led to a substantial productivity gap between female and male farmers

According to the FAO (2011, p. vi), "the yield gap between men and women averages around 20–30 percent. . .." Bringing yields on the land farmed by women up to the levels achieved by men would increase agricultural output in developing countries between 2.5 and 4 percent. . .. Closing the gender gap in agricultural yields could bring [the number of undernourished] down by as much as 100–150 million people." In Africa south of the Sahara "women comprise 50% of the agricultural labor force . . . but manage plots that are 20–30% less productive than male-managed plots" (Ali et al. 2016, p. 152). Critical productivity resources with the largest gender gaps include land, labor, credit, information, extension, and technology (Huyer 2016). A challenge to defining and addressing gender gaps in production (and value chains) is that joint management and production within the household can make it difficult to distinguish women's agricultural productivity from men's (Doss 2018).

Women are frequently disadvantaged and exploited across every aspect of agricultural value chains.

A growing body of literature illustrates the degree to which women are frequently disadvantaged and exploited across all the "processes involved in the production, processing, and marketing of a product from its inception to its final use" (Pyburn and Kruijssen 2020, p. 32). Women often provide labor while having limited decisionmaking power, are not compensated appropriately or considered to be doing "work," and have limited access to benefits and control over resources (Pyburn and Kruijssen 2020; Vos and Pyburn 2021). In some contexts, male and female smallholder farmers face similar disempowerment in the public-facing components of agricultural value chains, but disparities also exist regarding the control over and use of money and intrahousehold decisionmaking (Quisumbing et al. 2014; Malapit et al. 2020; Vos and Pyburn 2021).

Significant gender disparities can exist in land ownership, control over productive areas of land, and insecure land tenure.

Although the reasons for gender gaps in agricultural productivity and value chain participation can vary by country and context, there are several reoccurring themes. One major constraint is land ownership, including control over productive areas of land and insecure land tenure (Wekesah, Mutua, and Izugbara 2019; Vos

and Pyburn 2021; World Bank 2020). Laws and customs often restrict women's access to land and the "lack of security of land tenure results in lower access to credit and inputs leading to inefficient land use, reducing yields" (Huyer 2016, p. 106). A review of legislative reforms focused on improving gender parity in Africa found that, despite laudable content, their effectiveness in securing women's land rights was limited (Ghebru 2019). Other challenges to women's control of land include population pressures, increasing land values due to the growing commercialization of agriculture, and land "commodification"—or monetization (Ghebru 2019).

Women are significantly disadvantaged when it comes to their ability to access technological resources and improvements, such as irrigation, fertilizer, and appropriate tools.

Women frequently lack access to inputs needed for improved production, and they tend to adopt new technologies at lower rates (Wekesah, Mutua, and Izugbara 2019; World Bank 2020). A review of the evidence on gender differences in nonland agricultural inputs, technology, and services found that the main drivers of differences between women and men were gaps in access rather than propensity to use (Peterman, Behrman, and Quisumbing 2010). Across 24 studies, men had a higher mean access to technological resources, such as inorganic fertilizer, insecticide, improved seed varieties, and mechanical power (Peterman, Behrman, and Quisumbing 2010).

Although few studies examined access to natural resources, findings suggest that women are significantly disadvantaged when it comes to their ability to access irrigation and fertile soils (Peterman, Behrman, and Quisumbing 2010; Huyer 2016; Theis et al. 2018). There are also often significant differences in access to land preparation, weeding, and drying technologies and communication technologies (radios, cell phones) that can provide information on prices, weather, and important production information (Huyer 2016). The types and quality of seed available to women can determine their economic success. Female farmers tend to farm lower-value crops that are often for consumption rather than sale (World Bank 2020; Vos and Pyburn 2021). This type of production is critical for household food security, but the cultivation of noncommercial varieties means female farmers are less likely to engage in local value chains or have the opportunity to move out of subsistence production.

Human-resource constraints—including agricultural labor, extension services, and life-cycle challenges—can also present substantial barriers to women's agricultural productivity.

Limits on women's participation in the labor force include "marriage expectations, pregnancy, and childbirth, the postnatal period, childcare, and ongoing gender-specific health concerns such as menstruation and contraception" (Peterman, Behrman, and Quisumbing 2010, p. 8). Shifts in time and labor availability due to (a) migration and (b) men moving out of agriculture to work as day laborers in urban centers can constrain women's ability to engage in or expand agricultural production, especially when households had previously relied on joint production (Quisumbing et al. 2014; Huyer 2016; Doss 2018; Blackmore et al. 2021; Vos and Pyburn 2021).

Another factor that can constrain women's productivity is their more limited ability to access and engage with agricultural extension services. Women frequently have less access to extension and agricultural training, receive fewer visits to demonstration plots, and may not be considered legitimate farmers who need services (Banerjee et al. 2014; Huyer 2016; Wekesah, Mutua, and Izugbara 2019; World Bank 2020). Findings from research on the gender dimensions of extension services indicate the importance of considering the gender of extension agents, the quality of information, and time constraints to participation in training (Peterman, Behrman, and Quisumbing 2010).

Women may have fewer and more limited social networks, which can constrain their access to critical knowledge and resources to improve production.

Social and political capital (group membership, information exchange, social networks, political representation) play an important role in agricultural production across genders (Peterman, Behrman, and Quisumbing 2010). Farmers rely on social networks to exchange seed, labor, and other inputs; to share information about farming practices; and as a social safety net in times of hardship. Studies have shown that formal and informal networks are particularly important to female farmers as a way to gain and share information, but women's ability to access and engage in these networks can be limited by social and cultural norms (Peterman, Behrman, and Quisumbing 2010).

As with seed systems, markets, and finance, social and cultural norms can play a role in restricting women's agricultural productivity and their ability to be actively engaged in value chains. If women do not have decisionmaking agency within the household, they may not have control over how income from increased production is used (Huyer 2016; Doss 2018; Wekesah, Mutua, and Izugbara 2019; Vos and Pyburn 2021).

Attitudes about gender-based violence and women's ability to operate safely in the different spheres of the agricultural value chain can also play a significant role in their success (Malapit et al. 2020). Programming focused on enabling more women to engage in the agricultural value chain need to consider the conflicts that could arise with shifts in gender relations and men's roles as providers and leaders (Vos and Pyburn 2021).

Women's productivity challenges weaken their economic security and hinder their entrepreneurial efforts, while also potentially contributing to adverse environmental outcomes.

The productivity gap between men and women contributes to significant income inequality (Ali et al. 2016). Evidence suggests that this inequality may add to "an inefficient over-allocation of inputs to male-managed plots, resulting in large aggregate productivity losses for the agricultural sector" (Ali et al. 2016, p. 152). The gendered productivity challenges faced by many female farmers weaken their economic position and hamper their efforts to become entrepreneurs (Puskur et al. 2021). The well- documented disparities in resources can result in women not being able to adopt and sustain more climate- and environmentally friendly practices.

A review of conservation agriculture projects found that comparatively well-off male farmers adopted conservation agriculture practices more often than poorer farmers, who tended to be female (Wekesah, Mutua, and Izugbara 2019). Women's use of more environmentally harmful practices was often linked (1) to the need to meet the diverse and compounded needs of their households and (2) to a lack of weeding tools designed for women, which could facilitate a more limited use of herbicides (Wekesah, Mutua, and Izugbara 2019).

Opportunities for Improving Gender-Responsive Programming in Production and Value Chains

1. Help women reduce the amount of time they spend on other household tasks

Some promising approaches for improving women's agricultural productivity are not directly related to agriculture. Reducing the amount of time women have to spend on other tasks could increase time for entrepreneurial activities or to cultivate more diverse crops or crops with a higher commercial value (Doss 2018; World Bank 2020).

Improving the availability and access to water and firewood or other means of cooking, and reducing the care burden through improved child health and nutrition and a redistribution of the workload to other family members would likely give women more opportunity to engage in other types of work (Doss 2018; Vos and Pyburn 2021).

2. Develop programs that focus on promoting joint household production and training, and on helping women benefit equally from what is produced

Approaches that focus on joint production and joint training, as well as helping women benefit equally from what is produced, have the potential to increase household production and wellbeing without adding additional burdens to women (Doss 2018; World Bank 2020; Vos and Pyburn 2021).

Providing couples training that involves creating a joint action plan to manage farm tasks, and working with men to advance their understanding of women's needs in agriculture have the potential to facilitate and strengthen inclusive joint production (Wekesah, Mutua, and Izugbara 2019; World Bank 2020; Vos and Pyburn 2021).

3. Support gender-sensitive agricultural extension services

Supporting gender-sensitive agricultural extension services, such as increasing the number of female extension agents and gender-mainstreaming for extension agent training curricula, could help women and men access more information about improved production technologies and implement recommended approaches (World Bank 2020; Vos and Pyburn 2021). Additional ways of helping women access more resources and knowledge include (a) targeting agricultural training for both genders in the household, (b) deliberately enlisting women as program beneficiaries, and (c) offering agricultural inputs directly to women (Wekesah, Mutua, and Izugbara 2019; World Bank 2020).

4. Help women build and expand their networks

Helping women build and expand their networks would provide opportunities to increase information-sharing about inputs, seed, new technologies, financial resources, crop prices, and how to engage with buyers and processors successfully along the value chain (World Bank 2020). This could be done by increasing access to community support programs or building on existing networks such as self-help groups, cooperatives, localized savings groups, and other horizontal associations (Peterman, Behrman and Quisumbing 2010; Quisumbing et al. 2014; Malapit et al. 2020).

5. Strengthen women's land rights

Strengthening women's land rights could provide them with increased agency within existing networks and structures. Potential interventions include "recognition of customary land rights for women, legal protection of individual or occupancy rights, community land demarcation and collective titles, decentralized land administration systems that promote women's participation, (joint) land registration, and forms of decentralized dispute resolution mechanisms" (Vos and Pyburn 2021, p. 13).

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GENDER GAPS IN AGRICULTURAL GROWTH AND DEVELOPMENT

EVIDENCE BRIEF

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