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APRIL 2023

Making Complementary Agricultural Resources, Technologies and Services More Gender Responsive

By Katrina Kosec, Melissa Hidrobo, Hom Gartaula, Bjorn Van Campenhout and Lucia Carrillo



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ABOUT THIS SERIES

This working paper, produced by the CGIAR GENDER Impact Platform, is one in [a series of analytical working papers](#) by our researchers. They were produced to inform the Food and Agriculture Organization of the United Nations to write the 2023 report on the *Status of Rural Women in Agri-food Systems*.*

These evidence-based papers address key themes important for gender and social equality, and women's empowerment in agriculture and food systems. They each discuss:

- current status and emerging thinking
- the theme's relevance for transformative change toward more inclusive food systems
- the evolution of equality in agriculture and food systems over the past 10 years in low- and middle-income countries
- what has proved effective to ease structural constraints, and promote equality and empowerment
- specific suggestions about interventions, programs and policies that can help make agriculture and food systems more inclusive.

COVER PHOTO CREDIT: CGIAR/C. de Bode. *Members of a women's group deposit money into a shared savings box.*

ABOUT CGIAR GENDER IMPACT PLATFORM

Generating Evidence and New Directions for Equitable Results (GENDER) is CGIAR's impact platform designed to put equality and inclusion at the forefront of global agricultural research for development. The Platform is transforming the way gender research is done, both within and beyond CGIAR, to kick-start a process of genuine change toward greater gender equality and better lives for smallholder farmers everywhere. gender.cgiar.org.

DISCLAIMER

This working paper has gone through a process of nonblinded peer review by two reviewers external to the CGIAR Gender Impact Platform, and has also been reviewed by the FAO team working on the 2023 FAO report on the *Status of Rural Women in Agri-food Systems*. The views expressed in this publication are those of the author(s) and do not necessarily reflect the views or policies of the Food and Agriculture Organization of the United Nations nor of the CGIAR GENDER Impact Platform.

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Abstract

Rural women in low- and middle-income countries face multiple constraints in accessing and benefiting from essential complementary resources, technologies and services for agriculture production and participation in the food system. This paper highlights new thinking since the 2011 SOFA around these constraints and how to overcome them. Specifically, we consider complementary factors that allow women to access, retain and maximally benefit from productive resources such as land, labor and physical capital. These complementary factors comprise (1) networks and social capital resources (e.g., self-help groups, civil society groups and cooperatives), (2) information and communication technology, (3) technology (e.g., modern agricultural inputs, mechanization/laborsaving technologies and other technologies facilitating women's integration into agriculture and food systems), (4) agricultural extension and advisory services, (5) financial services (e.g., credit, formal savings, insurance) and (6) social safety nets. We analyze the evolution in women's access to these complementary factors since 2011 and describe the potential benefits of reducing constraints and thus closing the gap in access to complementary resources. We further provide evidence on what has been effective (or not) at reducing constraints on women accessing them. Finally, we conclude with policy recommendations.

Keywords: gender equality, social equality, women's empowerment, intersectionality, food systems, cooperatives, Information and Communication Technologies, technology, agricultural extension, financial inclusion, social safety nets

1. Relevance of complementary resources, technologies and services to women in agriculture and food systems

Much of the existing discourse around enabling women to realize their full potential in agriculture and food systems has focused on increasing their direct access to and control over productive resources such as land, natural resources and physical capital.¹ By targeting structural inequalities at multiple levels (e.g., within households, organizations and communities), improving women's access to these essential production factors is key to increasing productivity at the food systems level and beyond (Puskur et al. 2023). Often, policies and programming to improve women's access to productive resources target changing the legal system or governance structures, or otherwise catalyzing norm change at various levels. However, another key lever involves promoting gender-equal access to and control over certain *complementary* resources, technologies and services, which may face similar structural constraints.

By complementary resources, technologies and services, we mean complementary factors that increase women's ability to access, retain and maximally use or benefit from productive resources. Although theoretical models of agriculture production usually rely on two or three primary factors of production (land, labor and physical capital), the inputs to the production process are multiple and diverse (Debertin 2012). Thus, differentiating between primary production factors and complementary factors is somewhat arbitrary as many of the complementary resources, technologies and services may be considered key production factors in a particular context. Still, we aim to select a set of complementary factors that are important for allowing women to gain access to and benefit from land, labor and physical capital and consequently increase their productivity not only in agriculture, but across the food system.

A few examples illustrate what we mean by complementary factors. Social networks can link women to markets and opportunities along the value chain, enabling them to benefit more from crops produced on plots under their control. Information and communication technology (ICT) can provide women with relevant information on best agricultural practices, weather and market prices, helping them to decide on when to plant and what to plant on plots they manage. Financial services and social safety nets such as cash transfer programs can help relieve credit constraints and allow women to purchase necessary inputs for agricultural production or other income-generating activities. Technologies relieve women from drudgery and save time they can invest in other productive or leisure purposes. And receipt of gender-sensitive agricultural extension services has the potential to increase women's agricultural productivity by providing them with information on best practices and technology for agriculture.

These complementary factors may alleviate constraints on gender equality. These constraints are features of the institutional or normative environments that tend to restrain women from exerting agency and achieving their full potential (Quisumbing et al. 2023; Lecoutere, Achandi, et al. 2023). By altering these constraints themselves, complementary factors have the potential to alleviate the conditions that disadvantage women in accessing and controlling productive resources in the first place.

1. By food system, we mean the set of actors and interactions that occur along the full food value chain; this includes input supply and production of crops, livestock, fish and other agricultural commodities in addition to transportation, processing, retailing, wholesaling and preparation of foods.

For example, social networks for women may not only provide information about optimal farming practices or markets at which prices are highest (which is directly useful to their income generation), but additionally help women offset power imbalances within their household by increasing their bargaining power vis-à-vis husbands and other powerful members (Roy et al. 2022). Access to laborsaving technologies (e.g., tractors, farm machinery, sprayers, household appliances, etc.) may not only relieve drudgery and provide women with more time for productive work beyond the household, but also erode gender norms labeling domestic labor as women's work (Lecoutere, Achandi, et al. 2023). Access to ICT may not only provide women with relevant information to make them more productive, but also reduce information asymmetries between women and men that prevent their equal access to key productive resources, or allow women to contact and influence leaders and service providers designing policies or distributing inputs that might benefit them. This suggests potential for a virtuous cycle, whereby expanding women's access to complementary factors erodes harmful constraints on women, in turn expanding their access to complementary factors.

This paper answers two questions about complementary factors: (a) What are the main (structural) constraints to accessing and benefiting from them, and why would breaking down these constraints be beneficial? And (b) What works to break down these constraints? We consider six complementary factors: (1) networks and social capital resources (e.g., self-help groups, civil society groups and cooperatives), (2) ICT, (3) technology (e.g., modern agricultural inputs, mechanization, laborsaving technologies and other technologies facilitating women's integration into agriculture and food systems), (4) agricultural extension and advisory services, (5) financial services (e.g., credit, formal savings, insurance) and (6) social safety nets.

These complementary factors encompass a broad but important range of services, technologies and assets that might complement other productive resources. Adopting the Gendered Food Systems framework proposed by Njuki et al. (2021), the complementary factors we consider are part of the food-system drivers (biophysical and environmental, technology and infrastructure, political and economic, sociocultural and demographic) presented in the overarching paper (Lecoutere, Kosec, et al. 2023). These drivers, which include our complementary factors, are marked by structural inequalities linked to gender.

The paper proceeds as follows. First, we discuss newly emerging thinking around gender equality in agriculture and food systems as it pertains to complementary factors—contrasting it with previous thinking. Second, we review the constraints on women's ability to access and benefit from these six complementary factors and how they have evolved since the *State of Food and Agriculture 2010–11* (SOFA) report was written, and we discuss the possible societal benefits of breaking down these constraints and thus closing gender gaps in access. Third, we provide evidence on what has been found effective (or not) at improving women's ability to access and benefit from these complementary factors. Finally, we conclude with policy recommendations.

2. Previous and newly emerging thinking about gendered access to complementary factors

Acknowledgment that women suffer from unequal access to complementary factors is not new. However, substantial new thinking has emerged about how women interact with other household members and with society as a whole and how specific complementary factors might influence these relationships. Moreover, as technology and scientific knowledge advance, it is crucial not only to understand the new opportunities they provide, but also to ensure they do not leave out the most vulnerable segments of the population. In this section, we review both previous and new thinking on gendered access to complementary factors, tracing out some of the important considerations that solutions must incorporate.

2.1 Previous thinking

In the last few decades, there has been a shift away from the unitary model of the household to a collective model, under which individual members of a household have different preferences and may bargain over how to allocate resources (Chiappori 1988, 1992). Based on these models, many interventions aim to improve women's bargaining power by increasing their direct control over assets (e.g., land titling) or resources (e.g., cash), thereby improving their "outside options" (Doss and Quisumbing 2020). The defining feature of collective models is the assumption that households produce efficiently (Manser and Brown 1980; McElroy and Horney 1981; Chiappori 1997). However, new innovations in data collection—such as sex-disaggregated data at the plot level, or lab-in-the-field experiments—have allowed researchers to test this assumption, with evidence generally showing that household production is not efficient (Doss and Quisumbing 2020; Quisumbing and Doss 2021). This has spurred new thinking as to why inefficiencies persist and how to alleviate them.

A large body of work reveals that inefficiencies in production are in part due to barriers in women's access to complementary factors. The work documents gender gaps in access to technologies (e.g., improved seed, fertilizer and mechanization), natural resources (e.g., water and soil), human capital and information (e.g., education, labor and agricultural extension) and social and political capital (e.g., group membership and social networks) (Peterman, Behrman and Quisumbing 2011). The focus has generally been on comparing gaps, rather than understanding the decision-making processes and the constraints that give rise to gendered differences and inefficiencies. Moreover, studies have tended to focus on agricultural production rather than the broader food system—failing to consider the constraints on women's participation and ability to benefit from various nodes along the value chain.

2.2 New thinking

As mentioned above, models of the household have shifted—with evidence on lack of cooperation within the household growing—drawing into sharper relief why constraints matter. New thinking has moved to looking not only at gender gaps in access to complementary factors—which are a symptom of inefficiencies and inequality—but also at the underlying constraints that generate these inefficiencies and inequalities. Changing systems to alleviate structural inequalities means changing the institutions and norms that sustain or promote inequalities.

New thinking is also emerging that takes seriously the overall agri-food system as well as the gendered constraints within it—including its drivers which entail complementary factors (see the Gendered Food Systems framework in Njuki et al. [2021]). An increasing share of work considers women as entrepreneurs and not only farmers, in need of complementary factors to help them benefit from livelihood opportunities across key value chains.

Technological and social developments related to complementary factors also require new evidence. For example, ICT provides a relatively new class of complementary factors; when the 2010–11 SOFA report was written, gender-differentiated access to ICT and its implications for women’s production decisions was not well understood. ICT is now rapidly changing the provision of agricultural extension and advisory services, as well as access to insurance, credit, marketing and other services (Ceballos, Kramer and Robles 2019; Gumucio et al. 2019; Spielman et al. 2021). Gender gaps in women’s access to and ability to benefit from ICT can thus be expected to heavily influence their empowerment and role in food supply chains; we can learn from emerging evidence how to address these challenges.

Additionally, new and more advanced laborsaving technologies have proliferated. Understanding barriers to women accessing them, and how to address these barriers, requires new research that takes into account the new and evolving properties of these technologies. While laborsaving technologies can free up women’s and men’s time for other activities, some forms of mechanization may also replace women’s or men’s wage labor. In such a situation, how women’s (or men’s) saved labor is reallocated deserves special attention.

Finally, social safety nets—noncontributory programs targeted to poor and vulnerable populations (e.g., cash transfer programs)—have been a popular strategy for addressing poverty and vulnerability and improving individuals’ human capital and health. Social protection is increasingly recognized as being able to promote gender equality, expand women’s access to productive assets, spur women to have more influence over intrahousehold decision-making, provide women with information and expand their social networks (Peterman et al. 2019). However, benefits to women are not automatic, and social safety nets need to be designed to address gendered risks and vulnerabilities (Camilletti 2020). Social protection programs are also rapidly evolving in the way they are targeted, monitored, rolled out and continued over time—demanding new research.

3. Constraints women face in accessing and benefiting from complementary factors, and benefits of alleviating them

This section reviews the current constraints facing women’s access to and ability to benefit from each of the complementary factors we cover in this chapter. We focus on the evolution over the last 10 years since the 2010–2011 SOFA report, and the current status of these constraints. It additionally highlights the benefits of alleviating these constraints for each of the complementary factors, in turn.

3.1 Networks and social capital resources

Women have smaller network sizes and are less influential in their networks, leading them to receive less information from networks (Beaman and Dillon 2018).² What precisely gives rise to gendered access to networks and social capital? Existing literature identifies at least three constraints women face: (1) mobility constraints and heavy domestic work burdens, (2) psychological constraints and (3) governance and institutional constraints.

First, women have less mobility than do men; they may face greater care responsibilities, active opposition from family members and non-egalitarian gender norms, and these can confine them at home and hamper their access to social networks and capital beyond the household (Prillaman 2017; Cheema et al. 2019; Brulé and Gaikwad 2021; Bernhard, Shames and Teele 2021; Robinson and Gottlieb 2019). These mobility restrictions may also result in women generally having less access to information about existing civil society groups, their activities or how to join them—further dampening their likelihood of joining. Of course, specific mobility constraints faced will vary across contexts and across rural and urban areas within a given context.

Second, women can face psychological constraints, which may be internally imposed (e.g., due to their preferences, values and beliefs) or imposed on them by others (e.g., motivated by non-egalitarian social norms others harbor). These can prevent them from forming rich networks and building social capital. These narratives can take the form of women believing it is not appropriate for them to pursue these networks and social capital, or that they are not useful to a group. These beliefs, socialization and internalized norms about gender may lead them to avoid voicing opinions publicly or otherwise participating actively in groups (Atkeson and Rapoport 2003; Preece 2016). Additionally, these psychological constraints may interact with other, externally imposed norms, potentially reinforcing each other. Avenues for future research include establishing a better understanding of these interactions, as well as understanding how the gender composition of groups may alter the extent to which women experience psychological constraints.

Finally, institutions (i.e., formal and informal rules of the games) themselves—present at different levels of groups and government—may advantage or disadvantage women by defining the set of opportunities to participate, and conditions of participation, available to them (Kaaria et al. 2016). For example, participation in a group may require government-issued identification, payment of membership fees or access to a bank account, all of which may be less accessible to women. Or, community leaders may be biased toward men, giving them more opportunity to speak at community meetings. Thus, even when women have time and wish to participate in groups, they may fail to do so if it is financially or practically challenging.

These constraints on women are problematic given that having access to networks and social capital resources has a number of benefits for women—from reducing gender gaps in information access, to promoting egalitarian gender attitudes, to increasing women's productivity. For example, Po and Hickey (2020) note that when women have bridging social capital, it increases the diversity of their information sources and can shift broader societal views toward gender equality and women's leadership. Ingutia and Sumelius (2022) find that participation in a farmer group by women increases their crop yields. Similarly, Magnan et al. (2015) find that women's social networks increase their demand for a resource-conserving technology (laser land leveling).

Increasing women's access to network and social capital further has broad societal benefits; it can improve the cohesiveness of groups in which women are participants and broadly improve governance outcomes. For example, reducing gender inequality in group membership and participation in a producer organization reduces conflict and improves members' collaboration, thus improving the organization's outcomes including collective

2. While smaller networks have the potential to be stronger than larger networks (thus having higher quality overall), this is unlikely to apply here, where women's lesser access to networks is not by strategic choice but rather results from barriers they face to forming networks. These smaller networks are also likely to comprise many women who are similarly less-networked.

knowledge and benefits (Meinzen-Dick and Zwarteveen 1998; Coleman and Mwangi 2013). Additionally, more-gender-equitable groups tend to have better natural resource governance practices that promote conservation (Coleman and Mwangi 2013; Sultana and Thompson 2008; Agrawal 2001; Agrawal et al. 2006).

3.2 ICT

While ICT has been around for some time, in many low- and middle-income countries (LMICs) it is still relatively new and, especially in rural areas of LMICs, it is generally synonymous with (basic) mobile phones. Women are generally less likely to be early adopters, and gaps in ownership and access are likely to be sustained for the foreseeable future. Even though awareness of mobile internet is growing in most markets, it remains consistently lower for women compared to men; in 2020, women in LMICs were 23 percent less likely than men to use a mobile phone (GSMA Connected Women 2021). Mobile phones used by women are also generally older and of lower quality because they are handed down, or because they are cheaper imitations of the better quality devices men own.

In addition to less access, women also face a variety of challenges that restrict the usefulness of ICT (Aker, Ghosh and Burrell 2016). ICT comprises networked technologies that are more useful the more people use them. However, women usually have smaller networks, and the information they exchange may be substantially different from what is typically exchanged via men's networks (Beaman and Dillon 2018). Women may also have less access to electricity to charge their phones. Or, they may not have the means to obtain a (prepaid) phone or data plan, so they may be restricted to only receiving calls. In many countries, ICT is also closely tied to mobile money, and formal registration may be necessary—which may pose challenges for women (Villasenor, West and Lewis 2016). Different levels of education across genders may also result in gendered differences in how phones are used.

The crosscutting nature of ICT means that reducing the digital gender gap has a range of economic and social benefits. The empowering effects of information transmitted through a networked technology are undisputed, even though the magnitude of the effect is difficult to pin down. Reducing inequality in access to the technology is thus likely to have a substantial effect on women's empowerment in a variety of contexts and on various levels.

But ICT is often a complementary or enabling technology for a range of other (complementary) resources, services and technologies. For instance, ICT is increasingly used as a complementary technology to deliver information at various levels of the agricultural value chain (extension information, price information, inventories, etc.). ICT enables access to finance to people without banking access and has recently been used to provide last-mile access to insurance. As such, the expected societal benefits from gendered agricultural extension and advisory services or financial services, discussed in detail below, can be amplified by gender-equitable access to ICT.

ICT also enables governments to provide opportunities for citizen feedback, invite citizen participation in budgeting, support a free press or use technology to monitor service providers (Kosec and Wantchekon 2020). To the extent that these capabilities can be used to ensure women are receiving equal quality services or products, and policymakers deliver on policy commitments to promote gender equality, the existence of this technology might improve service delivery to women and responsiveness of policymakers to their needs.

3.3 Technology

Structural constraints also prevent women accessing many complementary technologies. For example, improved seed varieties may not reach women farmers because they lack information about how to obtain and use it, or they may not be able to use modern agricultural equipment due to a lack of skills or available training. As Quisumbing and Doss (2021) report, men and women are equally likely to adopt new technologies if enabling factors are equal. Taking the example of minitillers in Nepal, Paudel et al. (2020) observed that women are up to five percent

more likely to adopt a technology if they are given similar access to productive resources as men. However, it is rare that the enabling factors or access to productive resources are equal for women and men (Quisumbing and Doss 2021). The adoption of new technologies and practices depends on several factors, such as decision-making structures within the household (Theis et al. 2018; Gebre et al. 2021; Junia Mutenje et al. 2019); networks (Junia Mutenje et al. 2019); and, more importantly, access to other complementary resources. For example, to get the most out of improved seeds, a farmer also needs access to adequate irrigation, fertilizer and other inputs required for crop production. However, women's adoption capacities are often constrained by the existing mindset of the agricultural innovation system which considers the needs, preferences and physical statures of men.

Existing literature reveals several benefits of narrowing these gender gaps. As mentioned above, Paudel et al. (2020) illustrate a five percent increase in the adoption of mini tillers in the hills of Nepal if the gender gap is reduced by providing gender-equal access to productive resources. Analyzing Tanzania's National Panel Survey, Akram-Lodhi and Komba (2018) report that closing the gender gap in high-value crops may add over US\$102 million to the national GDP.

3.4 Agricultural extension and advisory services

A number of constraints also make women less likely to receive agricultural extension services (Peterman, Behrman, and Quisumbing 2011; Ragasa 2014) and limit their ability to benefit from them (Campaign ONE 2014). Extension services continue to be organized by male experts targeting predominantly the main (male) decision-maker within the household. Model farmers, often used by public extension services to disseminate new technologies, are often men. Topics covered generally revolve around crops grown mostly by men and concern technologies and practices that are easier for men to implement.

In many contexts, women are seen as merely helpers on the farm, and their engagement in agriculture as workers and primary farmers is underestimated (Najjar, Baruah and Garhi 2019; Twyman, Muriel and Garcia 2015). Social and gender norms around mobility and household roles may also prevent women from accessing the services. Often, there is limited attention to intrahousehold decision-making dynamics and how they affect access to agricultural extension. Complementary activities or preconditions to participate may lead to exclusion of certain women. Examples include reliance on ICT for agricultural extension and advisory service delivery (e.g., through a WhatsApp group) or the requirement to form social groups to access advisory services.

Given the important role that women play throughout informal food systems, it is expected that closing the gender gap in access to agricultural extension information would have measurable impact on the adoption of products and practices promoted, in turn affecting the aggregate food supply. BenYishay et al. (2020) show that men and women learn and retain information about the new technology equally well, with women applying it on their own farm more often than their men counterparts. In Uganda, Kabunga, Dubois and Qaim (2014) find that women in female-headed households would be as likely to adopt innovations in banana cultivation as men in male-headed households if they were as knowledgeable about the technology.

The empowering effect of providing information to women is also likely to have a range of indirect effects on food-system outcomes. A more prominent role for women in the farm household has been shown to result in more efficient intrahousehold allocations of scarce resources, more equitable distributions of returns to investments in household production and general improvements in welfare and poverty (Fiala and He 2017; de Brauw et al. 2014). Involving women in the choice of which crops to cultivate may also lead to better dietary and nutritional outcomes at the household level (Heckert, Olney and Ruel 2019; Quisumbing and Maluccio 2003) or diversified risk profiles (Dercon 2002).

3.5 Financial services

Substantial progress has been made in the last 10 years since the 2010–2011 SOFA report in advancing financial inclusion. The share of adults in the world with a bank account has increased from 51 percent in 2011 to 69 percent in 2017 (Demirguc-Kunt et al. 2018). Much of this expansion is due to a new generation of financial services that can be accessed through the internet and mobile phones. However, little progress has been made in closing the gender gap in access to services; in LMICs, the gender gap in owning a bank account remains at nine percentage points over the period 2011 to 2017 (Demirguc-Kunt et al. 2018). Similarly, [figures 2 and 3](#) show that the gender gap in taking out a loan or savings has persisted over time. Moreover, it is notable that while access to mobile money accounts in LMICs has doubled between 2014 and 2017, the gender gap has increased ([figure 4](#)).

In a systematic review, Gammage et al. (2017) find that the most cited constraints on women accessing financial products and services were lack of resources (income, assets, etc.), prohibitive cultural norms and discriminatory policies. For example, in some countries, women are not allowed to open a bank account or are required to provide specific permissions or additional documentation that can be challenging to obtain. Women are also less likely than men to possess the identification documents required to open formal financial accounts, such as national identity cards or passports (Villasenor, West and Lewis 2016), and women are less likely to have collateral to obtain loans (FAO 2019).

Constraints on women's use of financial services include resources, preferences, norms and financial literacy (Gammage et al. 2017). Risk and time (i.e., current versus future spending) preferences, liquidity constraints and trust may shape differences in access to and use of financial products and services. For example, demand for insurance is higher among men than women (Delavallade et al. 2015; Akter et al. 2016), and women tend to purchase lower value coverage (Bageant and Barrett 2016). Akter et al. (2016) find that women's aversion to certain weather insurance schemes is associated with distrust and low financial literacy, while Delavallade et al. (2015) hypothesize that it is also related to the different risks men and women face, with health risks being more relevant for women. Women's preferences for financial services also tend to be shaped by norms and household responsibilities (Gammage et al. 2017; FAO 2019).

Financial inclusion of women leads to benefits at the individual, household and community levels. At the individual level, financial inclusion can improve women's economic resilience and control over money (Prina 2015; FAO 2020), their involvement in value chains and labor market participation (Ambler, Jones and O'Sullivan 2018; Field et al. 2021) and investments in microenterprises (Dupas and Robinson 2013). At the household level, increased financial inclusion has been shown to increase agriculture productivity (Brune et al. 2016) and wealth (Horn et al. 2020). At the community level, increased financial inclusion can lead to women's increased participation in the economy, thereby spurring economic growth (FAO 2020).

3.6 Social safety nets

Social safety net programs have been on the rise since the turn of the century, covering 72 countries in 2000 and 149 countries by 2017 (World Bank Group 2017). Of the countries in the ASPIRE dataset in 2017, 60 percent had an unconditional cash transfer program and 43 percent a conditional cash transfer program (World Bank Group 2018). According to the World Bank report *The State of Social Safety Nets*, more than 1.9 billion people in the world were beneficiaries of a social safety net in 2014 (World Bank Group 2015). More recently, COVID-19 has fueled an unprecedented response from governments, with cash transfer benefits doubling and coverage growing by 240 percent compared to pre-pandemic levels (Gentilini 2021). Similar social protection responses are being observed in response to the Russia–Ukraine war.

Traditionally, women have been the target of many social safety net programs, and studies show that they benefit in terms of reduced household poverty and food insecurity (Hidrobo et al. 2018), increased asset wealth (Hidrobo et al. 2018), improved mental health (Ridley et al. 2020), increased enrolment and attendance (Baird et al. 2014) and reduced intimate partner violence (Buller et al. 2018).

Targeting women with safety net programs may not be sufficient to guarantee transformative impacts on gender equality and women’s empowerment (Simon 2019). First, women may not maintain control or have decision-making power over the cash transfers they receive. Key barriers include household gender norms, weak bargaining power, limited confidence, financial illiteracy and limited mobility (Camilletti 2021). Second, even when they do retain control, the notion of targeting women because they will invest it in their children’s nutrition, health and education may reinforce stereotypes instead of challenging them (Perera et al. 2022). In cases where women are not preferentially targeted, gender norms often mean household heads who are men receive the transfer and it remains in their control, although positive impacts can still accrue to women in terms of poverty, food security, intrahousehold relationships, health and school enrolment. Context, social norms, intrahousehold dynamics and program design shape the potential of social safety nets to lead to transformative impacts.

Well-designed social safety nets that take gender into account have the potential to contribute not only to reduced poverty, which is core to achieving SDG 1, but also to gender equality across other SDG goals, such as SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 5 (Gender Equality) and SDG 8 (Decent Work and Economic Growth) (UNICEF 2021). These projected benefits cover three of the four outcomes in the Gender Food Systems framework in Njuki et al. (2021)—specifically, related to dietary outcomes, gender equality and economic and livelihood outcomes. Moreover, given the reach of social safety nets, they also have the potential to transform unequal social and economic circumstances at a systemic level by tackling constraints (Newton 2016).

4. What has proven effective (or not) in reducing constraints on women’s access to and ability to benefit from complementary resources, technologies and services?

In the previous section, we identified a number of constraints on women accessing complementary factors, and we further cited evidence on the benefits of reducing these constraints and thus closing gender gaps. This section reviews what has worked to break down or otherwise overcome such constraints. Given the varied nature of the constraints across the various complementary factors we consider, the solutions are themselves varied. The search process for papers is detailed in the [annex](#), and the insights drawn out in this section are summarized in [table 1 of the annex](#).

4.1 Networks and social capital resources

One means of overcoming constraints on women accessing networks and social capital resources involves increasing their mobility. In Pakistan, providing women with access to transportation services—especially modes of transportation exclusively serving women—can lower both cost-related and social acceptance-related constraints on their mobility (Field and Vyborny 2021). Mobility might then stimulate building of social networks and participation in group activities, thus building social capital. Interventions that reduce women’s workload and drudgery can also increase women’s mobility—such as laborsaving technology; for example, Tanwir and Safdar (2013) find that culturally appropriate laborsaving technologies along with provision of childcare increase women’s participation in producer organizations by alleviating their need to be engaged in domestic and care work.

Another promising set of interventions tries to surmount women’s psychological constraints on building networks and social capital. If women do not feel capable of gathering for meaningful purposes with other women (e.g., to support their livelihoods or influence outcomes in their communities), or do not believe they can achieve outcomes together, they are unlikely to invest in expanding their networks and social capital. Therefore, breaking down these psychological constraints is critical. Group-based training can improve a woman’s self-efficacy and self-esteem, as well as her social capital (Brody et al. 2016; Roy et al. 2019). Exposing women to role models can also be effective in incentivizing them to participate in groups and explore new roles within them—including leadership roles (FAO 2015). Further, training or interventions specifically focused on fostering a sense of group identity, group-based injustice and confidence in the *collective* efficacy of their group can bring about women’s *collective* action; Martijn van Zomeren and colleagues have called this set of psychological conditions the “social identity model of collective action” (Van Zomeren, Postmes and Spears 2008; 2012; Van Zomeren, Kutlaca and Turner-Zwinkels 2018; Duncan 2018).

Finally, changes in formal rules and governance structures can also reduce constraints on women’s participation in groups. For example, Kaaria et al. (2016) highlights how rules of membership in producer organizations are a key constraint to women’s participation, so strategies to ensure that structures and governance mechanisms are gender sensitive and promote women’s inclusion can work well to boost women’s participation in them.

4.2 ICT

Targeted efforts are needed to overcome the expense of ICT, which often puts it out of reach for women or leads to them being systematically and disproportionately excluded (Burrell 2010). For instance, providing phones to women’s groups or providing incentives for women to acquire phones may help overcome barriers.

Also important for expanding women’s access to and use of ICT is understanding gendered differences in networks and how interventions can utilize the unique networks women have (Mekonnen, Gerber and Matz 2018). Both farmer groups and social learning have been found to be important for agricultural technology adoption (Conley and Udry 2010), especially among women (Mekonnen, Gerber and Matz 2018). This is particularly the case for simple practices that are within reach of women and require limited additional monetary investment (Van Campenhout 2021). Digital Green has taken this to the next level by creating a platform, much like YouTube, where farmers can upload short videos demonstrating best agronomic practices (Toyama et al. 2009). But networks are also exclusionary by nature. When networks are aligned according to gender, interventions that attempt to leverage networks can suffer equity issues (Beaman and Dillon 2018)—demanding novel, gender-sensitive strategies.

The networked nature of ICTs may mean that phones are less useful as a productive complementary resource for individuals with smaller networks. In Tanzania, Aker, Blumenstock and Dillon (2020) test an intervention on the production and distribution of a

“Yellow Pages” phone directory with contact details of a range of value chain actors. Results of this study suggest that providing women with contact details of input dealers, extension providers, traders, processors and retailers may render ICT more effective in integrating women in food supply chains.

The way content is delivered is also important; identifying the right delivery mechanism can be the difference between women benefiting on par with men or entirely failing to benefit. Some lessons have already emerged. For instance, the use of SMS has become a cost-effective way to deliver information to farmers (Fabregas, Kremer and Schilbach 2019). However, as women are generally less educated and more likely to be illiterate, alternative types of content delivery, such as interactive voice response (IVR), may be more effective (Steinberg et al. 2014). To ensure that women can equally benefit, mobile services should ensure interactive support services and voice mail are used in preference to text messages if the population is illiterate (Barnett et al. 2020).

4.3 Technology

Constraints on women’s access to technology can be addressed by considering both women and men during the design and development of technological innovations and making additional resources available to women. A study in India found that technologies like direct-seeded rice and machine-transplanted rice are good for laborsaving, reducing drudgery and mitigating greenhouse gas emissions from rice paddies; however, these technologies do not benefit certain groups—particularly women dependent on wage labor (e.g., engaging in rice transplanting). Introducing capacity-building programs for women and using the surplus labor force in other, more efficient and productive, sectors may allow women to benefit more fully (Gartaula et al. 2020). Sometimes the introduction of technology has an unexpected result as shown by a study on the introduction of a pedal thresher in the Nepal hills: men were interested in running the threshers, which are a substitute for the manual threshing of small millets normally performed by women (Devkota et al. 2016). The authors highlight it as a positive change because the machine took over the tedious job that women were doing manually as unpaid laborers which, due to the introduction of a machine, meant men could lend a hand for the threshing job.

Interventions with new technologies that use multiple dissemination approaches that are gender sensitive, such as information delivered through video screenings after women’s working hours, can improve women’s access and use of new technologies, as shown in a study from Ghana (Damba et al. 2020). Likewise, Le, Shimamura and Yamada (2020) provide evidence that social interactions through group membership helps the development of sustainable agriculture and further technology diffusion.

Adoption of improved seed varieties relies on having adequate access to physical and social capital, which requires policy changes to lower the barriers to these inputs (Teklewold, Adam and Marenja 2020). Women’s lower adoption of new technologies can be tackled with the help of gender-sensitive policies that advocate equitable and secure ownership of productive assets; such policy frameworks could be embraced as a guideline for women’s empowerment in agriculture (Ndeke et al. 2021).

In this context, Diro et al. (2021) argue that to increase women’s access to technologies like companion crops, the government and development partners would need to help women overcome liquidity constraints, which limit the widespread adoption of the technology. This is more important for women than men due to their lower access to productive capital. Technological advances in farm management practices such as conservation agriculture are also less likely to be adopted by women compared to men due to barriers in access to land and other inputs. A simple strategy of deliberately enlisting women as beneficiaries, working with men to advance their understanding of women’s needs in agriculture, and offering agricultural inputs directly to women could help enhance women’s participation in conservation agriculture (Wekesah, Mutua and Izugbara 2019).

4.4 Agricultural extension and advisory services

How agricultural extension is targeted makes a difference to women's access. Most often, agricultural extension officers target the main decision-maker with respect to agricultural production within households, which is also often assumed to be the man. However, the assumption that extension messages targeting one household member will trickle down to the rest of the household, including women and younger household members, is often incorrect. In Uganda, Lecoutere, Spielman and Van Campenhout (2019) manipulated who within the household viewed a short, engaging video on best practices in maize farming. They found that targeting the woman co-head on her own with information increased her knowledge about recommended practices, her role in agricultural decision-making, her subsequent adoption of recommended practices and inputs, and yields on fields she manages; the man co-head's knowledge about the practices and his unilateral decision-making were reduced. Targeting also seems key when the aim is to increase cooperation within the household. In Uganda, couple seminars raising awareness about participatory intrahousehold decision-making related to coffee as a cash crop promoted women's involvement in strategic farm and household decisions (Lecoutere and Wuyts 2021).

How extension is carried out is also important for ensuring women's access. Lambrecht, Vanlauwe and Maertens (2016) investigated whether inclusion of women farmers in an agricultural extension program increases adoption of three technologies at the household level: improved legume varieties, row planting and mineral fertilizer. In their study, participation in the program by both men and women led to the highest adoption rates. The Uganda study of Lecoutere, Spielman and Van Campenhout (2019) also had a treatment arm that targeted both co-heads together. This led to an increase in joint adoption of recommended practices and inputs, and the man co-head's unilateral decision-making was reduced. Donald, Goldstein and Rouanet (2022) found that if the wife is also invited to a session where action plans are drawn up for rubber tree cultivation, more investments were made without sacrificing current production.

Another key determinant of the effectiveness of agricultural extension and advisory services is related to the social identity of the person who brings the message. Traditionally, advice is provided by (men) agricultural experts. Recent research, however, has shown that the social identity of the person who provides extension information influences learning and adoption, and farmers appeared most convinced by communicators who shared a group identity with them or who faced similar agricultural conditions (Benyishay and Mobarak 2019). Introducing additional women extension agents who reach out to farms headed by women also has a positive effect on awareness and adoption among women farmers (Kondylis et al. 2016). Pan, Smith and Sulaiman (2018) explored similar issues in Uganda with women model farmers who facilitate training and access to hybrid maize seed, particularly for fellow women smallholder farmers. They found significant positive effects on the adoption of low-cost recommended agronomic practices and inputs by households and on household food security. And Lecoutere, Spielman, and Van Campenhout (2019) found that featuring women role models in the videos challenged men's beliefs and stereotypes about women's roles in agriculture and encouraged adoption of recommended practices by women.

Many other features of agricultural extension and advisory services also contribute to effectiveness. For example, the actual content will also affect the inclusiveness of the service. Often, agricultural extension centers around crops grown mainly by men, like maize or rice, and discusses the use of commercial inputs such as hybrid seed, which may be out of reach for women. Including food crops such as cassava and sweet potato and also focusing on practices that can be implemented without monetary outlays (e.g., organic manure, conservation agriculture methods) is likely to appeal more to women farmers.

The way the message is delivered is also likely to affect inclusiveness. Farmer field schools brings farmers together, enabling mutual learning, but also risk adverse group dynamics where men take over and women feel marginalized. Recently, more attention has also been

given to social advertising, behavioral change communication and framing the messages as success stories. Several recent studies have shown how these alternative formats are important in both increasing aspirations of women and challenging gender stereotypes among men (Beaman et al. 2012; la Ferrara, Chong and Duryea 2012).

4.5 Financial services

A recent systematic review of reviews on financial inclusion—which included financial services related to credit, savings, insurance and mobile money—found that in general, these financial services did not lead to transformational changes in women’s empowerment or poverty (Duvendack and Mader 2020). Below, we go into more detail on individual studies and review pieces on promising strategies to improve financial services to achieve more transformative impacts.

While in the early 2000s microfinance was seen as a promising tool for reducing poverty, more recent evaluations have tempered this outlook (Lensink and Bulte 2019). In a study across six countries, Banerjee, Karlan and Zinman (2015) concluded that microfinance does not lead to transformative effects on poverty. Evidence on giving women access to microcredit is also mixed (Vaessen et al. 2014; Lensink and Bulte 2019). In a qualitative study in Ghana, Ganle, Afriyie and Segbefia (2015) found that some women benefit from microfinance, other women have little control of the loan and are thus not better off, and some women are worse off due to their inability to repay the loans. In an effort to improve the potential of microfinance, many programs have bundled microcredit with other services such as financial literacy, business training or technical assistance, or they offer more flexible contracts. Studies have found that while bundling training with microcredit improves knowledge and practices, it rarely leads to increased profits or income (Karlan and Valdivia 2011; Sayinzoga, Bulte and Lensink 2016). One of the few exceptions is in Vietnam, where women microfinance clients who received gender and business training had increased knowledge, practices and business outcomes (Bulte, Lensink and Vu 2016). The same study also found that inviting husbands to participate in the training did not lead to significant impacts in knowledge or practices, but led to some weak positive differential impacts on agricultural sales and profits.

Offering free, no-frills banking or savings accounts has been shown to increase savings (Karlan, Ratan and Zinman 2014; Knowles 2018). For example, in Nepal, access to bank accounts with no fees also increased take-up and usage of bank accounts and improved women’s ability to cope with shocks (Prina 2015). And in Kenya, access to non-interest bank accounts for women market vendors increased their savings, productive investments and private expenditures (Dupas and Robinson 2013). However, in a study across three countries, Dupas et al. (2018) found that most people (mostly women) who were offered free bank accounts never used them, with lack of money or income cited as the main reason. To overcome this constraint, newer studies focus on giving women access to bank or savings accounts linked to income-generating opportunities or cash payments. For example, a project in Uganda encouraged couples to register at least one of their sugarcane blocks in the wife’s name, which required women to have access to a bank account. The result was significant increases in women’s access to bank accounts, alongside expansions in women’s involvement in the value chain (Ambler, Jones and O’Sullivan 2018). Similarly, Field et al. (2021) find that depositing wages from India’s public works program into women’s accounts instead of men’s increased their labor participation.

Another promising strategy for improving women’s access to and ability to benefit from financial services is using group-based platforms. In Mali, a community-based savings group led to increased savings, livestock holdings and food security (Beaman and Thuysbaert 2014). Informal microfinance groups, such as Village Savings and Loans Association, also showed promise in a multicountry study across Ghana, Uganda and Malawi, with positive impacts on women’s empowerment and microenterprise outcomes but not on income or consumption (Karlan et al. 2017). Part of the success of group lending stems from the social interaction, which may be more relevant in contexts where women’s mobility is more restricted. For example, in India, women microfinance clients who meet weekly were more likely to pool risk and less likely to default on their loans than clients who met monthly, highlighting the importance of frequent social interactions in this setting (Feigenberg, Field and Pande 2013).

Mobile money services are another promising way to reduce constraints on women's access to financial services. Mobile money can give women access to a convenient and private platform for saving. The service in Kenya, M-PESA, led to decreases in poverty that were driven by increased financial resilience and saving, and changes in occupational choice, with impacts most pronounced for women (Suri and Jack 2016). In Tanzania, Bastian et al. (2018) found that mobile savings increased saving among women microentrepreneurs, and business training bolstered this effect, but they did not find impacts on sales or profits. Although mobile money may relieve some constraints women face in accessing and using bank accounts, it can also exacerbate the gender gap in contexts where women have less access to mobile phones than men.

Financial literacy or education programs are another strategy to reduce constraints on women's access to and ability to benefit from financial services. In a meta-analysis of randomized controlled trial (RCT) studies, Kaiser et al. (2020) found that financial education programs have a positive treatment effect on financial knowledge and financial behavior. Koomson, Villano and Hadley (2020) examined the impact of financial literacy training on financial inclusion using data collected from an RCT in Ghana. They found that women beneficiaries are more likely to own an account as a result of the program, but they did not find impacts on savings, access to credit or likelihood of receiving financial assistance. In a novel long-term study conducted on youth in Uganda, Horn et al. (2021) found that financial education increased financial knowledge and trust one year after the intervention, but these impacts had faded after five years. However, they found sustained impacts on savings from both financial education and offering a savings account.

In an effort to make agriculture insurance more gender-inclusive, responsive and transformative, Timu and Kramer (2021) conducted a variety of willingness-to-pay experiments in Kenya. They found that having insurance payouts go to a woman's account instead of her spouse's, using women extension agents to inform and register farmers and bundling insurance products with seed distribution increased women's willingness to pay for insurance. In an RCT conducted in Ethiopia, Belissa et al. (2019), tested whether delayed payments and engaging leaders of local institutions (Iddirs), helps overcome constraints to take-up of weather insurance that are due to lack of liquidity and low levels of trust. They found that both significantly increased take-up of weather insurance.

4.6 Social safety nets

A large body of evidence exists documenting the positive impact of social safety nets on household poverty and food security (Hidrobo et al. 2018; Bastagli et al. 2016). A more recent systematic review of the gendered impacts of social protection found that social assistance programs also lead to positive impacts on a range of outcomes for women, from increased labor participation, savings and investments to use of health services, increased school enrolment and attendance and reduced risky sexual behavior (Perera et al. 2022). Here we first present the evidence on the impacts of social safety nets on agriculture productivity and income-generating activities along the food-system value chain, then we focus on the evidence and recommendations specific to improving women's ability to maximally benefit from social safety net programs.

In a review of the evidence of how social protection impacts agricultural productivity, Tirivayi, Knowles and Davis (2016) showed that most studies have found positive impacts on input use and asset accumulation. However, in an evaluation across seven countries of cash transfer programs in Africa that mainly target women, Daidone et al. (2019), presented a more nuanced picture, arguing that impacts depend on program design—particularly on the demographics of the target population, transfer size, and messaging—and evaluation design. For example, in a study in Kenya that tested some design features, Haushofer and Shapiro (2016) found that lump sum and large transfers are more likely to lead to investments in assets than monthly and smaller transfers.

Given the potential of social safety nets to reduce poverty and empower women, two reviews—Camilletti (2021) and Peterman et al. (2019)—presented design features of social safety nets that have shown promise in the literature for achieving gender-transformative

impacts. Below is a summary of their recommendations, with a focus on recommendations more relevant to agriculture and food systems:

- **Targeting:** Although evidence is mixed regarding the broader economic, education and health impacts of the recipient's gender (Perera et al. 2022) a limited number of studies have indicated that targeting female recipients may lead to larger improvements in women's empowerment (Haushofer and Shapiro 2016).
- **Benefit size and duration:** In order to relieve liquidity constraints and improve risk management, benefits of social safety nets should be reliable, timely and sizable. In general, transfers need to be of a meaningful size (20 percent of baseline consumption) and of long enough duration to have sustainable impacts on poverty and women's empowerment (Camilletti 2021). In the Kenya study discussed above, not only did larger transfers lead to larger impacts on assets, but it also led to larger impacts on an index of women's empowerment (Haushofer and Shapiro 2016).
- **Delivery:** Delivering benefits electronically, either through debit cards or mobile phones, can also reduce constraints women face in accessing and using cash transfers. For example, Aker et al. 2016 showed that delivering cash transfers via mobile money compared to in person improved household and child diets, which was partially explained by the reduction in women's time required to collect the transfers and allowing women to temporarily conceal the transfer (Aker et al. 2016). Similarly, in India, women whose wages from a government workfare program were deposited directly in their bank account (as opposed to their husbands') increased their labor supply more, relative to women who had an account opened but whose wages were not directly deposited (Field et al. 2021).
- **Plus programming:** Combining programs such as cash transfers with other services or programming has high potential for being gender transformative. In many cases, cash transfers are combined with training related to income-generating activities, financial literacy and savings. Training is often group-based and brings women together or women and men together. These "plus" activities have the potential to reduce constraints on women's ability to access and benefit from productive assets by providing them with information and skills, strengthening their social networks and connecting them directly to services. For example, a study in Niger found that women who received cash plus activities in the form of group savings, coaching, entrepreneurship training, cash grants and psychosocial interventions increased their consumption, food security and participation in and profits from off-farm activities compared to those who only received regular cash transfers (Bossuroy et al. 2021).

5. Key policy messages and recommendations

The paper reveals a vast number of constraints on women's ability to access critical complementary factors—comprising resources, technologies and services—that both directly benefit women's productivity as well as help them access key productive resources. It also explains why this is highly problematic from a social welfare standpoint. However, it

also provides a wealth of recent evidence on what works to address the specific constraints—normative, institutional and otherwise—that propagate gender inequality in access to and ability to benefit from these complementary factors. Many of the constraints women face are similar across the complementary factors, and thus many of the solutions overlap.

Customs, norms and perceptions affect both women (through their aspirations, locus of control, mobility, agency in decision-making) and men (in how they think they should support their wives and their roles) in accessing the complementary factors. For example, prohibitive norms on a woman's mobility reduce her network size and constrain her from accessing or using services such as financial services or social safety nets. At the same time, some complementary factors such as ICT (including mobile money) are not only solutions to reducing these constraints but also factors that may directly affect production across the value chain. Group-based interventions that provide women with a sense of group identity and lower the barriers to collective action may help challenge perceptions and improve women's ability to access and benefit from some of the complementary factors such as social networks, financial services or agricultural extension. Role models have also been shown to be important in challenging gender stereotypes in a variety of settings, including stereotypes around women accessing agriculture extension, and may help women adopt and use new technologies.

Formal rules and governance structures also continue to hinder women in gaining access to and benefiting from complementary production factors. While progress has been made in some of the more visible and high-stakes areas such as property rights and inheritance, institutional barriers continue to prevent women from accessing key complementary factors that are often not immediately on the radar of nongovernmental organizations and policymakers. For instance, women still face institutional barriers to accessing (ICT-based) financial services. Formal rules and governance structures at different levels of government and in professional associations and interest groups disadvantage women by defining the set of opportunities to participate, and conditions of participation, affecting women's ability to participate in social networks.

New evidence suggests that households are not efficient, and thus, it cannot be assumed that husband and wife act as a single unit with similar preferences or that information provided to a man will trickle down to his spouse. Promising interventions across the complementary factors are those that take into account the different preferences of men and women. For example, agriculture insurance that considers the different risk preferences of women and men will increase women's willingness to pay for the product. Similarly, agriculture extension services that focus on food crops more traditionally grown by women will also reduce constraints to women's access and ability to benefit from extension services. Joint targeting of interventions to the husband and wife will also lead to both receiving the information, and hopefully spur joint planning and decision-making.

The policy recommendations to increase women's access to complementary production factors derive from the above crosscutting themes. As mentioned in the Lecoutere, Kosec, et al. (2023) paper, this involves tackling structural constraints across multiple levels. Policies and programs should be designed to continuously but cautiously challenge prevailing gender norms and customs in society. At the same time, policymakers should continue to adapt formal rules and institutions that prevent women from accessing the complementary factors. Access to a particular resource in isolation or without changes to gender norms may not suffice in leading to transformational changes in access to complementary factors. Furthermore, policies and programs should consider intrahousehold and community dynamics and should take these into account when designing products or interventions.

The multiple constraints women face in accessing and benefiting from complementary factors highlight the need for multifaceted and synergistic solutions. Combinations of policies, programming and interventions that address the varied constraints on women are likely to be more effective than one-off provisions of a technology, service or resource, highlighting the need for cross-sectoral collaboration between ministries and with other relevant stakeholders.

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ANNEX AND GLOSSARY

Available at: <https://hdl.handle.net/10568/129706>



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