Reaching Smallholder Women with Information Services and Resilience Strategies to Respond to Climate Change

Edited by: Claudia Ringler, Muzna F. Alvi, Regina Birner, Christine Bosch, Elizabeth Bryan, Fridah Githuku, Ruth S. Meinzen-Dick, Patience B. Rwamigisa, and Mansi Shah

REACHING WOMEN FARMERS WITH CSA

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The project Reaching Smallholder Women with Information Services and Resilience Strategies to Respond to Climate Change aimed to increase the climate resilience of poor women and men farmers in Africa south of the Sahara and South Asia — especially those in Kenya, Uganda, and India — by overcoming the gendered information gap on accessing climate-smart agricultural (CSA) approaches. The project did this through piloting participatory video-based extension on CSA approaches with more than 30,000 farmers in the three countries. The notes in this collection summarize the key methods and findings from the study. It is hoped that they will inspire similar projects and programs that together will help eliminate the gap between rural men and women in resources, agency, and achievement once and for all.

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GENDER-RESPONSIVE CLIMATE-SMART AGRICULTURAL PRACTICES AND TECHNOLOGIES

Qualitative fieldwork to identify CSA practices preferred by women farmers in India, Kenya, and Uganda

Marilia Magalhaes, Laura Kawerau, Janerose Kweyu, and Vishak Pathak

SUMMARY

Promoting the adoption of climate-smart agricultural (CSA) practices is an important step toward enhancing farmer resilience to climate change. Given the differences in the resilience capacities, operating space, and response options of men and women farmers, it is imperative to understand the gendered preferences for and constraints to their adoption of CSA practices. This policy brief summarizes qualitative research conducted in rural India, Kenya, and Uganda to identify CSA practices preferred by women and men farmers. The findings highlight the need for gender-responsive finance models and information channels to ensure that support to climate change adaptation does not further widen the gender gap in agricultural resources, agency, and achievement.

INTRODUCTION

To identify climate-smart agricultural (CSA) practices that work for women farmers, focus group discussions (FGDs) and key informant interviews (KIIs) were conducted during 2019 and 2020 in rural India, Kenya, and Uganda. The groups were gender disaggregated to ensure that respondents felt comfortable and free to express their views, especially with regard to gender roles and responsibilities in agriculture. The FGDs used participatory impact diagrams (PIDs) to visualize linkages between climate stressors, adaptation strategies, and challenges linked to their implementation.

In India, a total of 245 farmers participated in 22 FGDs in nine districts of Gujarat: Ahmedabad, Anand, Arvalli, Chhota Udaipur, Gandhinagar, Kutch, Mehsana, Patan, and Surendranagar. In Kenya, 24 FGDs were conducted with 234 respondents in the rural areas of three counties, namely Busia, Laikipia, and Nakuru, complemented by eight KIIs with relevant stakeholders. The Kenyan FGDs disaggregated groups by gender and age. In Uganda, FGDs were conducted in five districts in the country's central region: Bukomansimbi, Kalungu, Kigoba, Nakasongola, and Rakai separately with men, women, and youth. A total of 212 farmers participated in the discussions. Moreover, in Uganda, in addition to traditional FGDs, smartphones were handed out to farmers to take pictures and videos to capture CSA practices and strategies (see Kawerau et al. 2023).

The discussions followed a semi-structured format and covered three main themes: women's and men's livelihood activities and their roles in agriculture; experiences and indicators of climate change and adaptive strategies; and sources of information on CSA.

GENDERED RESILIENCE CAPACITIES AND NEEDS

FGD participants in all three countries noted that women and men have distinct roles in agriculture. Men are more involved in activities that rely on specialized inputs (for example, application of fertilizers, pesticides, and herbicides) and equipment (for instance, machines for ploughing and harvesting as well as transportation to markets). In turn, women are more engaged in manual labor such as weeding and fodder collection, as well as crop storage, kitchen gardens, and caring for farm animals. In Kenya, women are specifically engaged in caring for poultry, dairy goats, and vegetables and horticultural enterprises. In Uganda, men are more often engaged in cash crops and livestock activities for sale while women are responsible for crops and livestock for home consumption. These different roles are directly linked to preferred CSA approaches and practices of women and men farmers.

The FGD results further suggest that while women are involved in agricultural activities, they have limited access to productive resources and are less likely to be involved in decision-making in agriculture. This affects their ability to adopt new practices that involve significant upfront or recurring investments. Participants in the discussions in Kenya reported that women generally do not own agricultural land and therefore cannot make decisions on how to use it.

Women participants in discussions in Kenya and India noted their more limited access to information sources such as agricultural advisory services, community meetings, and trainings. This gender gap in access to information reduces women's ability to make informed farming decisions, including on CSA practices. Kenyan women also complained about the lack of gender sensitivity of organizations providing trainings.

> *"You will find that when such trainings are called, it is men who attend because it is tailored to meet the men's needs, which include timing, venue, and language, so this cuts off women […]. Women cannot speak out, so even if something is against them or for them, they cannot stand and say this is what should be done, this is what should not be done so that is another constraint. […] Women lack the leadership skills, they lack the trainings, and they lack time."*
>
> Kenyan woman FGD participant

In India, farmers shared that they have now started accessing loans and credit facilities and are also opting for insurance schemes to protect against sudden crop loss. However, awareness and availability of such schemes remain low, especially among women farmers. Women participants in India, moreover, noted that men have more access to markets and participate in discussions at agro-dealers. Men therefore typically make all decisions regarding seeds, fertilizers, and the sale of crops. Moreover, in India, the burden of domestic work was perceived as a key barrier for some

women, making it difficult to focus on expanding agricultural production and enhancing their knowledge about CSA practices.

> *"Although we provide a substantial amount of labor, men are assumed to be responsible for farming and hence they take most of the important decisions."*
> Indian woman FGD participant

GENDERED CLIMATE CHANGE PERCEPTIONS

The adoption of CSA is predicated on farmers' experiences of climate change, such as droughts or floods, more variable precipitation patterns, and higher temperatures.

In Kenya, women and men farmers experienced prolonged droughts, dry spells, and delayed rains leading to water shortages. They also noted that the absence of rains led to a decline in animal-feed resources, which affects livestock productivity and milk production.

In India, most men farmers felt that the most significant impact of climate change was lower agricultural productivity and household income. Women farmers, on the other hand, identified a broader set of impacts of climate change, including on food and nutrition security, health and related expenses, and price fluctuations for food commodities.

In Uganda, FGD participants identified hotter droughts, too much rain, and stronger winds as climate change signals. Using "cellphilms," participants recorded that droughts have forced them to move longer distances in search of water.

CSA ADAPTATION STRATEGIES

India

The adaptation strategy that came up most often in discussions in India was an increase in the use of chemical pesticides to counter both the increase in pest attacks and the appearance of new pests as a result of climate change. However, while men favored and made decisions about the use of chemical pesticides, women were more aware of bio-pesticides, given their role in the preparation of natural alternatives to chemical fertilizers.

Diversifying from monocropping systems to multicropping, as well as diversifying from food to cash crops and vice versa, was another common adaptation strategy mentioned by both men and women farmers. Many farmers shared that they now prefer to grow cotton (rather than maize or vegetables) because it is less likely to be attacked by pests. Farmers also mentioned that they prefer short-duration crops, such as sorghum, castor, potato, and even flowers, to minimize the risks of crop loss. Farmers are also increasingly relying on horticultural crops, as they noted the crops' higher profitability and lower risk. Farmers in Kutch and Surendranagar districts have started to grow pomegranates and dates in response to climate change. Diversifying sources of income by moving into nonagricultural employment or migration for men, while women continue to manage farms, was highlighted as a further important adaptation strategy.

Kenya

In discussions in Kenya, men reported that they adapt to climate change through increased reforestation, water harvesting, terracing, and digging dams and water pans. They also noted increased use of agrochemicals. Women, on the other hand, mentioned increased mulching and a greater focus on food storage. Other strategies that farmers use to increase productivity and lower vulnerability or earn additional income were mentioned but not directly connected to climate change adaptation. These include crop and livestock diversification. Farmers noted combining maize with beans, and growing sugarcane, beans, and indigenous vegetables to reduce their vulnerability and risks. Women farmers also use kitchen gardens as an adaptive strategy. Some farmers have started multistory kitchen gardens, which are made from sacks stuffed with soil. When in surplus, vegetables from these kitchen gardens are also sold for income. This strategy was discussed mostly by younger women who said that it can be used by both rural and urban dwellers. According to a key informant, many women farmers use the crop diversification strategy:

TABLE 1 Adaptation strategies of women and men

	Gujarat, India		
	Women	Men	Both
On-farm	• Natural pesticides	• Chemical pesticides	• Diversifying from monocropping systems to multicropping • Diversifying from food to cash crops and vice versa • Short-duration crops • Horticulture
Off-farm		• Migration	• Nonagriculture work
	Kenya		
	Women	Men	Both
On-farm	• Mulching • Food storage • Farm enterprises • Kitchen gardens	• Reforestation • Water harvesting • Terracing • Digging dams and pans • Use of agrochemicals	• Diversification of crops and livestock
Off-farm	• Self-help groups	• Migration	
	Uganda		
	Women	Men	Both
	• Application of organic manure • Application of (bio)pesticides • Livestock feed • Watering/ irrigation (sprinklers) • Soil bunds for water conservation	• Water harvesting • Planting trees • Housing for animals • Crossbreeding of livestock	• Mulching • Agroforestry

> *"In fact, when you find that a man is still into one major crop which is mainly commercial, women go for various types of livestock, they will have chicken, they will have cereals, maybe some vegetables."*
>
> *Kenyan key informant*

Women also form self-help groups to share knowledge and information and obtain credit, as they are less able to access formal financial institutions like banks and micro-credit institutions because of lack of collateral:

> *"So, for them now to be able to access credit they form groups, or they join groups such that now when they want credit for small things like even buying farm inputs, taking kids to school, whatever enterprise they want to engage in their main source of credit is the merry-go-rounds and table banking."*
>
> *Kenyan key informant*

Uganda

In Uganda, adaptation responses include bio-pesticide use and digging trenches (soil bunds) to collect water and reduce soil erosion. Some groups identified several adaptation options only through visual tools. For women's groups these included mulching, application of organic manure, agroforestry, and treating livestock with traditional medicine. For men and youth groups, housing for animals and agroforestry were practices more likely to be mentioned using visual tools.

CONCLUSIONS

These qualitative studies in the three countries show that farmers consider climate change as a serious challenge to their livelihoods and food security, and that they are already adopting many practices to adapt to the negative impacts of climate change.

Adaptation strategies vary by gender and sometimes by age group, and are often linked to gendered roles in agrifood systems. Men tend to focus more on reforestation, water harvesting, terracing, and the use of agrochemicals, while women focus more on mulching, food storage, and looking after livestock. However, the adoption of these practices is constrained by two major factors that particularly affect women farmers: lack of financial resources and lack of information and education on how to implement some of the CSA practices.

Given that CSA strategies are gendered and given that women face greater barriers to adopting CSA practices, it is important to develop gender-responsive financial products and information channels that reduce the gender gap in resources, agency, and achievement in agrifood systems.

FURTHER READING

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Photo: Laura Kawerau.

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REACHING WOMEN FARMERS WITH CSA

POLICY NOTE 2

The role of photovoice and cellphilms to support women farmers' climate-resilience strategies

Laura Kawerau, Lukas Welk, Athena Birkenberg, Thomas Daum, Cosmas Alfred Butele, and Regina Birner

SUMMARY

Information and communication technologies (ICTs) can support the collection of agricultural data. While most such data collection efforts have focused on phone surveys, ICT can also facilitate the collection of visual data through photovoice or cellphilms. ICT for visual data has not been widely used nor assessed in the context of agriculture. This note summarizes findings from a qualitative field study on the use of ICT tools for the collection of information on climate-smart agriculture (CSA) practices by women and men farmers in the central region of Uganda. The findings suggest that these visual research tools can increase insights on women's perceptions, needs, and strategies for agricultural development and climate resilience.

INTRODUCTION

Climate change is increasingly affecting rural communities and food security around the world. Many studies use quantitative research designs to generate statistically meaningful data. Other studies use qualitative methods such as focus group discussions (FGDs) or key informant interviews. Visual research methods, on the other hand, are seldom used in agricultural studies. This study aims to fill a knowledge gap in showing both the potential and the obstacles of visual research tools in generating additional data that may be missed by solely relying on traditional data collection tools. The study introduced photovoice and cellphilm to supplement traditional FGDs with women and men that aimed to identify preferred CSA approaches and climate-resilience strategies. Photovoice, which utilizes photographs taken, selected, and reflected on by participants, was first promoted by Caroline Wang and Mary Ann Burris in the 1990s in a women's health and development program in China. Cellphilm refers to the recording of short videos with cellphones and was introduced in 2009 by Jonathan Dockney and Kethan Tomaselli in the context of film studies; it was later popularized by Katie MacEntee as a participatory action research tool. Both methods have the same goals: to empower people to record and reflect themselves, to promote critical consciousness about key challenges through photos/films taken, and to reach policymakers. These two tools were used in this study to explore how small scale-farmers — including male, female, and young farmers — adapt their farming practices to climate change.

METHODS

The study was conducted in six districts of Uganda's central region. The study team visited each district for six days, starting with traditional gendered and youth FGDs [see also Magalhaes et al. (2023)], followed by the handing out of smartphones for collection of cellphilm and photovoice data. Farmers received training on how to use the smartphones as cameras for taking pictures and videos and were invited to do so over two days. Women, men, and youth then met again separately in groups to discuss and rank the climate adaptation practices captured on photos and recordings. On the sixth day, the visit ended with a joint discussion that brought together all three groups. Each group presented its three to four most preferred practices, followed by a facilitated discussion.

RESULTS

During the traditional FGDs, women generally mentioned fewer CSA practices compared to men and youth, but they took an approximately equal number of photos and cellphilm recordings during the visual data collection. The recordings thus elicited a relatively larger volume of information from women. While no CSA practice was solely recorded on photos and cellphilms, some practices were more often found in the recordings. For women, these practices include mulching, application of organic manure, and agroforestry (Table 1). Some photos were not self-explanatory and required further clarification from farmers. In addition, a larger set of CSA practices were listed through the traditional FGDs compared to the photos, possibly suggesting that farmers were aware

TABLE 1 Practices recorded by Ugandan women farmers on photos and cellphilms, but rarely mentioned during traditional FGDs

	District				
Topic	**Bukomansimbi**	**Kalungu**	**Kiboga**	**Mubende**	**Nakasongola**
Livestock	• Housing for animals	• Housing for animals • Livestock feed management	• Treating livestock with traditional concoctions	• Treating livestock with traditional concoctions • Livestock feed management	• Treating livestock with traditional concoctions
Crop management	• Agroforestry • Manual weeding • Applying traditional concoctions	• Agroforestry • Manual weeding • Intercropping • Planting trees • Pruning bananas	• Handpicking pests • Trapping pests	• Agroforestry	• Applying pesticides / herbicides • Intercropping
Water and soil management	• Applying organic manure • Mulching	• Applying organic manure • Mulching • Constructing soil and water conservation structures	• Applying organic manure • Mulching	• Applying organic manure	• Water harvesting • Mulching
Land use			• Deep plowing		
Other		• Bee keeping • Cultivating degraded land • Using energy-saving stoves • Income diversification	• Bee keeping		

Source: Authors.

of such practices but did not see them being used in their neighborhood.

With their active participation in the research process, farmers not only learned to use a new tool but were also empowered by contributing to a first analysis of their own findings during the second round of group discussions. Farmers' self-esteem was visibly enhanced by the opportunity to share their own knowledge and experience on climate change adaptation.

CONCLUDING COMMENTS

The use of photovoice and cellphilms in agricultural research is still nascent but can be effective in collecting valuable data about how farmers, particularly women farmers, adapt to climate change. Compared to traditional FGDs, digital tools to create videos and photos helped to generate more comprehensive data. The digital visual tools increased the richness and context-specificity of information compared to the FGDs. Farmers showed enthusiasm in participating and contributing to the study using smartphones, particularly enabling shyer individuals to actively contribute their views. Women especially seemed to feel confident in sharing their knowledge using digital devices. They recorded CSA practices outside the ones identified during the FGDs. Their feedback highlighted the empowering aspect of being enabled to use a smartphone and to "teach the researcher" as a co-researcher about their adaptation strategies. Using such methods, which help to give voice to women, is key for sustainable and climate-resilient development and provides an avenue for women to become agents of change for climate action.

However, using digital visual tools is more time-consuming and comes with ethical challenges — such as the potential dissemination of the photos and videos through the Internet and the need for careful and conscious handling of power relations. Moreover, availability and access to electricity can pose a challenge to this research approach as does the need for a dark room for the second meeting, where images and recordings were shown using a projector. In situations where more abstract thinking is possible and time is scarce,

traditional FGDs aided by limited visualization, such as through participatory impact diagrams might present a good alternative to cellphilm and photovoice. Such visual diagrams worked particularly well in the youth groups. However, individual empowerment is limited.

If ethical aspects are adequately considered, digital tools like smartphones have great potential to aid in complex research, such as the identification of climate-resilience strategies. The additional efforts taken by research teams using digital visual tools are, in our experience, worth the additional value these technologies bring to research in varying disciplines, including agriculture, geography, and other research studying land use, climate change adaptation, and human-nature interactions.

In addition to having value for development practitioners and researchers, short videos taken by farmers may contribute to developing new ways of knowledge exchange among farmers, between farmers and agricultural extension workers, and between farmers and researchers.

FOR FURTHER READING

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Do climate-smart agricultural practices support adaptation, mitigation, and productivity? A review of CSA practices used in participatory video interventions in India, Kenya, and Uganda

Lukas Welk

SUMMARY

Climate change poses a threat to smallholder farmers worldwide, impacting livelihoods and agricultural production. At the same time, agrifood systems account for about one-third of all greenhouse gas (GHG) emissions. Climate-smart agriculture (CSA) offers synergistic practices that boost productivity, aid farmers in adapting to climate change, and have the potential to mitigate GHG emissions. This note reviews the extent to which a set of practices identified by smallholder farmers in India, Kenya, and Uganda for inclusion in a participatory video-based extension intervention meet the CSA criteria. The findings suggest that the practices hold triple-win potential but often several need to be applied as a package; they also need to be adapted to local conditions.

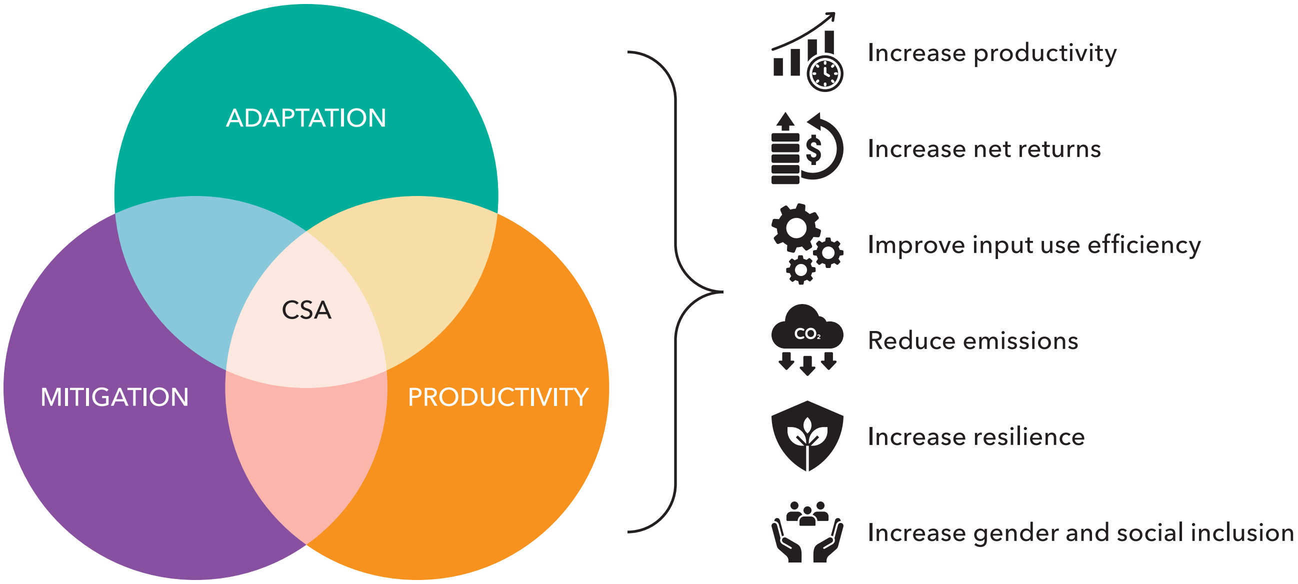
INTRODUCTION

Climate change and population growth in sub-Saharan Africa and South Asia jeopardize agricultural production and food security. Farmers in India, Kenya, and Uganda grapple with erratic weather patterns, resulting in reduced crop and livestock productivity and sometimes production failure. In Kenya and Uganda, challenges are magnified due to the reliance on rainfed agricultural production systems. At the same time, farmers' livelihood strategies focus primarily on income generation. This can inadvertently lead to increased GHG emissions, for example, through excessive tillage or poor livestock management.

Climate-smart agriculture (CSA) encompasses technologies, practices, tools, and policies that support climate change adaptation and mitigation, while enhancing agricultural productivity. It is composed of three pillars: (1) sustainably increasing agricultural productivity, profitability, and incomes; (2) adapting and building resilience to climate change; and (3) reducing and/or removing GHG emissions (mitigation) where possible (Figure 1). Examples of CSA approaches include investments in low-energy irrigation, mulching and planting of cover crops, and manure management to reduce emissions from animal waste.

Under the project "Reaching Smallholder Women with Information Services and Resilience Strategies to

FIGURE 1 CSA approach



Respond to Climate Change," a series of CSA practices were identified by women and men farmers through qualitative fieldwork and with support from local agencies familiar with climate change challenges in the localities (see also Magalhaes et al. 2023). The identified practices address clear community needs such as lack of water, increased dry periods, pests, infertile soils, and high costs of production. However, it was not clear *a priori* if the identified practices contribute to all three tenets of CSA: productivity improvement, climate change adaptation, and mitigation. This policy note reviews the contribution of these practices to the three pillars of CSA based on the literature.

CSA PRACTICES AND THEIR SYNERGIES

The following reviews the CSA potential of these practices, and Table 1 presents the identified practices by country as well as their hypothesized effects on productivity, climate change adaptation, and mitigation based on a review of the literature.

Climate-smart pest management (CSPM) and disease management comprises a range of measures, including intercropping, pruning, weeding, retention of natural habitats, and other biocontrol measures. In Uganda, for example, intercropping of coffee and bananas helps to control pests. Other CSPM practices include the use of yellow sticky cards and pheromone traps to catch pests. CSPM helps to reduce expenditures on pesticides, makes farms more resilient to pest-related yield losses, and, by reducing pesticide use, decreases the GHG emissions intensity per unit of food produced.

Climate-smart pig and poultry management can reduce GHG emissions through improved manure management (a source of carbon dioxide [CO_2], methane, and nitrous oxide [N_2O]) as well as through climate-adapted feeding strategies. Moreover, when livestock and poultry are kept in shelters, feeding and disease treatment becomes easier, increasing production efficiency while reducing theft, external disease exposure, and, if well-ventilated, animal heat stress. Moreover, the mix of feed residues and farmyard manure can be easily gathered. Pig manure, for example, is a good substitute for chemical fertilizers; the nutrient content of poultry manure is even higher. If solid manure is composted before being applied to fields, N_2O and methane emissions can be reduced. However, this process releases CO_2, so it is important to cover the storage pit with leaves or wood. Using farmyard manure instead of slurry can also reduce GHG emissions. This creates an efficient organic fertilizer that can be incorporated directly into the soil, mulch, or zai pits. When properly applied, this can increase productivity, partially replace synthetic fertilizers, and improve soil fertility. Climate-smart pig and poultry farming can also increase farmer resilience through diversifying agricultural production systems;

TABLE 1 Productivity, adaptation, and mitigation potential of CSA practices in Kenya, Uganda, and India

CSA practice	Productivity		Adaptation	Mitigation potential
	Short-term	Long-term		
Kenya				
Minimum tillage	▼	▲	+	High
Planting drought-resistant crops	▲	▲	+++	Low to high, depending on whether irrigation is used, as irrigation can be energy-intensive
Mulching	▲	▲	+++	High
Cover cropping	▲	▲	++	High
Intercropping	▼	▲	+	High, in combination with minimum tillage and mulching
Zai pits	▲	▲	+++	Low, soil carbon losses due to construction
Crop rotation	▼	▲	++	High, particularly for rotation with legumes
Use of manure	▲	▲	+++	High, particularly when underutilized and as replacement for synthetic fertilizer
Uganda				
Climate-smart poultry management	▲	▲	+++	Medium, through improved manure management and better feeding practices
Climate-smart pig management	▲	▲	+++	Medium, through improved manure management and feeding practices
Climate-smart pest management	▲	▲	+++	Medium, through replacing synthetic with natural pest control mechanisms
Use of organic pesticides	▲	▲	+++	Medium, particularly when underutilized and as replacement for synthetic pesticides
Soil bunds	▼	▲	+++	Low, soil carbon losses due to construction
Intercropping	▼	▲	+	High, in combination with minimum tillage and mulching
India				
Soil testing	▲ (depends on cost)	▲	+++	High, due to optimized fertilization
Climate-smart pest management	▲	▲	+++	Medium, through replacing synthetic with natural pest control mechanisms
Use of organic pesticides	▲	▲	+++	Medium, particularly when underutilized and as replacement for synthetic pesticides

Source: Author.

pigs and poultry can generate income when crop production fails as a result of droughts, for example.

Cover crops reduce weed pressure, such as from the Striga weed in Kenya, while also reducing erosion and improving soil health. Lower weed pressure results in lower herbicide costs, making agricultural production more profitable. By sequestering carbon in the soil, cover crops also have the potential to reduce GHG emissions. When nitrogen-fixing varieties are used, N_2O emissions can be reduced by sequestering nitrogen.

Crop rotation reduces soil nutrient depletion caused by repeatedly growing crops with the same nutrient requirements. Crop rotation with nitrogen-fixing crops can increase soil fertility, reduce denitrification, and thus reduce N_2O emissions, and can reduce the need to apply fertilizers. The practice can also reduce pest pressures as different crops attract different pests.

Drought-resistant varieties and crops can help farmers cope with periods of mild to moderate water stress. Their use helps protect yields and income and can save water and energy. Drought-resistant varieties

FIGURE 2

A. Soil bunds

B. Zai pits

avoid replanting of crops and associated emissions in response to drought events and thus help maintain production levels.

Intercropping can improve soil conservation, reduce pathogen pressure, regulate water dynamics, and increase food production. Nitrogen-fixing legumes and deep-rooted species such as lucerne are especially promising. As an example, intercropping maize with leguminous crops in combination with minimum tillage and mulching can lead to significantly lower carbon emissions compared to monoculture maize, without yield loss.

Minimum tillage has the potential to reduce GHG emissions due to reduced soil organic matter decomposition compared to conventional tilling. In addition, minimum tillage improves the soil's ability to control temperature fluctuations during droughts, making production more resilient in drought-prone areas. Minimum tillage can reduce labor requirements for tilling but might increase labor needs for weeding.

Mulching helps to retain or increase water and nutrients in the soil. Mulching can also protect food crops from excessive heat, making crop production more resilient. For mulching, crop residues like stalks or straw can be used and placed directly on the soil. Productivity could be affected by higher labor inputs.

Organic pesticides substantially reduce environmental and health impacts of agricultural production, compared to synthetic pesticide use. Examples used in Uganda include concoctions of cattle urine, ash, tobacco leaves, pokeweed, and red pepper. In India, crown flowers are used to control termites and neem leaves in combination with cow urine, manure, and water are used to control sucking pests. Producing pesticides in-house reduces the need for synthetic pesticides, which in turn leads to cost savings.

Soil bunds are used by farmers to catch and retain water, especially in areas with unpredictable drought and flood spells. The bunds are dug close to crops to provide plant roots with water (Figure 2a). This practice helps farmers to maintain or increase productivity through water conservation. Soil bunds also help reduce surface water run-off and soil erosion, while reducing water and energy costs. Construction of soil bunds is generally highly labor-intensive and does remove crop area from production, which can be challenging for farmers with smaller plots.

Soil testing helps determine the nutrient content and pH of the soil, allowing farmers to determine the right amount of nutrients to apply to increase productivity and maintain fertility, improving their adaptive capacity. Soil testing can thus improve productivity and profitability of production systems and reduce emissions from unbalanced use and overuse of fertilizers.

Zai pits can be used to retain moisture when there is no rain and provide higher soil fertility through the incorporation of manure. Used extensively in dryland areas of Niger and in parts of Kenya, zai pits can reduce water erosion and sequester carbon (Figure 2b). The capacity of zai pits to retain moisture helps farmers cope with extended dry periods or unproductive soils to maintain crop production. Manure incorporated into zai pits leads to lower GHG emissions compared to manure left in open fields, while increasing soil fertility.

CONCLUDING COMMENTS

The CSA practices presented in this note hold great potential to sustainably increase farmers' agricultural production while helping them adapt to the adverse impacts of climate change and reduce GHG emissions.

An important aspect is that many of the practices are interrelated and only reach their full potential when applied synergistically. For example, zai pits need to be mulched and should incorporate manure to increase the soil nutrient content. Similarly, good livestock management is needed to generate better farm manure. Therefore, for CSA practices to achieve their potential, policymakers, researchers, and practitioners must move away from isolated approaches that focus either on adaptation or mitigation or only on productivity improvements and those that focus on single CSA practices. Instead, joint strategies with holistic practices and programs adapted to local conditions must be developed and supported.

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GENDERED INFORMATION GAPS AND SOLUTIONS

Democratizing messaging? The role of ICTs in agriculture extension

Rashid Parvez Khan

SUMMARY

Information and communications technology (ICT) in low- and middle-income countries has changed significantly over the past seven decades, starting with radio and newspapers and transforming almost daily with the rise of smartphones and mobile Internet. While ICT is an integral part of agricultural extension, little is known about how extension has been influenced by these changes in ICT. A systematic review of 133 papers focused on countries in South Asia, Southeast Asia, and sub-Saharan Africa found that changes in ICT have enabled a shift from linear dissemination and "one-way communication" to co-innovation and farmer-to-farmer learning, with the potential for increased democratization of agricultural extension. This note summarizes these findings.

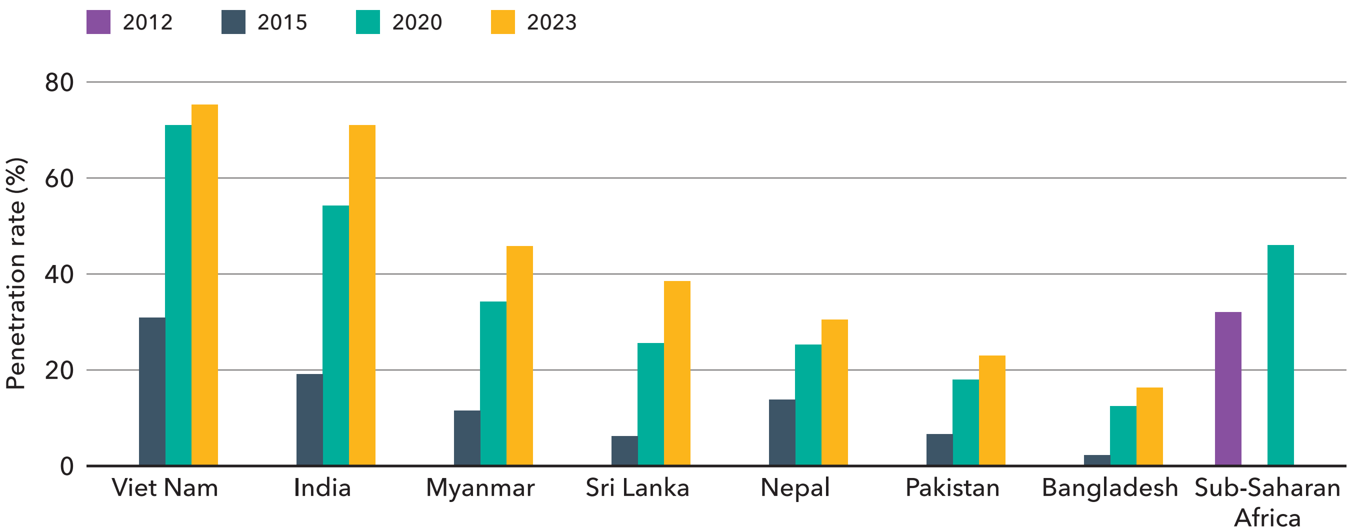
EVOLUTION IN THE USE OF ICT FOR AGRICULTURAL EXTENSION

Agricultural extension is key to support farmer livelihoods through the dissemination of information on improved agricultural practices, supply of inputs, access to markets, and weather forecasting, among others. Interest is growing among rural development agencies and professionals in understanding the role of ICT in shaping and enhancing agricultural extension, especially as the sector faces the challenges of climate change, gender inequalities, and recurrent agrarian crises.

Over the past seven decades, ICT use has continuously evolved to meet the demands of agricultural extension and changes occurring in the farming system. Traditional ICTs like newspapers and radios were the primary sources of information for farmers during the 1950s and 1960s. While newspapers were mainly concentrated in urban areas and limited to those who could read, radios were an essential mechanism for disseminating knowledge and information in different languages and formats, especially to the poor and illiterate.

In the late 1960s, information started to be disseminated through television and video demonstrations. Videos were considered suitable for low-literacy populations, as they combined visual and verbal communication. The 1990s witnessed the evolution of cellular technology and its features, such as text messaging and FM radio. Along with the use of mobile-based agricultural extension, web-based applications and portal services have become important tools to share and disseminate agricultural information and knowledge, and in the marketing of goods and services. More recently, smartphones have facilitated the transmission of complex technical practices through videos and other capabilities.

FIGURE 1 Penetration of smartphones in emerging economies



Source: Statista (2023).

MODERN ICT: FROM ONE-WAY INFORMATION TRANSFER TO TWO-WAY INFORMATION EXCHANGE

Traditional ICTs such as newspapers, radio, and television are largely limited to one-way transfer of information. As a result, they face the problem of information asymmetry and challenges in providing timely, accurate, and customized information.

With the rise of modern ICTs, the scope for direct communication between farmers and extension agents or other farmers, either as part of one-to-one or one-to-many interactions, has greatly expanded. Cellphones facilitate two-way communication, whereby farmers can ask questions and request information. Short messaging services (SMS) for cellphones have become another key tool for providing information to farmers. A further feature employed extensively is interactive voice response (IVR), a service that uses voicemail for information delivery, allowing illiterate people to participate. As an example, the Kenya Agricultural Commodity Exchange collaborated with Interactive Media Services Limited to provide market information through IVR, leading to reduced transaction costs and broadening trade networks among farmers.

SMARTPHONES AND THE DEMOCRATIZATION OF AGRICULTURAL INFORMATION

Smartphone ownership has dramatically increased in emerging economies and this has, in turn, improved Internet access (Figure 1). Farmers' increased use of smartphones has helped to democratize the generation and dissemination of agricultural information.

With smartphones, farmers can take pictures of agricultural practices or shoot video clips about pests and other challenges and then quickly share the information with other farmers and extension agents. Unlike with radio and television broadcasts, exchange of information is not time-bound. Video-based messaging has tremendous potential for disseminating information on new technologies and for reporting challenges faced in farmers' fields, enabling more resilient, inclusive, and democratic information systems. Furthermore, smartphones support the collection of data on households, farms, plots, livestock, and crops that can then be used to provide individual customized advisory content using applications.

Evidence from the studies reviewed shows that video messaging on smartphones increases outreach and adoption of agricultural practices by six to seven times as compared to one-to-one exchanges between farmers. A study from Bangladesh showed that video-facilitated discussions led to changes in farmers' attitudes and encouraged them to adopt complex agricultural innovations.

A key feature of smartphones in use by farmers is WhatsApp. This application can be used for real-time video chatting, allowing them to discuss issues with extension agents or other farmers without leaving their farms. Information can also be stored for later viewing and sharing. Using WhatsApp, farmers can also produce, share, watch, and comment on videos and audio files as well as share photos and web links. YouTube is another social media platform where young farmers search for information on new agricultural technologies and agricultural innovations. With YouTube, farmers (and other actors) can produce, share, watch, and comment on videos.

ACCESS BARRIERS TO MODERN ICT

Mobile phones face various limitations, such as connectivity issues, limited content in local languages, and inadequate infrastructure, such as electricity to charge phones. Many farmers cannot afford to buy data packs or own a device to access agricultural information, which restricts the potential of smartphones by poorer populations. Illiteracy is still a challenge in some countries, limiting farmers' ability to engage in text-based communication, though low-literacy users can still use WhatsApp to call peers, leave voice messages, and watch YouTube videos.

There is also a considerable gender gap in mobile ownership in low- and middle-income countries (LMICs). On average, women are 7 percent less likely than men to own a mobile phone, 19 percent less likely to use mobile Internet, and 17 percent less likely to own a smartphone. Gender gaps are largest in South Asia, reaching 15 percent for mobile phone ownership and 42 percent for smartphones. Sub-Saharan Africa comes in second, with a gender gap of 13 percent for mobile phones and 28 percent for smartphones. The gap in mobile phone and smartphone ownership has remained fairly stable in sub-Saharan Africa but narrowed somewhat in South Asia (GSMA 2023).

Gender gaps in information sources are much higher in rural areas, as reflected in Welk et al. (2023) on information sources in use for climate-smart agriculture (CSA) approaches. Fake news can also impact the use of ICTs for agricultural extension. Users should ideally receive training on what could be fake and misleading information in the agricultural space.

POLICY IMPLICATIONS

Agricultural production systems are subject to rapid changes due to climate change and other global crises. To remain profitable and resilient, farmers need real-time information that can help them make timely farming decisions. The use of social media platforms available through smartphones facilitates bidirectional exchange of information that can support farmers in navigating such complex environments while also disseminating relevant information.

Though access to extension messages through ICTs is still limited in rural areas of LMICs, increased mobile phone penetration and Internet connectivity have made it easier and cheaper to distribute information on agriculture and CSA. Recent studies on the use of smartphones and social media apps like WhatsApp, YouTube, and Facebook have shown that remote locations can be reached with up-to-date information, and time and mobility constraints can be overcome more

readily as compared to traditional media. However, training on how to use smartphones and how to identify credible information on agriculture through modern ICTs is important for reaping their benefits.

The findings of this study have practical implications for government extension agencies and agricultural information providers interested in disseminating complex agricultural practices to small-scale farmers using smartphones and mobile Internet. To increase equity in access to these tools, governments could provide subsidized mobile phones or cheap data packs to resource-poor and women farmers, together with capacity building on the use of such devices for accessing relevant information on agriculture and CSA. Gender needs to be mainstreamed in agricultural extension strategies using ICTs to guarantee that both women and men receive services tailored to their different needs and preferences. Finally, literacy and numeracy skills need to be strengthened as part of elementary school education, combined with literacy campaigns for adults to ensure that all farmers can access modern ICTs.

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Gendered information channels for climate-smart agricultural practices: Evidence from India, Kenya, and Uganda

Lukas Welk, Prapti Barooah, Edward Kato, and Michael K. Ndegwa

SUMMARY

Lack of access to information is an important barrier affecting women farmers' adoption of climate-smart agriculture (CSA) practices and technologies. To overcome this barrier, the use of information and communication technologies is increasingly being promoted. However, digital tools might widen, rather than reduce, gendered information gaps given women's lower use of mobile phones and mobile Internet as compared to men in sub-Saharan African and South Asia. This policy note summarizes data on information channels that women and men farmers use for CSA practices in Gujarat, India, parts of Kenya, and central Uganda. The results can be used by governments, nongovernmental organizations, and other actor groups interested in ensuring equity in access to information on CSA practices in low- and middle-income countries.

INTRODUCTION

Adequate access to agricultural extension, including information on climate-smart agriculture (CSA), is important for agricultural development and promotion of climate resilience. Relevant information on production practices and climate can help farmers increase their productivity, income, and resilience to adverse shocks, such as climate extreme events. However, little information exists on the information sources and channels that women and men farmers rely on for CSA practices.

To increase the reach of agricultural extension, information and communication technologies (ICTs) — such as cellphones, Internet-based approaches, and extension videos — are increasingly being used. These tools received a further boost during the COVID-19 pandemic, when mobility constraints reduced access to face-to-face extension. ICTs have the potential to put low-cost, easily accessed information into the hands of many. Access to ICTs and appropriate targeting of messages nonetheless remain major challenges.

The "Reaching Smallholder Women with Information Services and Resilience Strategies to Respond to Climate Change" project collected intrahousehold data on information sources used for accessing CSA approaches in India, Kenya, and Uganda.

INFORMATION CHANNELS IN INDIA

Table 1 presents data on channels used for accessing information on CSA practices across rural areas of Gujarat, India, by members of the Self Employed Women's Association (SEWA) and their spouses. The most important sources are traditional forecasters, indigenous knowledge, and personal experience, used by 44 percent of women farmers and 39 percent of men farmers. This is followed by family members, who are an important source of information for 26 percent of women and 27 percent of men.

Women are slightly more likely to receive information on CSA from NGOs than men; this could be due to the respondents' linkage with SEWA. On the other hand, men were more likely to obtain information from agri-service providers, government extension services, TV, community meetings, their cellphones, and agricultural shows. However, most of these sources of information are used by few farmers.

TABLE 1 Channels used to access information on CSA by gender in rural Gujarat, India (percent)

Information sources	Women (n=2632)	Men (n=1781)
Traditional forecasters/indigenous knowledge/own experience	44	39
Family members	26	27
Neighbors	7	6
Agriservice providers, seed companies, private input dealers	6	7
NGOs	4	2
Farmer organizations	3	3
TV	3	5
Government extension workers	2	4
Community meetings	1	2
Newspaper/bulletin	1	1
Cellphones	1	2
Agricultural shows	0	1

Source: Authors based on survey data.

Note: Data were collected during April to July 2022.

INFORMATION CHANNELS IN KENYA

The data presented in Table 2 show the aggregate results on information sources for CSA practices used by farmers in Busia, Laikipia, and Nakuru counties in Kenya. Overall, the differences between women and men farmers in terms of channels used to access information on CSA were small. The most important information channels are informal sources, including traditional forecasters, neighbors, and family members. Thus, actors interested in increasing awareness and knowledge of CSA practices should engage with these groups, possibly at the community level.

More formal sources of agricultural extension — such as agriservice providers, government extension, and community meetings or barazas — rank second in overall importance. These formal sources are more likely to be consulted by men than women. As an example, 15 percent of women farmers listed government extension as a source of information on CSA practices compared with 20 percent of men farmers.

Radio was listed by 12 percent of women and 17 percent of men farmers as a source of information on CSA practices, possibly due to radio programs that focus on conveying this information. Television, cellphones, and the Internet, on the other hand, were identified by very few farmers as go-to sources for CSA information. While mobile phone ownership and access is higher in Kenya

TABLE 2 Channels used to access information on CSA by gender in rural Kenya (percent)

Information sources	Women (n=716)	Men (n=442)
Traditional forecasters	74	72
Neighbors	39	37
Family members	32	28
Agriservice providers, seed companies	23	27
Government extension workers	15	20
Radio	12	17
Community meetings/barazas	10	11
Schools/teachers	10	16
Farmer organizations, co-ops, community-based organizations	9	12
NGOs	7	8
TV	3	3
Farmer field days/demonstrations	2	4
Religious groups	1	1
Newspaper/bulletins	1	2
Cellphones/Internet	1	1
Agricultural shows	1	3

Source: Authors based on survey data.

Note: Data were collected in February, 2020.

than in Uganda, farmers are currently unlikely to use this channel to learn about CSA practices.

INFORMATION CHANNELS IN UGANDA

Table 3 presents the main channels women and men farmers rely on for CSA information in six districts of central Uganda. Overall, men are more likely to access formal channels for information on CSA. For example, 19 percent of women listed the government as a source for information on CSA, compared with 25 percent of men. Women farmers were also less likely to list NGOs, farmer organizations, and agricultural service providers as sources of information on CSA compared with men farmers. Unlike in India and Kenya, in Uganda agriservice providers are the most important source of information overall. Other important sources of information on CSA for both genders are community meetings and religious organizations.

TABLE 3 Channels used to access information on CSA by gender in rural Uganda (percent)

Information sources	Women (n=514)	Men (n=598)
Agricultural service providers (inputs)	31	39
Community meetings	25	28
Religious organizations	20	23
Government	19	25
NGOs	17	21
Farmer organizations	15	25
Own experience/indigenous knowledge	4	67
Radio	3	89
Neighbors	2	69
Family members	1	60
TV	1	24
Farmer schools	0.2	7
Cellphones	0.2	18
Internet	0	3
Agricultural shows	0	8
Extension videos	0	4

Source: Authors based on survey data.

Note: Data were collected in October and November 2020.

Some information channels are hardly used by women but are heavily accessed by men for information on CSA. For example, while 89 percent of men stated that they used radio for insights on CSA, only 3 percent of women did. Television is also hardly used by women (1 percent), while 24 percent of men reported using this channel for information on CSA practices. Men also listed family members and neighbors as an important source of information on CSA practices, but few women did. In addition, men farmers also identified their own experience and indigenous knowledge as key sources of CSA information.

In terms of ICT, 18 percent of male farmers use cellphones as a source of information for CSA approaches, compared with 0.2 percent of women farmers. While overall use of Internet is very low and Ugandan women do not appear to use the Internet at all for accessing information on CSA, 3 percent of men reported using it for information on CSA practices. This is likely linked to the gender gap in mobile phone ownership in Uganda, reported as 17 percent, and in mobile Internet (48 percent) (GSMA 2020). Due to the low use of cellphones and low Internet access, information on CSA practices provided through these digital tools is unlikely to reach women farmers.

DIFFERENCES AND SIMILARITIES

Compared to Uganda and Kenya, few farmers in Gujarat, India, reported government organizations as a source of information on CSA practices. The differences between the two neighboring countries in sub-Saharan Africa are also significant: while women farmers in Uganda generally do not consider their social networks as a source of information on CSA practices, women farmers in Kenya use them at rates equal to those of their spouses. Family members are also an important source of CSA information in Gujarat.

The use of digital sources for accessing CSA information is extremely low in all three countries, especially among women farmers. Only men farmers in Uganda use cellphones as a source of CSA information to a significant extent. Thus, while digital tools are promising in terms of reach and lower cost compared with traditional face-to-face extension, they are currently not used to support the climate-resilience strategies of rural farmers.

CONCLUDING COMMENTS

The data presented in this note show differences across genders and countries in information channels in use for CSA practices. The results suggest that information on CSA needs to be provided through locally appropriate channels. Moreover, digital sources are still emerging and are currently unlikely to reach large numbers of farmers, and even fewer women farmers.

It should be noted that some sources of information such as face-to-face extension visits, agricultural fairs, and demonstrations most likely suffered from impacts of the COVID-19 pandemic (data collection in India and Uganda was completed in July 2022 and November of 2020, respectively, while the Kenya survey was completed in February 2020).

Across all three countries, traditional and indigenous knowledge and personal experiences remain important sources of information for CSA practices. Government and other actor groups interested in increasing climate resilience in agriculture in the short to medium term should identify ways to work with these traditional sources of information.

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Crises and women's access to agricultural information: Insights from India and Nepal during the COVID-19 pandemic

Muzna Alvi, Prapti Barooah, Shweta Gupta, and Smriti Saini

SUMMARY

Strict lockdown measures implemented in response to the COVID-19 pandemic had extensive impacts on agriculture, and especially on women farmers. These effects were worsened by a lack of reliable and timely access to agricultural extension. This note summarizes findings from panel phone surveys conducted in India and Nepal on the impacts of lockdown measures on women's ability to access agricultural extension services and their perceived impact on agricultural productivity. We find that women's already limited access to formal extension services was further reduced during the pandemic, leading to greater reliance on informal social networks. In both countries, approximately 50 percent of farmers reported negative consequences on productivity due to the unavailability of information during the lockdown. We propose strategies to enhance the inclusivity and resilience of extension systems in India and Nepal in future crises, including through the use of group- and community-based approaches.

INTRODUCTION

Despite the significant role women play in agriculture, adequate gender-responsive extension services are lacking in the South Asia region. Inadequate information access was further exacerbated by the COVID-19 pandemic and subsequent lockdowns, that restricted mobility, disallowed group gatherings, and closed schools and businesses. These lockdowns reduced access to reliable and timely information about market access, diseases, pests, insurance, and credit. The food and energy price crisis that followed the pandemic lockdowns as well as continued climate-related crises further increase the need to develop resilient and inclusive agricultural extension and information systems.

What were the consequences of the lockdowns linked to the COVID-19 pandemic on women's access to formal and informal sources of agricultural extension services? How did the pandemic impact agricultural productivity? What measures can be implemented to enhance the resilience and gender equity of the agricultural extension system? To answer these questions, we analyze data obtained through a panel phone survey conducted with women farmers in Gujarat, India, and Dang district in Nepal.

DATA

Data were collected through phone surveys carried out during the COVID-19 pandemic in Gujarat, a western state in India, and in Dang district in midwestern

Nepal. The surveys aimed to explore the gender-specific impacts of the lockdowns on food and water security, income, livelihoods, mobility, and instances of household violence and conflict. During 2020 and 2021, five rounds of phone surveys were conducted in both countries. In Gujarat, the first round was administered in May–June 2020, just before Kharif (monsoon) crop sowing, while the last round was conducted in July–August 2021. In Dang district, the first round took place in early July 2020, and the final round a year later.

In Gujarat, our sample are members of the Self-Employed Women's Association (SEWA), a trade union of women engaged in informal work, including agriculture. The surveys were conducted in nine districts of Gujarat, where SEWA has a significant presence. The sample consists of 627 women, covering rural and urban respondents. Our findings are derived from 228 women who identified farming as their primary agricultural activity. In Nepal, the sample was chosen through systematic random sampling from a listing of maize farmers conducted in-person across four rural municipalities (Lamahi, Shantinagar, Dangisharan, and Rapti) in Dang district in February 2020. The first round of the survey covered 759 respondents, including 540 women and 219 men. We focus our results on the women's sample and draw comparisons with the men's sample where appropriate.

Our findings are based on the agricultural extension module of the survey, and whenever possible, we incorporate findings from other sections of the survey to shed light on issues related to access to agricultural inputs and markets. The agriculture extension module asked respondents about their primary source of agricultural information and whether it remained accessible to them during and after the lockdown. For those who reported that their main source was unavailable, we inquired about the alternative sources of information they relied on. In both cases, respondents were asked to provide feedback on the quality, frequency, and timeliness of the received information. Additionally, we asked respondents whether their farms experienced any negative consequences due to the inability to access timely extension services and information. To observe changes over time, the same module was administered during subsequent rounds of the survey in both locations.

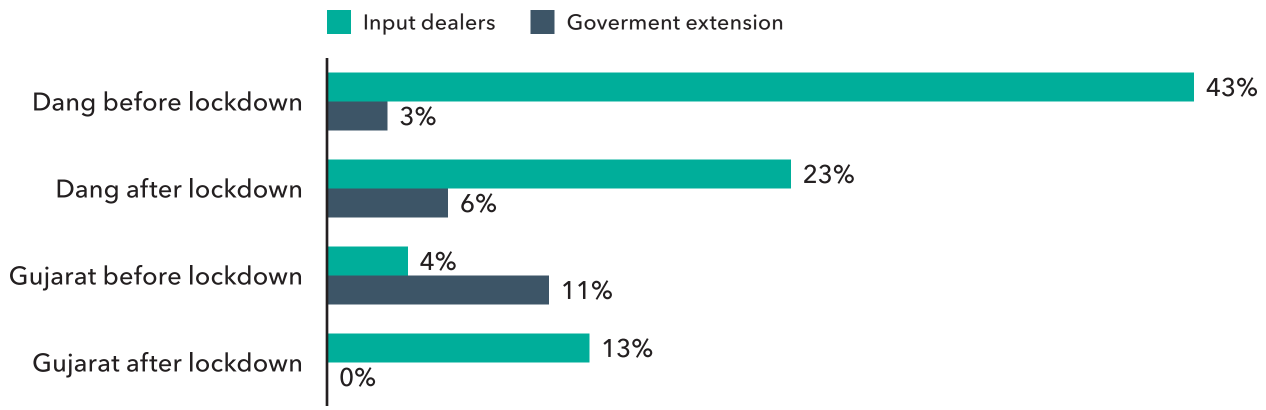
RESULTS

During the first round of the survey, 27 percent of women in Gujarat and 29 percent in Dang reported that their primary or regular source of agricultural information was unavailable or inaccessible due to the lockdowns. Within this subsample, the immediate impact of the lockdown was a reduced reliance on group-based sources of information such as group meetings and field days. Instead, these women shifted toward obtaining information from own social networks, including family members and friends. In Dang district, sources of information that relied on in-person interactions—such as agricultural input dealers and meetings organized by self-help groups (SHGs), cooperatives, and other farmer groups—experienced a decline during the lockdown. Conversely, the proportion of farmers who reported relying on traditional knowledge and information from family members or neighbors increased, as also seen in Gujarat. This trend persisted into the last round of the survey, with traditional knowledge replacing local input dealers as the most important source of information. Access to government extension services by women was already low before the lockdown and declined to nil in Gujarat in response to the lockdown, but slightly increased in Dang district (Figure 1).

During the initial phase of the lockdown, respondents in Dang district also expressed heightened concerns regarding the quality of information they received. In round 1 of the survey, 53 percent of respondents reported that the overall quality of information received from various sources had deteriorated since implementation of the lockdown measures; and 62 percent of respondents felt that they were unable to access timely information, as the frequency of information dissemination was lower compared to the pre-lockdown period.

As part of the survey, we asked about the impact of limited access to information on farmers' output, based on their self-reported agriculture productivity. In Gujarat, 49 percent of all farmers surveyed reported negative effects on their farms. Similarly, in Nepal, around 57 percent of women farmers stated that agricultural productivity had declined due to their inability to access timely and high-quality agricultural information during the lockdown, manifested in lower yield quality and quantity, lack of input availability, and pest attacks.

FIGURE 1 Changes in sources of formal agricultural information used by women farmers before and after the lockdown



Source: Based on Alvi et al. (2021).

These challenges persisted into the second round of the survey. In Gujarat, 42 percent of farmers reported experiencing low productivity because of lack of timely information. In Dang, the figure was slightly higher, with 56 percent of women farmers reporting reduced productivity due to limited access to timely and quality agricultural information. As movement restrictions were lifted, the share of respondents reporting negative impacts on their farms because of lack of information declined. By the last round, the share had fallen to 16 percent in Gujarat and 30 percent in Dang district.

It is important to consider heterogeneities of these impacts, as they are mediated through differences in access to economic and social capital. In South Asia, and elsewhere, certain castes and ethnic groups face social and economic inequalities, which can manifest in limited access to agricultural information and extension services. Discrimination and unequal distribution of resources can restrict the opportunities available to these marginalized groups, thereby hindering their ability to cope with and recover from crises. In India we found that respondents from historically disadvantaged ethnic communities were more likely to depend on social networks and traditional knowledge as sources of information, and less likely on formal sources of extension. We find no such results in Dang, where like India, caste- and tribe-based social hierarchies are widely entrenched and practiced.

In Nepal, women educated beyond primary level were more likely to rely on government sources than traditional knowledge as a primary source of information. Similarly, women in Nepal who were primary decision makers were less likely to report negative impacts (52 percent) due to information access issues, compared to those who said their spouse was the main decision maker (63 percent). This suggests that women are better able to cope with shocks when they have more agency to take decisions.

WAY FORWARD

We already know that periods of crisis affect vulnerable populations disproportionately, as they do not have the resources or social capital to adequately deal with shocks. As periods of crisis—human-made, natural disasters, and climate change-induced extreme weather events—become more prevalent, there is a need to invest in systems of extension that are crisis-resilient, reliable, and inclusive, especially for historically marginalized groups. Women's engagement in agricultural extension activities and programs can be hindered by various factors, including limited access to assets and resources, barriers related to information access (such as delivery channels, timing, language, location, and duration), and prevailing gender roles in agriculture.

Interventions based on information and communications technology (ICT) hold promise as they can be upscaled at low-cost and delivered remotely, are easily adaptable and dynamic, and can quickly respond to emerging threats. However, women's access to phones remains much lower than that of men in South Asia, and heterogeneities arise in technology access and literacy across other dimensions of social identity. Delivering extension through ICT-based methods might therefore reinforce existing inequalities.

Farmer field schools, led by and targeting women, are another way to reach women, who are often excluded from interventions that typically target men farmers. However, women already have a high care burden and time poverty, and interventions that require investment of time will have to be thoughtfully designed to ensure equitable participation.

Because of existing social norms and lack of recognition of women's roles in agriculture, men extension workers may not be able to reach women farmers adequately. However, the number of women extension workers in India and Nepal remains very low. Indeed, recent research conducted in Africa has highlighted the importance of extension agents' gender in agricultural outreach and behavior change among farmers (Azzarri and Nico 2023). Training and deploying women extension workers within the formal extension system can help in improving targeting of women.

Group-based approaches to extension delivered through women's groups have been proven to increase knowledge and adoption of innovative extension practices. SEWA itself routinely delivers information to its farmer members through various in-person and ICT-based tools, and reliance on SEWA as the primary source of information increased dramatically during our surveys, from 18 percent in the first round to 33 percent in the fifth round.

Finally, community-based frontline workers have been at the forefront of health and nutrition information and service delivery in both India and Nepal. More recently, kisan sakhis (friends of farmers) and pashu sakhis (friends of animal/livestock) have been deployed to deliver information on agriculture and livestock health, respectively, in some states in India with considerable success. Training a cadre of such frontline workers, and adequately compensating them for their time and effort, is a model of agriculture extension delivery that could be rapidly deployed in times of crisis, as was done most recently in India for distributing relief measures during the pandemic.

FOR FURTHER READING

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This work received financial support from the German Federal Ministry for Economic Cooperation and Development (BMZ) commissioned and administered through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Fund for International Agricultural Research (FIA), grant number: 81235251. It also received support from USAID for surveys in Dang district under the Gender, Climate and Nutrition Integration Initiative (GCAN) and the Cereal Systems Initiative for South Asia (CSISA) and the CGIAR Research Program on Policies, Institutions and Markets (PIM) led by IFPRI.

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PARTICIPATORY VIDEO EXTENSION ON CSA AND WOMEN'S EMPOWERMENT: POTENTIAL AND CHALLENGES

Women's empowerment, poverty, and crop productivity: Evidence from Uganda

Lukas Welk and Greg Seymour

ABSTRACT

Evidence suggests that women's limited access to resources, agency, and associated achievements affect agricultural productivity in much of Africa and Asia. These relationships are further mediated by poverty, which affects the livelihood strategies that are available to, and pursued by, rural women and men. This policy note provides insights on how the relationship between women's empowerment and crop productivity differs for households at different levels of poverty. The findings suggest that better-off households with more-empowered women achieve higher agricultural productivity, while the opposite holds for income-poor households with more-empowered women. Thus, to be successful, resilience strategies need to not only be gender-sensitive but also consider additional time and other constraints of income-poor women farmers.

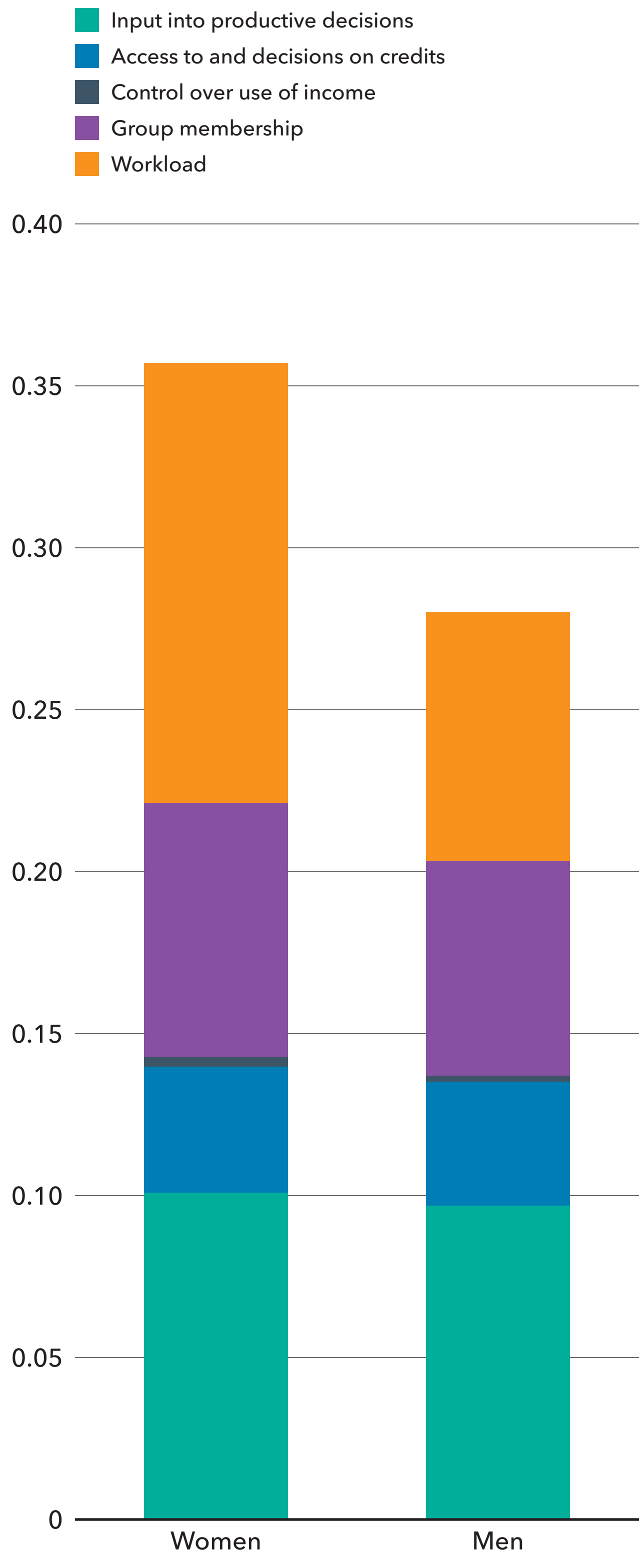
INTRODUCTION

A growing body of literature shows a positive relationship between women's empowerment and crop productivity. The main reasons more-empowered women are thought to achieve higher productivity are improved access to assets and credit, reduced time burdens, and stronger decision-making and bargaining power. More-empowered women, for example, might be more likely to gain control over fertilizer and other inputs needed for agricultural production. Similarly, group membership, another aspect of women's empowerment, has been found to improve access to information and access to credit. Some evidence also exists of a positive relationship between income and women's empowerment. Finally, reduced time poverty can allow women to dedicate more time to remunerative activities. The literature also suggests that reducing women's time poverty can have a positive impact on their own health and that of their children. However, few empowerment–productivity analyses have taken the role of poverty into account.

DATA AND METHODS

Our analysis uses mixed methods, including household data collected in 2020 in Uganda's central region and data collected through focus group discussions (FDGs). We study the relationship between women's empowerment and household crop productivity, using a Cobb-Douglas production function. Productivity was measured using the total yield value per hectare of household-operated plots at market prices. Households were grouped according to their poverty level, which was calculated based on total household income and household size. The Ugandan poverty line of US$ 1/capita/day was used to determine the household poverty cut-off. Women's empowerment was measured using the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI). Empowerment scores were calculated by summing across the six binary indicators that comprise A-WEAI. To supplement the quantitative data, 14 sex-disaggregated FGDs were conducted in November and

FIGURE 1 Contribution of each A-WEAI indicator to disempowerment



Source: IFPRI Uganda CSA baseline survey.

Note: No respondents were inadequate in the ownership of assets indicator, hence there is no contribution to disempowerment.

December 2021 to investigate gender differences in agricultural productivity of smallholder farmers.

RESULTS

Decomposition of the A-WEAI results (Figure 1) shows that compared to men, women's high workloads contribute most to their disempowerment, followed by a lack of group membership.

In addition to achieving different levels of productivity, men and women in poor and nonpoor households differ in the quantity of time they devote to different activities, and in the level of inputs they use. Both male and female members of nonpoor households spent more time on nonagricultural work and less on agricultural activities, compared to members of poor households (Table 1). In addition, women in poor households spent significantly more time on childcare than women in nonpoor households. This suggests a link between income and time poverty. Moreover, women in poor households spent, on average, 3.3 more hours on nonagricultural activities and 9.8 more hours on childcare than their male counterparts.

Differences in input use between poor and nonpoor households are also significant. Nonpoor households spent 4.5 times as much on hired labor and 3 times as much on agricultural chemicals. Hired labor might well reduce women's time spent on drudgery-prone agricultural activities such as planting and harvesting. In addition, application of pesticides results in less time spent weeding, a task typically done by women.

The econometric results show a significant positive relationship between women's empowerment scores and crop yields for nonpoor households (Table 2). For poor households, women's empowerment scores are negatively linked to crop yield values. The yield gap between poor and nopoor households thus widens as women's empowerment increases. The results imply that a certain level of resources (that is, lack of poverty) is required for women's empowerment to lead to productivity gains. In households above this threshold, greater control and access to these resources allows women to contribute in ways that increase crop production. For households below this threshold, however, this is not possible. In these households, women may choose to not engage in agriculture, focusing instead

TABLE 1 Average time spent per day on agricultural and nonagricultural work by gender and poverty level

Time spent on…	Wealth status	Time (min)	N	Standard deviation
Nonagricultural work (men)	Nonpoor	206 ***	102	269
	Poor	114	618	194
Nonagricultural work (women)	Nonpoor	361 **	105	224
	Poor	309	618	163
Agricultural work (men)	Nonpoor	329 **	102	218
	Poor	366	618	202
Agricultural work (women)	Nonpoor	242 **	105	205
	Poor	276	618	263
Childcare (men)	Nonpoor	199	102	362
	Poor	215	618	375
Childcare (women)	Nonpoor	689 **	105	542
	Poor	808	618	529

Source: IFPRI Uganda CSA baseline survey.

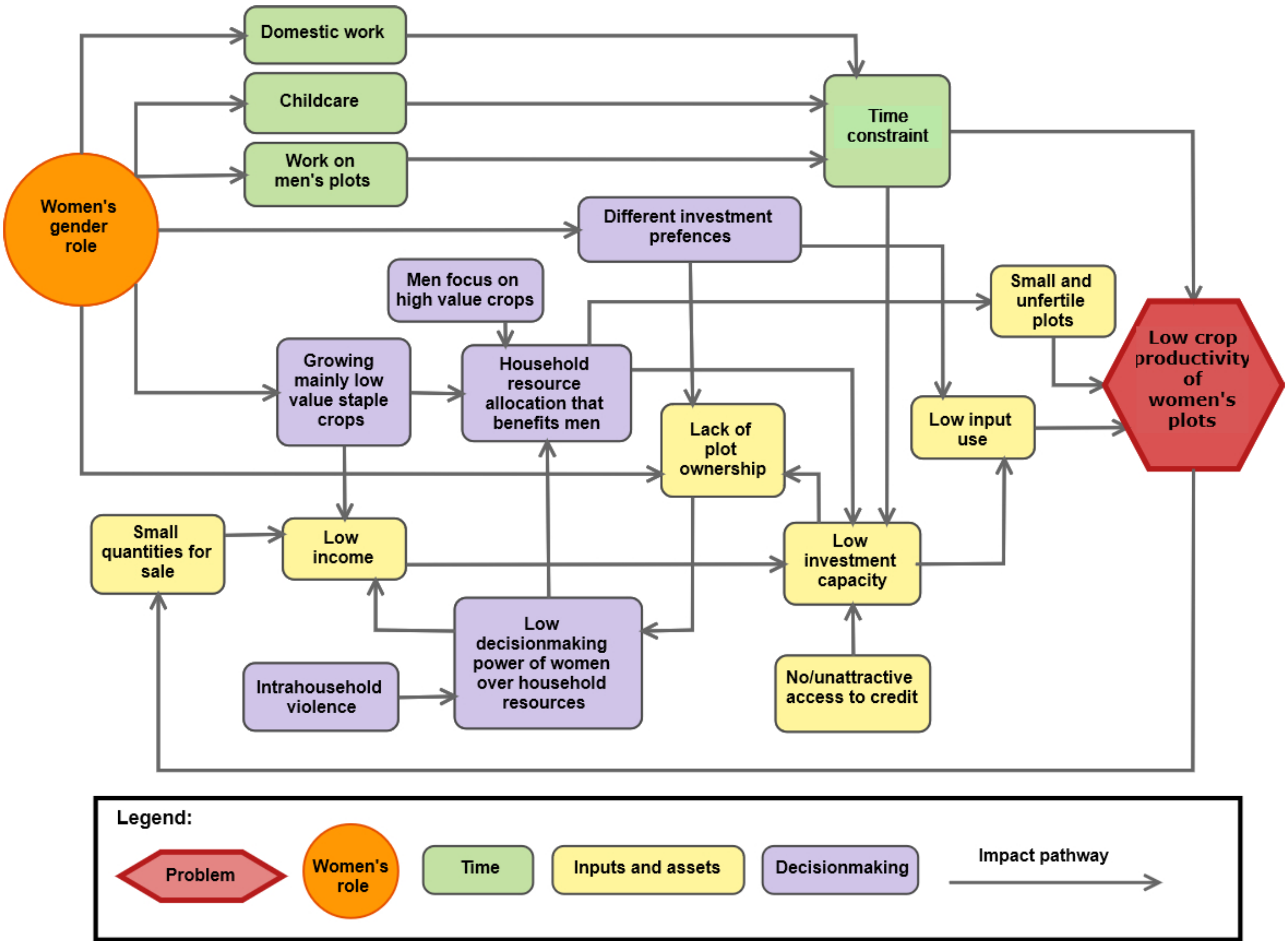
Note: Differences between poor and nonpoor are statistically significant at *** p<0.01, ** p<0.05, * p<0.1. Agricultural work includes staple crop, horticultural, and high-value crop farming and livestock raising and keeping. Nonagricultural work includes work as an employee, own business work, fishpond culture, weaving/sewing, and commuting to work.

TABLE 2 Econometric results of relationship between women's empowerment score and agricultural productivity

Variables	Ln (plot yield value in kg/ hectare)	Robust standard errors
Plot size (ha)#	0.132**	(0.0552)
Male field days on plot (days)#	0.157*	(0.0838)
Female field days on plot (days)#	-0.0916	(0.0827)
Cost of hired labor on plot (in UGX)#	0.0346***	(0.0109)
Cost of agrichemicals (in UGX)#	0.0243**	(0.0107)
Water shortage on plot (1=yes)	-0.666***	(0.131)
Total land cultivated (ha)#	0.150*	(0.0789)
Household size (no. of people)#	0.446***	(0.165)
Extension visit last year (1=yes)	0.0190	(0.161)
Women's empowerment score#	0.849*	(0.461)
Poor (1=yes)	-1.068***	(0.299)
Poor* women's empowerment score#	-1.091**	(0.524)
Constant	11.81***	(0.447)
Observations	736	
R-squared	0.277	

Source: Calculated from IFPRI Uganda CSA baseline survey. # Measured using natural log (Ln) transformation. Note: 'Poor' indicates the average change in the dependent variable when comparing individuals who are classified as poor (poor = 1) to those who are not (poor = 0); *** p<0.01, ** p<0.05, * p<0.1

FIGURE 2 Flowchart of factors contributing to low crop productivity on women's plots



Source: Authors based on focus group discussions.

on nonagricultural work or unpaid activities. This may ultimately lead to a decrease in crop productivity. Although no positive relationship can be identified between women's empowerment and crop productivity for poor households, empowered women in poor households may experience less time poverty.

In addition to quantitative data, the results of the FGDs (Figure 2) provide insights into the underlying intrahousehold factors that influence women's contributions to crop productivity. They also provide valuable information on challenges that need to be addressed to allow women to fully benefit from their contributions to agricultural production. The main challenges identified during the FGDs include women's lack of time and low disposable income, assets, and inputs. In addition, women are often assigned smaller and less fertile plots and focus on producing food for the table, while men, who most often allocate plots in the family, farm plots where cash crops are grown. In some households, women may have a say in agricultural decisions, but others experience intrahousehold violence and some lose control of the crops they have grown.

Women are also expected to work on men's plots, particularly for planting and weeding, limiting the time they can spend on their own plots or on other income-generating activities. The lack of decisionmaking power over income, and insufficient own income reduces their investment in the plots they manage. In addition, their willingness and time capacity to invest is further limited by the time consumed by activities such as childcare, domestic work, and work on men's plots.

CONCLUDING COMMENTS

Our results suggest that poverty levels mediate the pathways from women's empowerment to household crop productivity. Women's increased agency alone, if not linked to assets and other resources that allow them to engage productively, does not necessarily increase crop productivity. Moreover, even if income, inputs, and assets are available and women can make decisions about them, their large time burden might prevent them from engaging more in agriculture. While interventions to improve women's empowerment may not directly result in a measurable reduction in income poverty or an increase in crop productivity, improved agency can help reduce time poverty or allow women to engage in other income-generating activities.

Better-off households that purchase more inputs show a positive relationship between women's empowerment and crop productivity, as women in these households benefit from a lower time burden, probably through hired labor and increased input use. Therefore, to improve agricultural productivity, especially in periods of crisis, policies that aim at empowering women should go hand-in-hand with measures that improve access to inputs and increase household income.

Reducing time poverty, a key domain of women's agency, can have multiple positive impacts for women and their families, including improved health, human capital formation, and economic opportunities. Governments could unlock this potential by providing collective childcare opportunities or machinery services to reduce the time spent on planting and harvesting crops, among other local solutions.

FURTHER READING

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POLICY NOTE 8

Impact of participatory video-based extension and posters on awareness, knowledge, and adoption of climate-smart agricultural practices: Insights from women farmers in Gujarat, India

Prapti Barooah, Muzna Alvi, and Claudia Ringler

SUMMARY

Climate-smart agriculture (CSA) is critical for reducing smallholder farmers' vulnerability and enhancing their capacity to cope with the adverse impacts of climate change. Constraints to information and extension access — especially among women farmers, who play a vital role in Indian agriculture — are increasingly acknowledged as a barrier for widespread adoption of CSA practices. This note summarizes results from a study implemented among smallholder women farmers in rural Gujarat, India, to assess the effectiveness of a participatory video and poster extension intervention on increasing awareness, knowledge, and adoption of CSA practices. The findings suggest that videos and posters are a viable information delivery mechanism for promoting awareness around CSA practices but should be supplemented with additional capacity development, access to financial resources, and labor-sharing arrangements.

INTRODUCTION

Recognizing the adverse impacts of climate change on India's agricultural systems and the resulting need to adopt a CSA approach, India's central and state governments have integrated climate change concerns into policies through several missions and programs across sectors. However, despite such efforts, adoption of CSA practices is still quite low, especially among women farmers (Barooah et al. 2023).

Women farmers in India are faced with several constraints, such as limited land ownership, poor access to credit, information, and formal extension, and multiple pressures on their time, which, in turn, lead to their increased vulnerability to climate change and reduced information on, access to, and use of CSA practices. Very few training programs exist for generating awareness among women on CSA practices, contributing to their lower capacity to adapt to climate change. In this context, use of ICT and multimedia-based extension can be a viable method to enhance understanding and promote engagement on CSA among women farmers.

THE INTERVENTION

The International Food Policy Research Institute (IFPRI), in collaboration with the Self Employed Women's Association (SEWA) and All India Disaster Mitigation Institute, carried out extensive qualitative interviews with men and women farmers in Gujarat, India, to understand climate change impacts and adaptation measures adopted by farming households, as well as information channels on CSA practices used by rural men and women, and to identify locally relevant CSA practices that women farmers could adopt if information gaps could be bridged (Magalhaes et al. 2023). Based on these findings, two types of extension materials (posters and videos) were designed to generate awareness on three practices: (1) climate-smart integrated pest management (IPM), such as pheromone traps, yellow sticky cards, use of T-shaped stands with bird perches to attract pest predators such as birds, and light bulbs to attract pests; (2) biopesticides; and (3) soil testing. These were identified through participatory discussions as part of the formative research.

To understand how modern communication tools such as group-based poster and video sessions can influence awareness, knowledge, and adoption of CSA practices by women farmers, a quantitative research study was implemented as a cluster randomized controlled trial between April 2022 and June 2023 with three treatment groups and one control group. The study was conducted in eight districts of Gujarat, reaching 2,627 women farmers during the baseline survey and 2,254 women in the endline survey, after both posters and videos had been rolled out. All respondents were members of SEWA-affiliated self-help groups, engaged in agriculture, and resided in rural areas.

The intervention provided information to farmers on climate-smart IPM, biopesticides, and soil testing by showing them posters (treatment group 1, 33 villages), videos (treatment group 2, 23 villages), or both posters and videos (treatment group 3, 17 villages). To minimize the risk of spillover, randomization was done at the village level such that all farmers in a village received the same type of treatment. The control group farmers continued to receive existing government and private sources of information. Of the 2,254 respondents from the endline survey, 1,233 women farmers were reached by one of the three treatments, while 537 women farmers were assigned to the control group (32 villages).

An independent consultant hired by IFPRI developed the content for the videos and posters in consultation with SEWA. The videos featured local farmers from the region discussing critical information on climate-smart IPM, biopesticides, and soil testing in the local language, while the posters summarized this information. They were shown on tablets to farmers, in groups of 10, in their respective villages. Information-sharing sessions that followed the poster or video interventions were facilitated by resource persons trained extensively by SEWA.

RESULTS

While 1,233 women farmers had been invited to see the posters, videos, or both during the intervention rollout period, only 743 (60 percent) recalled during the endline survey that they had participated in the intervention. A slightly higher share (around 63 percent) of women assigned to treatment groups 2 (videos only) and 3 (both posters and videos) recalled that they received this information compared to those assigned to treatment group 1 (57 percent), who were shown only posters.

TABLE 1 Effects of different information channels on awareness and adoption of featured CSA practices

CSA practice		Intent to Treat (ITT) Posters	Intent to Treat (ITT) Videos	Intent to Treat (ITT) Posters +Videos	Local Average Treatment Effects (LATE) Posters	Local Average Treatment Effects (LATE) Videos	Local Average Treatment Effects (LATE) Posters +Videos
Soil testing	Awareness	0.00 (0.04)	0.03 (0.06)	-0.02 (0.07)	0.25*** (0.04)	0.21*** (0.05)	0.17** (0.08)
	Adoption	-0.03 (0.04)	0.01 (0.04)	0.03 (0.05)	0.02 (0.05)	0.09 (0.05)	0.11* (0.06)
Biopesticides	Awareness	0.08 (0.06)	0.12* (0.06)	0.08 (0.08)	0.28*** (0.05)	0.32*** (0.05)	0.28*** (0.07)
	Adoption	-0.07 (0.06)	-0.09 (0.07)	-0.12 (0.08)	0.04 (0.07)	0.01 (0.08)	-0.01 (0.10)
Yellow sticky cards	Awareness	0.10* (0.05)	0.19** (0.05)	0.14* (0.07)	0.32*** (0.04)	0.40*** (0.04)	0.39*** (0.07)
	Adoption	-0.03 (0.07)	-0.07 (0.07)	0.04 (0.11)	0.02 (0.08)	-0.00 (0.09)	0.08 (0.13)
Pheromone traps	Awareness	0.03 (0.04)	0.04 (0.04)	0.07 (0.07)	0.21*** (0.04)	0.20*** (0.04)	0.27*** (0.07)
	Adoption	-0.02 (0.07)	-0.00 (0.08)	0.01 (0.09)	-0.00 (0.08)	0.00 (0.08)	0.02 (0.10)
T-shaped stands	Awareness	0.10** (0.04)	0.14** (0.04)	0.03 (0.04)	0.25*** (0.04)	0.30*** (0.03)	0.19*** (0.19)
	Adoption	0.05 (0.07)	0.10 (0.08)	-0.06 (0.06)	0.12 (0.10)	0.16 (0.10)	-0.04 (0.08)
Light bulbs	Awareness	0.04 (0.03)	0.06 (0.04)	0.06* (0.03)	0.14*** (0.04)	0.14*** (0.05)	0.17*** (0.03)
	Adoption	-0.08 (0.09)	-0.04 (0.08)	-0.15* (0.08)	-0.02 (0.10)	0.01 (0.09)	-0.09 (0.09)

Source: Authors.

Note: Regression output based on endline data only; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, standard error in parentheses, village fixed effects used.

Due to the relatively low recall rates for the interventions among study participants, we used two approaches to assess their impact on awareness, knowledge, and adoption of CSA practices. The first approach estimates the average effect of the treatments among all farmers invited to participate in the intervention, regardless of whether they remembered participating. This is the intent to treat estimate (ITT). To assess the effect of taking part in the intervention on only those who recalled participating, we used an estimate of local average treatment effects (LATE).

Based on endline survey data, we found that women farmers who received information through any of the information channels (posters, videos, or both posters and videos) were significantly more likely to be aware about featured CSA practices such as soil testing, climate-smart IPM (including yellow sticky cards, pheromone traps, T-shaped stands with bird perches, and light bulbs to capture pests), and biopesticides compared to the control group, which did not receive information on these topics (Table 1). Groups that received information on soil testing through posters were likely to be most aware (as compared to the control group) about this practice in the endline survey, followed by treatment groups 2 and 3. Awareness on biopesticides, yellow sticky cards, and T-shaped stands is likely to have increased the most for women assigned to group 2 compared to other types of treatments. On the other hand, women assigned to treatment group 3 showed the greatest increase in awareness on pheromone traps and using light bulbs to attract pests relative to other treatment groups.

TABLE 2 Effects of different information channels on knowledge scores for target CSA practices

	Intent to Treat (ITT)			Local Average Treatment Effects (LATE)		
	Posters	Videos	Posters +Videos	Posters	Videos	Posters +Videos
Weighted score on knowledge test	-0.91 (1.10)	0.27 (1.28)	0.25 (1.53)	-0.67 (1.30)	1.16 (1.45)	-0.88 (1.49)

Source: Authors.

Note: Difference-in-differences regression output; * p < 0.10, ** p < 0.05, *** p < 0.01, standard error in parentheses, village fixed effects used.

To assess changes in knowledge linked to the selected CSA approaches, we implemented a knowledge test with 20 questions (10 on different aspects of soil testing and 10 on climate-smart IPM and organic pesticides). We noted various levels of difficulty in answering each of these questions and differences in respondents' ability to address them. We therefore assigned weights to the raw knowledge scores to generate standardized scores. By doing so, we ensured that difficult questions that fewer respondents could answer correctly carried more weight in the final outcome.

We found that while the average weighted knowledge scores increased between the baseline and endline among treatment groups 2 and 3 as well as the control group, it fell for participants assigned to treatment group 1. The ITT and LATE estimates both show that participants who were shown only videos (treatment 2) were likely to obtain an average incremental knowledge score of 0.27 (ITT) and 1.16 (LATE), as compared to the control group participants (Table 2). While the ITT estimates show that the average scores for treatment group 3 (posters plus videos) were 0.25 points higher compared to the control group, the LATE estimates reveal lower average scores compared to the control group. On the other hand, treatment group 1 participants who were only exposed to the more traditional extension method (that is, posters) were likely to have lower average scores compared to their peers in the control group. Although the coefficients are not statistically significant for any of the treatment groups, showing videos only appears to have had a higher positive impact on knowledge scores as compared to information delivered through posters or through both videos and posters.

Assessing the impact of the interventions on adoption based on endline survey data, we found that farmers who received information through both posters and videos were significantly more likely to adopt soil testing compared to the control group, which did not receive an information intervention on this, while the same was not true for participants assigned to treatment groups 1 and 2. The impact of the interventions on promoting adoption of biopesticides, yellow sticky cards, pheromone traps, T-shaped stands with bird perches, and light bulbs to attract pests was not found to be statistically significant (Table 1).

The most important constraints to the adoption of CSA practices as revealed by study participants are information gaps regarding their implementation, as well as evidence on their potential benefits, along with limited access to financial resources and labor for implementing the practices. Around 40–45 percent of respondents in the endline survey noted they had not adopted the target CSA practices because they were not convinced of their benefits. About 15 percent of respondents across treatment groups reported they had not adopted the CSA practices due to insufficient labor to implement them, and a similar share also faced financial constraints to adopting the recommended CSA practices.

CONCLUSIONS

The results show that videos and posters can be a promising extension approach to enhance awareness, knowledge, and adoption of CSA practices. Repeated access to video messages along with continued discussion and training on implementing these practices is, however, likely to be critical for widespread adoption, as a substantial share of women who had been invited to see the videos and posters did not recall seeing them. Moreover, given that adoption was more likely by participants who had seen the posters and videos – possibly because the information was more clearly conveyed by the combined information channels – it will be important to spend more time on their complementarities, including pretesting before rollout. It is also important to demonstrate local evidence for the benefits of these practices.

The results on adoption emphasize that behavior change is often not linear and that changes in awareness do not necessarily translate into changes in knowledge or in adoption behavior. Support needs to be provided to remove barriers associated with each stage of the adoption process. Access to quality and timely information as well as capacity building are cornerstones in facilitating this process, but need to be complemented by relieving other constraints, such as access to credit and labor.

FURTHER READING

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Photo: Claudia Ringler / IFPRI.

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Can participatory video-based extension increase awareness and knowledge of climate adaptation practices? Insights from rural Kenya

Michael K. Ndegwa, Claudia Ringler, Francisca N. Muteti, Edward Kato, and Elizabeth Bryan

SUMMARY

Climate-smart agriculture (CSA) has been promoted as a framework to identify a set of solutions that simultaneously sustain agricultural productivity and incomes, increase the resilience of agriculture, and reduce greenhouse gas emissions. However, it has proven to be challenging to reach women farmers with information on CSA practices. This note summarizes results from a study that assessed whether participatory video-based extension approaches tailored to women's preferred CSA approaches could reduce the gender gap in awareness and adoption of CSA practices in Kenya. The findings suggest that watching the videos increased awareness of the CSA practices promoted in the videos as well as other practices. However, watching the videos did not increase the adoption of the CSA practices. We propose strategies to strengthen the uptake of CSA practices alongside participatory video-based extension.

INTRODUCTION

Intensifying climate change is having substantial negative impacts on many low-income countries reliant on the agriculture sector for economic growth and rural livelihoods. In Kenya, climate extreme events, such as prolonged droughts and extreme flooding, have resulted in significant economic losses and negatively impacted food security and livelihoods. Climate-smart agriculture (CSA) has been promoted as a framework to identify a set of solutions that simultaneously sustain agricultural productivity and incomes, increase the resilience of food systems, and reduce greenhouse gas emissions. A number of CSA practices have been promoted in Kenya in recent years using various extension approaches ranging from farmer field schools to digital platforms.

Access to climate information and extension services is essential for more widespread adoption of CSA approaches. However, research shows that climate information and extension services are less likely to reach women farmers. The gender disparity in access to climate information and extension services is one factor contributing to women's relatively lower levels of adoption of CSA practices. More recent emphasis on digital extension approaches risks exacerbating gender inequalities in CSA awareness and adoption, given gender gaps in smartphone ownership and mobile Internet usage. Moreover, men and women have different preferences for CSA approaches, yet women's preferred practices are often not reflected in extension messages, which further contributes to the gender gap in their adoption. There is, therefore, a need for innovative participatory information sharing and extension models that deliver knowledge of CSA practices and promote their adoption among both men and women.

THE INTERVENTION

To test whether video-based extension approaches tailored to women's preferred CSA approaches could reduce the gender gap in awareness and adoption of CSA practices in Kenya, IFPRI partnered with GROOTS (Grassroots Organizations Operating Together in Sisterhood)-Kenya to design and roll out participatory video screenings to women and men farmers using an experimental design in three counties in Kenya—Busia, Nakuru, and Laikipia. Focus group discussions and key informant interviews were carried out with farmers in the three counties to identify locally viable CSA practices that are preferred by women (Magalhaes et al. 2023). Videos featuring women champion farmers discussing three practices—cover cropping, minimum tillage, and zai pits—were then designed and shown to groups of farmers randomly selected to view the videos from among the communities where GROOTS works. Data were collected from men and women from 740 households in the study sites, including those that had viewed the videos and those that had not. The research team then assessed the extent to which the videos increased awareness and adoption of the featured practices.

RESULTS

Data show that awareness and adoption of zai pits was very low at baseline. Only 12 percent of women and 18 percent of men farmers were aware of zai pits as a CSA practice, and the gender difference was statistically significant. Among those aware of the practice, adoption was also low, with 38 percent of women and 29 percent of men adopting zai pits on their farms. Similarly, only 38 percent of women and 44 percent of men were aware of minimum tillage as a CSA practice at baseline, and the gender difference was statistically significant. About one-half of those aware of minimum tillage said that they were practicing it on their farms and no significant gender differences in adoption of the practice were found. Awareness and adoption of cover crops as a CSA practice was considerably higher than for the other two practices at baseline. About 60 percent of women and 66 percent of men were aware of the practice and over 70 percent of those aware were adopting it on their farms. Like the other two practices, the gender difference was statistically significant (p<10%) in awareness but not in adoption. These results suggest that overcoming gender differences in awareness, through the provision of information, could reduce gender gaps in adoption of these practices.

While a total of 572 farmers (325 women and 247 men) were invited to view the videos, only 60 percent indicated that they had watched the videos during the intervention period. Women were slightly more likely than men to report having viewed the videos (among those who were invited). Because of the low rates of participation in the intervention among the individuals selected to view the videos, we use two approaches to assess the impacts of the videos on awareness and adoption of CSA practices. The first approach estimates the average effect of the videos on awareness

TABLE 1 Effects of videos on awareness of featured CSA practices

	Intent to Treat (ITT)		Local Average Treatment Effects (LATE)	
CSA practice	Women	Men	Women	Men
Zai pits/Planting pits	0.088**	0.091**	0.183**	0.232**
	(0.04)	(0.05)	(0.08)	(0.11)
No till/Minimum tillage	0.120***	0.03	0.249***	0.076
	(0.04)	(0.04)	(0.08)	(0.10)
Cover cropping	0.100**	0.109**	0.206***	0.275**
	(0.04)	(0.04)	(0.08)	(0.11)

Source: Authors.

and adoption of the practices among all farmers invited to view the videos, regardless of whether they actually watched them. This is the intent to treat estimate (ITT), which likely underestimates the impact of the videos. To assess the effect of watching the videos on only those who viewed them, we use an estimate of local average treatment effects (LATE).

The results of the video intervention on farmers who were invited to view the videos (ITT) show that the videos increased the awareness of zai pits, minimum tillage, and cover cropping among men and women farmers (ITT results, Table 1). Among farmers who reported actually watching the videos, the videos had a much larger impact on awareness of these practices (LATE results, Table 1). Interestingly, awareness of CSA practices not featured in the videos also increased among individuals who participated in the intervention. This is likely due to the way in which the videos were shown. Farmers watched the videos in groups and the screening was followed by discussions with GROOTS and local extension staff. Farmers may have used this opportunity to discuss and learn about other CSA practices.

Despite increases in awareness following the video intervention, no effect of watching the videos on adoption of the CSA practices was found using either of the estimation approaches (ITT and LATE, Table 2). This suggests that access to information was not the primary constraint to households' adoption of these particular practices. Other key constraints farmers pointed

TABLE 2 Effects of videos on the adoption of CSA practices

	Intent to Treat (ITT)		Local Average Treatment Effects (LATE)	
CSA practice	Women	Men	Women	Men
Zai pits/Planting pits	0.003	-0.053	0.006	-0.125
	(0.06)	(0.07)	(0.10)	(0.16)
No till/Minimum tillage	0.001	0.007	-0.001	0.017
	(0.05)	(0.05)	(0.09)	(0.13)
Cover cropping	-0.006	-0.064	-0.011	-0.154
	(0.05)	(0.05)	(0.09)	(0.12)

Source: Authors.

to in the survey include cost, skepticism about the benefits, lack of labor, and lack of in-depth information on how to implement the practices. In the case of zai pits and minimum tillage, the time required to implement these practices is significant, and women, in particular, already have a considerable labor burden with both domestic and productive responsibilities.

CONCLUSIONS

The results show that lack of access to information is not the only constraint hindering more widespread adoption of CSA practices. Individual practices are likely to face different sets of constraints to adoption. For example, some practices entail some capital costs while others require significant labor investment or more detailed knowledge to implement effectively.

Therefore, for digital extension messages providing information on CSA practices to effectively encourage adoption will require bundling the information with other interventions that address other constraints, such as the provision of credit and/or labor-sharing arrangements. Furthermore, extended exposure to video messages, beyond a single showing, coupled with more detailed training to increase technical understanding of CSA practices may be necessary for their widespread adoption. Follow-up interactions with trusted extension agents that tailor messages to individual farmer needs may also help convince skeptical farmers of the benefits of adoption. Finally, we also note the potential impacts of the COVID-19 pandemic on the quality of the rollout of the intervention itself and on farmers' ability to uptake the promoted CSA practices during this time of crisis.

FOR FURTHER READING

Magalhaes, M., L. Kawerau, J. Kweyu, and V. Pathak. 2023. "Qualitative Fieldwork to Identify CSA Practices Preferred by Women Farmers in India, Kenya and Uganda." In Reaching Smallholder Women with Information Services and Resilience Strategies to Respond to Climate Change. Eds. C. Ringler, M.F. Alvi, B. Birner, C. Bosch, E. Bryan, F. Githuku, R.S. Meinzen-Dick, P.B. Rwamigisa, and M. Shah. Washington, DC: International Food Policy Research Institute (IFPRI).

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Photo: GROOTS Kenya

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REACHING WOMEN FARMERS WITH CSA

POLICY NOTE 10

Do informational videos impact awareness, knowledge, and adoption of climate-smart agricultural practices? Insights from rural Uganda

Edward Kato, Patience B. Rwamigisa, Herbert Kamusiime, Farha Sufian, and Claudia Ringler

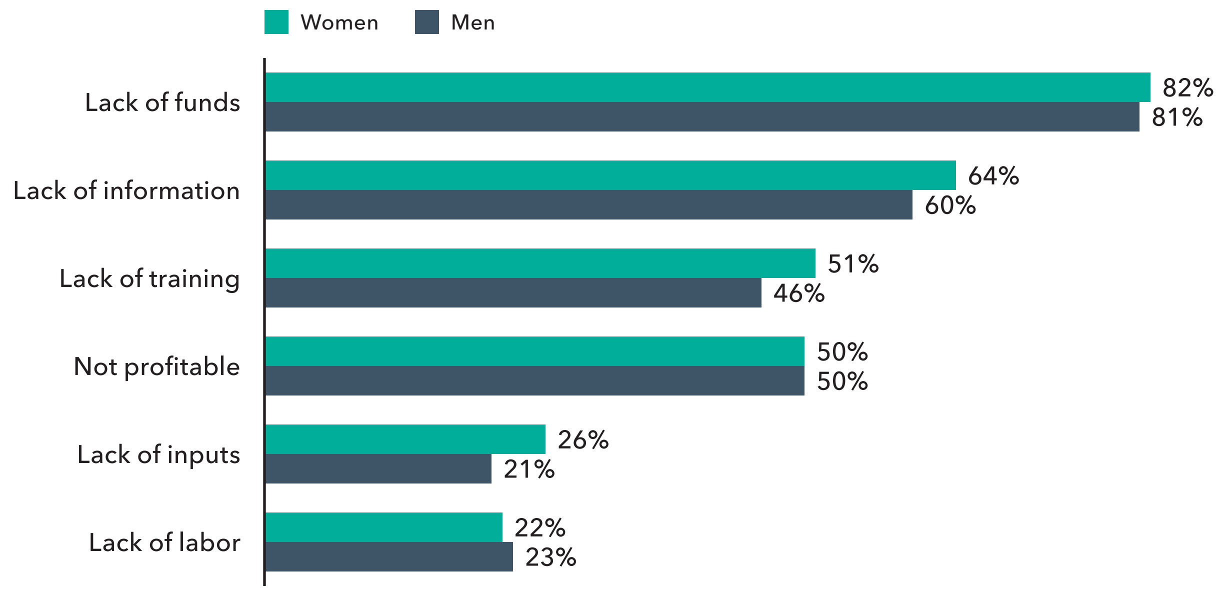
SUMMARY

Uganda is highly vulnerable to adverse impacts from climate change, including erratic rainfall patterns, prolonged droughts, and increased frequency of pests and diseases. While many climate-smart agricultural (CSA) practices have been identified, a gender gap in access to and adoption of these practices persists. This study tested participatory video-based extension to reach underserved women and men farmers in parts of central Uganda and assessed its impacts on gendered awareness, knowledge, and adoption of CSA practices as well as women's empowerment. We find limited impacts on awareness and knowledge and significant impacts for the adoption of several CSA practices. We also find some improvement in women's decision-making but a decline in their group membership. We propose strategies to strengthen the uptake of CSA practices that can be implemented alongside participatory video-based extension.

INTRODUCTION

Climate-smart agriculture (CSA) is a set of principles and approaches that support identification of technologies, practices, tools, and policies that jointly increase agricultural productivity, support climate change adaptation, and reduce greenhouse gas emissions. Uganda, like many other low- and middle-income countries, is highly vulnerable to adverse climate change impacts, including erratic rainfall patterns, prolonged droughts, and increased frequency of pests and diseases. Although several CSA practices such as conservation agriculture, agroforestry, integrated pest management, and improved livestock management have been introduced to build the resilience of the agriculture sector to adverse climate change impacts, limited access to resources and information has curtailed desired progress. Additionally, rigid gender norms and a considerable gender gap in access to resources affects women's agency in agriculture, reducing their access to and benefits from CSA approaches. Getting information on the menu of available climate-smart options into the hands of women farmers and their support groups at the local level is therefore a critical challenge. This study used innovative, participatory video-based extension services to reach underserved women and men farmers in selected areas of Uganda. It also tested the impact of video-based messaging on awareness, knowledge, and adoption of CSA practices.

FIGURE 1 Constraints to the adoption of CSA practices by gender, baseline survey, Uganda (%)



Source: IFPRI Uganda CSA baseline survey.

THE INTERVENTION

To assess the impact of participatory extension services on farmers, a cluster-level randomized controlled trial was designed and implemented in the central region of Uganda. The intervention area included the three richest and the three poorest districts of the central region (Mubende, Nakasongola, Rakai and Bukomansimbi, Kalungu, and Kiboga, respectively). IFPRI partnered with the Africa Institute for Strategic Resource Services and Development (AFRISA) of Makerere University and Uganda's Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)'s Directorate of Agricultural Extension in the design and roll-out of videos showing women implementing CSA practices that were previously identified through gendered focus group discussions, key informant interviews and engagement with MAAIF (Magalhaes et al. 2023). The videos showcased climate-smart poultry and pig management, climate-smart pest management, and climate-smart soil and water management with a focus on soil bunds. A total of 720 households were randomly selected for the study, with one-half drawn from treatment villages that received video screenings, and the remainder from control villages that continued to rely on traditional extension channels. A baseline survey was conducted between October and November 2020, and the endline survey took place between February and March 2022. This study uses the experimental randomization design to

TABLE 1 Impact of the video intervention on the adoption of CSA practices

CSA Practice	Women	Men
Soil bunds	0.114***	0.034
Composted pig manure	0.096**	0.189**
Composted cattle manure	0.126***	0.030
Composted chicken manure	0.010	0.117**
Livestock manure management	0.126***	0.028

Source: IFPRI Uganda CSA baseline and endline survey.

compare differences in outcomes between treated and control respondents to understand differences in their awareness, knowledge, and adoption of CSA practices.

RESULTS

Survey findings reveal that in addition to lack of funds and lack of access to training, inability to access information acts as one of the leading barriers to the adoption of CSA practices for both women and men farmers in Uganda (Figure 1). These results reinforce the need for expanding the existing set of gendered information channels to support the adoption of CSA approaches (Welk et al. 2023).

Except for soil bunds, we observe gendered differences in the awareness and adoption of all climate-resilient technologies featured in the screened videos. For almost all CSA practices, men had higher awareness and adoption levels. An exception was women's awareness of climate-smart pig management in the baseline, which was significantly higher than that of men.

Due to COVID-19 restrictions and risks associated with video showings, as well as changes in rural structures post-COVID-19, only 30 percent of targeted farmers who had been invited to video showings indicated that they had participated in the screening sessions. In some cases, other family members attended the screening instead.

We find that the video sessions impacted women's awareness of CSA practices for composting chicken manure as part of climate-smart poultry management (an increase of 4.8 percent) and men's awareness of climate-smart pest management (an increase of 12.2 percent). At the same time, we do not find significant changes in farmers' knowledge of climate-smart pig, poultry, soil and water, or pest management as a result of the video showings.

However, we do find increased adoption of several CSA practices linked to the videos. Results in Table 1 suggest a significant increase in the adoption of soil bunds (11.4 percent), composted pig manure (9.6 percent), composted cattle manure (12.6 percent), and livestock manure management (12.6 percent) by women farmers in the sample. The more significant impacts for women farmers suggest additionally that women were more likely to undertake new practices as compared to men after having had access to the informational videos. This is indicative of the efficacy of innovative video-based extension services in reducing gender gaps in the awareness and adoption of CSA practices. The increase in adoption of new practices can also be attributed to the discussion sessions that followed video screenings within treatment villages, giving farmers a platform for shared learning and exchange with extension service providers following the video screening.

The study also finds spillover effects of video-based extension services on women's empowerment, as measured by the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI). Results in Table 2 show statistically significant impacts of the screening sessions on specific subdomains of empowerment, although the overall empowerment score remains unaffected. Such findings are expected, as significant changes in overall empowerment take time. Among the subdomains, we find that women with access to video screenings

TABLE 2 Impact of the video intervention on domains of women's empowerment

Indicators of empowerment	Women
Weighted empowerment score	*0.004*
Input in productive decisions	0.076**
Ownership of assets	0.000
Access to and decisions on credit	-0.016
Control over income	0.002
Group membership	-0.165***
Work balance	-0.003

Source: IFPRI Uganda CSA baseline and endline survey.

were 7.6 percent more likely to have input in household agricultural decisions following the intervention, while the impact on men remained statistically insignificant. However, we observe trade-offs within the subdomains of empowerment, as women in the treatment group are found 16.5 percent less likely to be active members of groups in their community. This is possibly because some CSA practices, such as soil bunds, are labor-intensive, reducing women's time availability for social or community activities. Although not significant, we also observe a small decline in women's leisure time following the intervention.

CONCLUSION

Innovative extension approaches provide an opportunity to reach more—and more diverse—members of a community. We find that although impact of the participatory video intervention on awareness and knowledge of women and men farmers was limited, adoption of several CSA practices increased significantly. This suggests that farmers were largely aware of the practices and had some knowledge of how to implement them but had not considered them adoption-worthy in their specific context. We note that women benefited more from the participatory video intervention—which also only showcased women—resulting in their higher adoption of CSA practices. Video interventions can, therefore, support reducing gender gaps in climate resilience. To further strengthen their impact, we propose extended exposure and follow-up interactions with local extension agents, along with complementary services that remove further constraints to the adoption of CSA, such as gender-responsive access to finance.

FURTHER READINGS

Magalhaes, M., L. Kawerau, J. Kweyu, and V. Pathak. 2023. "Qualitative Fieldwork to Identify CSA Practices Preferred by Women Farmers in India, Kenya, and Uganda." In *Reaching Smallholder Women with Information Services and Resilience Strategies to Respond to Climate Change*. Eds. C. Ringler, M.F. Alvi, R. Birner, C. Bosch, E. Bryan, F. Githuku, R.S. Meinzen-Dick, P.B. Rwamigisa, and M. Shah. Washington, DC: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.136965

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REACHING WOMEN FARMERS WITH CSA

POLICY NOTE 11

Insights from farmers and extension agents: Perceptions of a participatory video intervention in India, Kenya, and Uganda

Damilola Aladesuru, James Billy Kasule, and Garima Joshi

SUMMARY

Digital tools, including video-based extension, are increasingly being recognized as a viable alternative to traditional extension approaches given their cost-effectiveness and potential to reach large groups of farmers quickly. They are also increasingly seen as an effective medium for reaching out to women farmers, who face particular constraints in accessing agricultural information. This policy note summarizes fieldwork on perceptions of video-based agricultural extension on climate-smart agriculture (CSA) shared by men and women farmers and extension workers in Gujarat, India, parts of Kenya, and central Uganda. The results can be useful for designing innovative extension approaches for promoting CSA practices in low- and middle-income countries.

INTRODUCTION

Since the 1990s and early 2000s, digital tools (television, radio, telephone calls and messages, integrated voice response, etc.) have emerged as an effective alternative to traditional extension approaches for delivering agricultural information (Khan 2023). More recently, videos have been gaining prominence, especially for reaching out to women farmers, who might not be able to fully benefit from other digital tools that require users to be literate and comfortable with using digital technology. However, evidence around the effectiveness of videos, delivered via participatory video extension, for achieving the goal of improved information access for women farmers remains limited.

The "Reaching Smallholder Women with Information Services and Resilience Strategies to Respond to Climate Change" project implemented by the International Food Policy Research Institute (IFPRI) collected qualitative insights from women and men farmers and extension workers in India, Kenya, and Uganda to obtain feedback on changes in their knowledge, attitudes, and practices related to the videos on CSA practices that they were shown as part of the project. This qualitative fieldwork sought to understand the advantages and disadvantages of videos compared to other forms of extension and explored mechanisms through which videos affected adoption of CSA practices. Furthermore, the comparison across the three countries offers critical lessons around contextual factors that shape the effectiveness of video-based extension.

FARMERS' VIEWS ON THE USE OF VIDEO-BASED EXTENSION

Farmers across all three countries perceived videos to be a very effective medium for imparting information on different CSA practices. They noted that the "real-life" settings depicted in the videos – that is, use of

TABLE 1 Quotes illustrating the perceptions of women farmers about the usefulness of video-based extension

India	Kenya	Uganda
Usually, no other agency is providing any information to us. KVKs [Krishi Vigyan Kendra, farm science center] often show videos on farming, but often to men only.	The medium of using videos is a good one because it brings direct things that I am able to see from different parts of the country. [...] It helps us not to lose hope because we realize it is not just us who are affected by climate [change] but people from other parts of the country as well.	Visual representation is useful as we can simultaneously learn and observe.
We could connect with the content shown in the videos, as we grow the same crops as shown in the videos like cotton and castor.	We have been planting cover crops like potatoes like mentioned but not with the knowledge that it is a cover crop. Rather with the ideology that it is a normal crop which is expected to give great yields.	Videos give me constant information, and I don't have to pay for gas or airtime for an extension worker or veterinary officer to come to my house.

Source: Authors, based on qualitative survey data.

local dialect, localized content featuring women farmers from the audience's community or region, on their own farms — helped them absorb the information better than lecture-based training sessions. These aspects of the video messages made the content more relatable and thus aided in better and easier understanding and recall. Moreover, visual representation captured their attention and stimulated their interest. This supported viewing of several videos showcasing different CSA practices, over a short period of time. Farmers shared that learning about a wide range of practices through other means of communication can be overwhelming for them and that it is often difficult to sustain their interest. Women participants across the three countries appreciated that videos could be watched near their homes, without a need for them to travel and find someone to manage their household chores during their absence. As several other extension methods, including field demonstrations and other training events, require women's absence from their homes, they are often excluded from these opportunities.

Farmers in Kenya noted that well-detailed and accurate videos can enable them to observe the methods other farmers are implementing on their farms without physically visiting them. They found it particularly helpful to learn about practices in more distant or less accessible locations.

Participants in India highlighted that localization of the video content established a reliable and trustworthy connection with the video messages. Women farmers in India also indicated that they preferred videos over posters as they are often unable to read the messages presented in the posters given their limited literacy, which limits their ability to engage with the material.

Farmers in Uganda appreciated that they could rewatch the videos whenever they needed to, and they considered the video-based extension methods inexpensive compared to in-person training sessions, which involve transportation costs as well as other costs associated with extension workers' visits. However, they noted that videos need to be shown in community settings to avoid excluding farmers who do not have smartphones. Women farmers noted the lack of access to videos outside of the group showings as part of the project.

EXTENSION WORKERS' PERCEPTIONS ON THE USE OF VIDEO-BASED EXTENSION

Extension workers across the three countries seemed enthusiastic about the use of videos as an agricultural extension tool. They felt videos go beyond theoretical discussions in representing how CSA practices are to be undertaken on farms, and thus can directly support their adoption.

Extension workers in Uganda noted the cost-effectiveness of providing information through videos as compared to other methods that involve paying transportation costs to farmers and/or trainers for

TABLE 2 Quotes illustrating the perceptions of extension workers about the usefulness of video-based extension

India	Kenya	Uganda
There are often audio-related issues when we show the videos, especially when the group size is more than 10 – it becomes difficult for everyone to hear properly. Speakers then become necessary. (Female extension officer, Gujarat)	When you teach without a video not all farmers will understand. We need the video, [and] then an extension officer for explaining. (Female extension officer, Busia)	Women farmers were inspired and motivated by the video. […] Because the women in the videos were just like them, it gave the women farmers hope that they, too, could reach their farming goals. (Male district veterinary, Bukomansimbi)
With videos, women understand easily. However, if we want to share the videos with them, it would be a problem as some women won't have access to mobile phones. (Female extension officer, Gujarat)	Seeing is believing so if you ask me, I feel like it's a good idea to use the videos in reaching out to many farmers and getting them more educated on different agricultural practices. (Male extension officer, Nakuru)	Women usually feel inferior, so when they see fellow woman taking on a lead role in doing something to the extent that they are recorded on video, they get very encouraged. (Male crop extension officer, Kalungu)

Source: Authors, based on qualitative survey data.

Note: Unlike in Kenya and Uganda, in India, videos were shown on a tablet.

participating in field days. Moreover, they noted that videos do not require the physical presence of extension workers, suggesting potential for wider reach. Extension workers also remarked that women drew inspiration from the women farmers shown in the videos who had taken the initiative to improve their livelihood opportunities by adopting the recommended CSA practices.

A major concern raised by participants in both Kenya and Uganda was that to ensure that video length was manageable, videos provided only basic information about the practices, but not in-depth information on all aspects of CSA or on the entire production system. Further, videos are often more suited for a younger audience, but younger farmers often lack decision-making power, limiting their adoption of new practices. Finally, extension workers across all countries remarked that despite being cost-effective, using videos for larger groups involves a range of logistical challenges. These include obtaining a good-quality projector and speakers; providing for back-up power and associated rental and electricity costs; identifying screening locations that are enclosed and ideally dark for better viewing quality; and having the technical know-how to run the video equipment. Extension workers in India highlighted the issue of limited smartphone ownership, especially among women, for refresher viewings.

CONCLUDING REMARKS

These results suggest that video-based approaches could play a significant role in enhancing the effectiveness of extension systems across diverse contexts. While videos can be hugely beneficial for quality and

timely information delivery to a large number of both men and women farmers, the study identified several aspects that need to be strengthened to ensure their effectiveness and sustainability.

Customizing content based on local conditions and providing locally relevant information that responds to the needs of farmers makes videos more relatable and increases the likelihood of adoption of CSA practices. Participatory development of videos also facilitates incorporation of in-depth information, taking into account wider perspectives.

Further, considering the inequities that exist in terms of access to resources – including smartphones as well as limited digital literacy, especially among women farmers – video viewings in group settings in the presence of extension agents are preferred over watching on personal devices. Group interaction and engagement around the video content was seen as improving learning and motivation on the part of farmers to adopt CSA practices. However, group viewings and the presence of extension support reduce the cost advantage associated with digital tools. Group meetings also run the risk of excluding women farmers, who are often not recognized as "farmers" according to conventional definitions based on land rights. Furthermore, to enhance the effectiveness of video showings, it is important to build the capacities of extension workers to handle the logistics involved in delivering information through videos, along with developing infrastructure for cost-effective information delivery.

These challenges call attention to the need for gender-transformative approaches, which supplement agricultural information with efforts to address gender-based inequities within societies that prevent women farmers from enjoying opportunities equal to those of men. Videos can be a crucial and influential medium to achieve this goal.

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Photo: James Billy Kasule.

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Challenges and opportunities in implementing video-based extension approaches targeting women farmers: An implementer's perspective

Patience B. Rwamigisa, Angella Namyenya, Cosmas Alfred Butele, Mansi Shah, Fridah Githuku, and Dennis Njung'e

SUMMARY

Agricultural extension services play an important role in agricultural development. Timely and reliable information services are key to improving farmers' knowledge of strategies to increase agricultural productivity, assisting them in accessing inputs and credit, providing early warning against pests and other shocks, and offering them critical advice on climate action. However, equitable access to knowledge, information, and technology remains challenging in most countries. This inequity is even more pronounced among farmers from marginalized groups, including women farmers, resulting in their limited access to climate resilience-enhancing technologies and practices. This note summarizes findings from implementers of participatory video-based extension interventions in India, Kenya, and Uganda. The findings suggest that videos targeting women farmers can reach them effectively. Still, participatory video-based extension should be accompanied by group discussions, providing complementary inputs, and dismantling other barriers that impede women's agency and achievements in agriculture.

INTRODUCTION

In India, agricultural extension is provided under the government's flagship Agriculture Technology Management Agency (ATMA) scheme. However, between its inception in 2005–06 and December 2018, only one-fourth of participants in farmer-oriented activities—such as exposure visits, training, demonstrations, farm schools, and Kisan Melas (farm exhibitions)—were women. In Kenya, extension services also face challenges reaching women farmers, which reduces their access to improved seeds, fertilizers, and pesticides. In Uganda, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) acknowledges that while women provide 70 percent of the labor force in agriculture, fewer than 20 percent have access to agricultural extension, and women-managed plots produce 17 percent less, on average, than those managed by men or jointly. In all three countries, women who do access extension services do so braving additional constraints, such as limited mobility, a shortage of qualified women extension staff, inappropriate extension packages, and extension events that fail to consider women's time constraints.

To address this inequality in information access, the International Food Policy Research Institute (IFPRI)—together with the Africa Institute for Strategic Resource Services and Development (AFRISA) of Makerere University and MAAIF in Uganda, GROOTS Kenya, the Self Employed Women's Association (SEWA) in India, and University of Hohenheim, Germany—conducted a study to assess the potential of using a participatory video-based intervention for disseminating information on climate-smart agricultural (CSA) practices, targeting women farmers. The study was conducted in six districts in central Uganda (Bukomansimbi, Kalungu, Kiboga, Mubende, Nakasongola, and Rakai); three counties in Kenya (Busia, Laikipia, and Nakuru); and nine districts in Gujarat State, India (Ahmedabad, Anand, Arvalli, Chhota Udaipur, Gandhinagar, Kutch, Mehsana, Patan, and Surendranagar). The CSA practices were selected based on local demand and agroclimatic conditions and included: soil health testing, climate-smart pest management, and use of organic pesticides in Gujarat, India; conservation agricultural practices, zai pits, and minimum tillage in Kenya; and climate-smart pest management, soil bunds, and climate-smart poultry and pig management in Uganda. Between 2021 and 2023, the videos were shown to more than 34,000 women farmers in Gujarat, 2,311 farmers in Kenya (including 1,766 women), and 1,228 farmers in Uganda (including 801 women).

KEY FINDINGS

From an implementer's perspective, videos present a unique opportunity to better reach women farmers but also pose challenges in implementation. We discuss key findings from the video rollout in the three countries that can guide the scaling of such approaches in other contexts.

In India, adopting a participatory approach to identify the topics for training increased interest in and effectiveness of the trainings (Magalhaes et al. 2023). Making videos with women from the community as protagonists and using local languages and dialects imbued a sense of ownership of the videos and helped women understand and connect to the content (Aladesuru et al. 2023). Moreover, using multiple modes of information delivery, or stacking of tools, can be an effective solution for delivering agricultural extension services. We found that combining videos and posters for imparting agricultural training helped women retain more information (Barooah et al. 2023). For information delivery to be most effective, the use of ICT tools must be integrated with face-to-face communication; that is, a "phygital" approach. In India, this involved showing the videos, facilitated and followed by SEWA master trainers or agricultural extension workers using posters to provide more details on the topic. This interactive training not

only helped capture the attention of trainees but also facilitated discussions, deliberations, and participation.

In Kenya, smallholder farmers typically engage in multiple economic activities, on- and off-farm, as agricultural income often cannot meet their livelihood needs. It is, therefore, not uncommon that while women focus on agricultural activities, male household members seek employment in small towns where they may gather information on agriculture. In contrast, women often have no time or other resources to access agricultural information. The participatory video interventions in Kenya supported women farmers and positively affected neighbors and family members. We found that the mode of information sharing is an important determinant of how climate and farming information services are perceived. Farmers were more trusting of extension officers on the topic of CSA practices but more dependent on television for weather and climate information. Farmers noted that localized, prerecorded videos ensured that they saw, internalized, and questioned practices such as intercropping, mulching, and zai pits. Expert support, particularly from government extension officers, supplemented this information-sharing mode through enhanced and localized explanations. This created better rapport with farmers and facilitated follow-up interactions.

In Uganda, extension staff found the videos convenient for cost-effectively training a large number of farmers. Videos did not require purchase of demonstration materials, which are often not durable. Video showings worked particularly well for women because they saw their peers on the screen and were able to relate to the messages. Moreover, approximately one-third of women who participated in a survey supporting this study identified community meetings as a source of information on CSA practices, suggesting that communal video showings are an appropriate information channel for them. However, lack of appropriate communication with women prior to the video showings as well as their time constraints resulted in only 29 percent of targeted women actually seeing them.

Across all countries, it was challenging for smallholder farmers to retain many technical details in one viewing, so it is important to keep videos short, focusing on key concepts. Hence the length of videos should not be more than 3 to 4 minutes, with more technical details provided as part of follow-on discussions. That said, some farmers noted that not all aspects of practices had been conveyed in the short videos. Moreover, in Kenya and India, sharing videos in digital form (and in India also the posters) with farmers with mobile phone access increased outreach, since the information was stored for future reference and later shared with family members. Given the low bandwidth of the network in rural areas and the overall lower quality of mobile devices owned by women farmers, the need for keeping videos short was reinforced for easier sharing through mediums such as WhatsApp.

Facilitating community viewing of videos was not without challenges. Low Internet connectivity and lack of infrastructure for community viewing in rural areas—such as a room equipped with a projector, large screen, and speakers—made it difficult to screen videos everywhere. Lack of a reliable power supply was also a challenge. As a result, SEWA resorted to handheld devices, such as tablets, for showing videos in smaller groups.

CONCLUDING REMARKS

Some key findings emerge from our experience of implementing the participatory video extension in three different contexts. Given increasingly frequent climate and market shocks, agriculture is becoming less viable and profitable for small and marginal farmers. As a result, farmers' risk-taking appetite to adopt any new agricultural technology or make changes to existing practices based on a single training intervention is low.

To support the uptake of learning provided by videos, interventions should provide complementary inputs and services, such as credit or an insurance product. Lack of finance to implement CSA practices was the major barrier identified that stymied adoption followed by lack of information and training on these practices across all three countries. Additionally, video-based training must be imparted over a longer timeframe, that is beyond a single intervention, to increase recall of video content and knowledge imparted and to increase adoption. Adoption was not significant in Kenya where the lag between the video intervention and data collection on changes in awareness, knowledge and adoption was the longest.

Our findings suggest that the most widely used information sources for CSA are traditional forecasters, indigenous knowledge and agricultural service providers, community meetings, and neighbors and friends. While these sources can provide important information to support climate-resilience strategies, they might be less effective in adding new technologies or practices to the mix, including climate mitigation practices. At the same time, more formal extension services, such as government extension or farmer field days, are less likely to reach women farmers. Training videos accompanied by group discussions can thus fill an important information gap on CSA practices and strategies for women farmers, if they respond to women's needs and preferences. To yet further align with traditional information channels, these videos should also better integrate traditional knowledge sources.

MAAIF in Uganda has already integrated the videos into its e-extension platform, and the district of Mubende has purchased video-showing equipment based on experiences from the project. GROOTS Kenya has developed other CSA projects using video-based extension approaches and SEWA has opened climate schools for capacity sharing on CSA practices.

More efforts are also needed to recruit women extension personnel into the formal extension system. Priority in resource allocation for localized, grassroots-informed extension services and human resource recruitment and allocation that intentionally supports women farmers is needed.

SEWA's experience has shown the importance of involving rural youth in the design of extension services and of training young rural women from the community as extension officers. This generates employment opportunities for rural youth and can reduce outmigration. Extension workers who come from the same trade and community have a better understanding of the challenges and issues faced by women farmers and can better deliver and design localized extension services. Moreover, beneficiaries are likely to have more faith in such people and the training they impart. Several states in India are already experimenting with the concept of community-based frontline workers to convey agricultural and livestock information.

In addition, there is a lack of resources to support smallholder women farmers in adopting climate resilience strategies. Budgetary resources need to be allocated to local, women-centered climate actions, such as the women-preferred crop and livestock practices identified in this study as well as post-harvest management and food storage, and to foster greater collaboration among women farmers at the local level.

We therefore call for better financing of women-centered climate action at the local level. There is already considerable dependence on civil society organizations to provide capacity and financing for climate action. These services need to be better funded and accompanied by larger efforts to support women farmers by the public sector.

We also note that no CSA practice works for all farmers or even for many farmers. And practices that men

farmers would like to adopt often differ from those that women farmers are interested in. As such, programs supporting climate action in agricultural areas should provide a broad menu of adaptation options that farmers can pick from and further adapt to their own local context. While many farmers were aware of certain CSA practices, they often lacked the in-depth technical knowledge to ensure that they are climate-smart. Many other farmers, on the other hand, were not interested in adopting these practices due to past, negative experiences with CSA practices.

Gender equality contributes to increasing productivity, improving the socioeconomic status of smallholder farmers, and revitalizing rural economies. However, sociocultural barriers and exclusion of women from access to resources and information and other inequalities based on wealth, place of residence, race, or ethnicity increase the gender gap in achievements, adversely affecting food security and rural livelihoods. Bridging this divide calls for strategic action in policy and transformative social norms that dismantle these barriers, providing women with greater ownership and control over resources and information.

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Photos: p.2 Damilola Aladesuru; p.4 GROOTS Kenya.

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