Reach Alliance

Cutting Through the Grass Ceiling:

Supporting Women Smallholder Farmers with the Collective Power of Community, Participatory Learning, and Trust

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Cover photo: Happy mother and baby in Keonjhar district, Odisha. With the UPAVAN interventions, women had substantially improved their own and their children's health & nutrition. (Credit: Digital Green)

Contents

Executive Summary

In India, 58 per cent of rural households depend on agriculture as their main source of income. Oftentimes, farmers and agrarian workers are among the poorest in their communities, especially those who own or work on smallholder farms. Unable to access economic growth opportunities within the agricultural sector, they face increasing pressure from obstacles such as low productivity, environmental degradation, and an underdeveloped food-processing sector. This results in significant inequality within the agricultural sector — especially among women smallholder farmers who face compounding barriers from high levels of gender inequality.

Aiming to address these inequalities, Digital Green, an independent nongovernmental organization, provides innovative agricultural extension interventions. These interventions are designed to target communities at the local level by training members of the local community using instructional videos and group facilitation. The interventions are both more effective in

increasing adoption rates of desired practices and more accessible to underserved communities compared to traditional extension methods.

Our examination of Digital Green's UPAVAN trial's successes and shortcomings reveals five key insights to be learned when designing interventions to support the empowerment of women:

1. Enacting sustainable change requires men, family, and community members to see themselves as beneficiaries of women's empowerment.

2. Gender-responsive interventions cannot take a "one-size fits all" approach and must include women and men in all phases of the interventions

3. Gender-sensitive content must be designed to spotlight accurate representations of women.

4. Successful and sustainable interventions require a strong foundation of trust and partnerships with the communities they serve.

5. Effective technology interventions consider and are responsive to the social, political, and cultural factors they operate in.

Women Farmers: What They Need to Feed the World

Ensuring food security for rapidly growing countries like India, which is predicted to have the world's largest population as early as 2023, will be crucial in preventing widespread famine and undernutrition among vulnerable populations. In order to achieve the required increases in food supply, nutrition, and equality relies on harnessing smallholder farms' productivity, and ensuring equitable access to resources. Avoiding widespread famine and hunger will depend on the inclusive development of smallholder farms and addressing gender inequalities within the agricultural sector.

Women play a crucial role in agriculture and in their contributions to food security. Smallholder and family farms, where most women farmers are employed, are the most common form of agriculture today, with over 500 million family farms producing 80 per cent of the world's food supply.[1] Smallholder farmers are agrarian producers who cultivate crops, rear livestock, or raise fish on a limited scale (usually less than 10 hectares of land), often as family-owned enterprises. The Food and Agriculture Organization of the United Nations (FAO) estimates that if women farmers had the same access to productive resources as their male counterparts, farm yields would increase by 20 to 30 per cent.[2] This increase in yield could reduce the number of undernourished people by 12 to 17 per cent globally.[3] However, to reach their potential, women farmers must be supported in their communities and by the men in their lives. It is impossible for women to fully realize these gains in their agricultural productivity unless systemic barriers are removed, improvements in gender relations are actualized, and men are successfully engaged as partners and beneficiaries of gender equality.

India's Invisible Farmers

Women make up a majority of India's agrarian workforce: 73 per cent of rural women are employed within agriculture and allied sectors compared to 55 per cent of men. However, their contributions within this sector are often underrecognized and hampered by unequal access to land and capital-intensive inputs, underrepresentation in leadership roles, and limited bargaining power with state institutions and markets. As a result, women smallholder farmers work in highly precarious conditions, with little access to the opportunities their male counterparts have, which negatively affects their ability to earn incomes and sustain livelihoods. Women not only remain embedded within the informal sector to a greater extent than men, but they also face additional barriers and constraints within informal employment, which affects their autonomy within the sector.

While women contribute to a higher proportion of agricultural labour and play a crucial role in all farm-related activities, they are not seen as active decision makers. Instead, they are typically assigned more subservient roles as helpers to their male family members. They are also less likely to own land or work in senior positions. Women's contributions to the Indian agricultural sector are pivotal. Despite this, macroeconomic policies and agricultural programs fail to address

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1   "Enhancing the Potential of Family Farming for Poverty Reduction and Food Security Through Gender-Sensitive Rural Advisory Services," Food and Agriculture Organization of the United Nations (FAO). 2015.

2   Ibid., 5; Matthew Abraham and Prabhu Pingali, "Transforming Smallholder Agriculture to Achieve the SDGs," In *The Role of Smallholder Farms in Food and Nutrition Security*, edited by Sergio Gomez y Paloma, Laura Riesgo, and Kamel Louhichi (Cham: Springer, 2020), 173–209.

3   "Enhancing the Potential of Family Farming," 5.

deeply rooted gender inequality, limiting women's ability to receive institutional support.

Women farmers attempting to increase farm productivity face the following barriers:

1. Lower access to productive resources and agricultural inputs
2. Higher burden of intra-household labour and unpaid labour
3. Discrimination from formal and customary institutions regarding inheritance, property rights, and land tenure
4. Exclusion from agricultural and political groups such as producer organizations where membership serves as a source of knowledge, inputs, and power
5. Lack of access to resources and learning opportunities provided by advisory services
6. Entrenched gender discrimination among agricultural extension agents and other advisory services.

Women's role as primary caretakers within homes means that their contributions to food security go beyond measures of farm productivity and yields. Through prenatal nutrition and breastfeeding, women create food security for their infants. They also tend to allocate resources differently than men — investing in the overall well-being of the family at higher rates than men do.[4]

Investing in women's empowerment is therefore a critical strategy and will contribute to the attainment of multiple Sustainable Development Goals, including poverty, nutrition, social, and environmental goals as Figure 1 indicates.

Designing Gender-Sensitive Agricultural Extension Services

Ensuring that women have access to timely and relevant information and agricultural knowledge is a crucial step toward reducing gender inequalities within the agricultural sector. Known as agricultural extension, or agricultural advisory services, these services serve as the main conduit by which farmers disseminate information or gain new and relevant information.

Typical approaches to extension services exist in the form of farmer-to-farmer extension, common interest groups, farmer field schools, and the training-and-visit approach. These are typically designed to be gender-agnostic approaches and serve both men and women. However, these methods fail to be accessible to most women and can sometimes negatively affect women farmers.

For example, because the majority of extension staff are men, it can be difficult for women to interact and participate fully with extension staff due to cultural and societal norms. Furthermore,

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4   Ibid.; "How to Feed the World in 2050."

EMPOWERING FEMALE SMALLHOLDER FARMERS

POVERTY GOALS	NUTRITION GOALS	SOCIAL GOALS	ENVIRONMENTAL GOALS
Goal 1: No poverty **Goal 8:** Decent work and economic growth	**Goal 2:** Zero hunger **Goal 3:** Good health and well-being	**Goal 5:** Gender equality **Goal 10:** Reduce inequality within and among countries	**Goal 12:** Responsible production and consumption **Goal 13:** Climate action **Goal 15:** Life on land

Figure 2. Various Goals for Smallholder Farmer Development and Inclusive Growth (adapted from Abraham and Pingali, "Transforming Smallholder Agriculture to Achieve the SDGs")

Figure 2. Savita Kunti from Baratibara in the village Anganwadi Centre getting her natal vaccination after receiving video advisories on best maternal and child health & nutrition practices in the 1000-day period. (Credit: Digital Green)

when women interact with male agents, they can be met with biased or discriminatory interactions. Rural and small-yield farms are also less visited by extension agents who prefer to visit larger farms with more resources to implement changes, meaning that the farms in greatest need are often overlooked. Gender inequalities have persisted despite reforms to improve extension access for women; worldwide, only 5 per cent of all extension resources are directed toward women, and fewer than 15 per cent of extension agents are female.

The design of extension services typically fails to consider or respond to the needs of women, for example, failing to consider women's time constraints with household and additional responsibilities. Women's agricultural participation is limited by structural barriers, such as lack of access to assets and financial resources (i.e., credit, loans, property ownership, etc.), as well as lack of access to agriculture extension activities and information, (e.g., medium of delivery, time constraints, and information relevancy). Services that cater to the needs of local women farmers are more likely to have a

greater rate of adoption for desired practices and can provide them with targeted information such as nutrition-sensitive agricultural information to allow them to increase nutrition in their households. While extension services have the potential to provide accurate and timely information to both men and women farmers, they often fail to reach those who would most benefit from the services. Especially in times of crises, such as the COVID-19 lockdowns in India, women's already low access to extension can be further exacerbated. Women also end up bearing disproportionate economic burdens.

In South Asia, where women play a significant role in the agricultural sector, gender-responsive extension continues to be inadequately accessible for women farmers and fails to meet their needs. The last 30 years have seen a paradigm shift in extension services, moving away from traditional and top-down "training and visit" approaches, to more decentralized, participatory, and demand-driven approaches. Although national schemes and nongovernmental organizations have facilitated special provisions

to mainstream support for women farmers (with varying success), women continue to face insufficient and barriered access to traditional extension services.

To reach more rural women, the use of information and communication technology (ICT) has improved the delivery and uptake of agricultural extension services, especially when a gender-responsive lens informs the technology's design. The combination of social and technological innovations employed by Digital Green, an international development organization, is 10 times more cost effective (on a cost-per-adoption basis per dollar spent) than a classical extension system and results in higher uptake of practices compared to traditional extension services by 21 per cent.[5] Its Upscaling Participatory Action and Videos for Agriculture and Nutrition (UPAVAN) project aimed to deliver nutrition-sensitive agriculture extension in rural Odisha. The intervention was designed with deep-rooted community and grassroots partnerships to deliver extension services to hard-to-reach rural women and women in particularly vulnerable tribal groups.

Nutrition-Sensitive Agriculture: A Trial with Smallholder Farmers

Odisha is an eastern Indian state bordering the Bay of Bengal. The agriculture sector is the main contributor to the state's economy, with approximately 76 per cent of the working population based in the sector. Smallholder farmers constitute 90 per cent of farming communities there. As worsening conditions of climate change threaten crop yield and soil quality, as well as low productivity resulting from the lack of assured irrigation and low levels of fertilizer consumption and mechanization, smallholder farmers have faced significant gaps in yield potential, which affect their livelihoods and food security.

The UPAVAN trial in Odisha aimed to determine the effect that nutrition-sensitive agriculture (NSA) participatory women's groups would have on the farmers' nutritional and agricultural knowledge and on maternal and child health outcomes within the first 1,000 days of life. The participants were divided into four groups or "arms":

- (Arm 1) groups learning about NSA practices via digital videos, with follow-up visits to their homes to check on their adoption of the new practices shared (AGRI)
- (Arm 2) groups learning about NSA and nutrition-specific behaviours, with follow-up visits to their homes (AGRI-NUT)
- (Arm 3) groups learning about NSA paired with a participatory learning and action (PLA) approach to nutrition-specific behaviours with follow-up visits to their homes (AGRI-NUT + PLA)[6]
- (Arm 4) a control arm that does not receive any interventions.

The study was conducted in four administrative blocks (district subdivisions for the purpose of rural development) — Patna, Keonjhar, Harichandanpur, and Ghatgaon — all located in the Keonjhar District in Odisha. Of the 1.8 million

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5   Rikin Gandhi, Rajesh Veeraraghaven, Kentaro Toyama, and Vanaja Rampresad, "Digital Green: Participatory Video and Mediated Instruction for Agricultural Extension," in *International Conference on Information and Communication Technologies and Development* (Bangalore: IEEE, 2009), 1–10. ↗

6   Participatory learning and action is a type of qualitative research that emphasizes the engagement and participation of community members to encourage them to analyze their own situations, helping to redefine the power relations between the locals and researchers implementing interventions. Community members are incentivized to take action, which leads to more engagement in intervention plans. PLA's community-based approach also gives marginalized members of society the opportunity to share their ideas and opinions, allowing for solutions that account for more members of the community.

people residing in Keonjhar, 86 per cent are rural, and Scheduled Castes and Scheduled Tribes (historically disadvantaged groups in India) make up 57 per cent of the population.

Several partners implemented and funded the trial:

- *Digital Green* — a global development organization focused on digital participatory extension. They coordinated the implementation of the interventions.
- *Voluntary Association for Rural Reconstruction and Appropriate Technology (VARRAT)* — nongovernmental organization (NGO) based in Odisha. VARRAT implemented the intervention in Keonjhar.
- *John Snow Inc. (JSI) Research and Training Institute* — provided technical assistance in the development of the interventions.
- *Ekjut* — an Indian NGO that provided technical assistance in PLA for the AGRI-NUT+PLA cluster.
- *The London School of Hygiene and Tropical Medicine (LSHTM)* — lead research activities with University College London's Institute for Global Health and Development Corner Consulting Pvt. Ltd.

The study was a four-arm cluster randomized controlled trial designed to run for 53 months (December 2015 to May 2020), including program development, set-up, baseline and endline surveys, and implementation. The intervention implementation itself lasted for 32 months from March 2017 to October 2019. Repeat cross-sectional surveys were conducted to assess the impact of the interventions at baseline between November 2016 and January 2017 and endline between November 2019 and January 2020.

Hub-and-Spoke Approach

Digital Green's approach to using local community members is based on the hub-and-spoke approach. Information from the "hub," or the centralized source of technology or knowledge, is sent to smaller branches, where the information can be tailored and adjusted to meet the local community's needs. The UPAVAN trial used key community members to build trust in the information shared with the community. This also ensured that the information would be shared in the local language with actors who reflected the participants themselves, both physically and based on background. By contrast, participants in more typical agricultural interventions meet information with scrutiny and skepticism because it comes from outsiders who, from the participants' perspective, have no reason to be trusted. In part, this distrust stems from a history of extension agents' abandoned efforts and lack of dedication. The UPAVAN trial worked to eliminate this factor by educating and uplifting community members so that the impact of the intervention would be more sustainable.
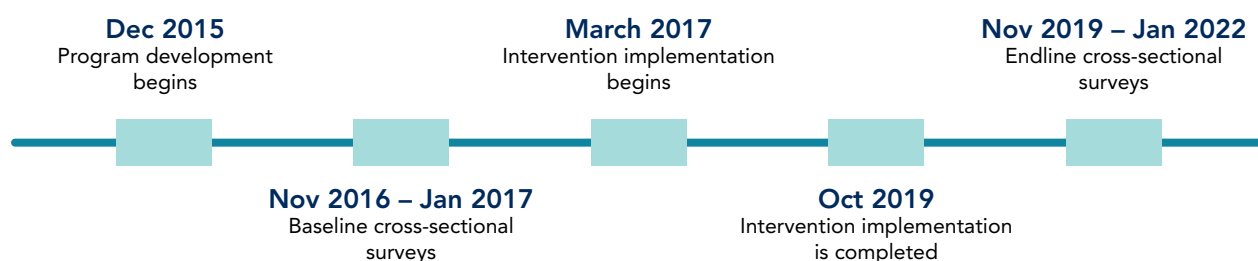
Dec 2015
Program development begins

March 2017
Intervention implementation begins

Nov 2019 – Jan 2022
Endline cross-sectional surveys

Nov 2016 – Jan 2017
Baseline cross-sectional surveys

Oct 2019
Intervention implementation is completed

Figure 2. Timeline of UPAVAN Trial

Figure 3. Production of the videos being screened within different villages would not only feature community members themselves but would be produced by resource persons from the same villages. (Credit: Digital Green)

Community Video Facilitation

All three intervention arms, excluding the control arm, were based on Digital Green's participatory video-based approach. This method uses low-cost participatory videos broadcast in self-help groups to disseminate information regarding agricultural practices. The approach has four components:

- **Participatory identification of content.** Members of Digital Green consult with local partners and community members to determine relevant video topics. Then they compile methods and practices related to these topics and identify constraints in improving productivity.

- **Training and local production of videos.** Community members are trained in the development of storyboards, video production, and editing. Subject matter experts review the storyboards, after which local community members demonstrate the advised practices in the videos, using

their local language. In cases where added credibility would aid in the delivery of information, a government extension agent also appears in the video.

- **Video dissemination.** Videos are broadcast to various relevant self-help groups, guided by a trained facilitator from within the community. The facilitator takes input from group members when deciding the times and venues of subsequent video screenings. Group members are encouraged to pause the videos at strategic moments and discuss the practices shown in the videos.

- **Follow-up visits.** The facilitator visits group members' homes or farms to determine whether they were able to correctly recall and adopt the practices shown in the videos. The information gathered from each video screening, such as information about viewership, knowledge recall, and adoption of practices, is gathered through surveys and home visits by those implementing the intervention.

In all intervention arms, the groups met twice a month over the course of 32 months. For participants in the AGRI arm (arm 1), all of the meetings centred on NSA content. Participants in the AGRI-NUT arm (arm 2) engaged in NSA content for half of the meetings, and focused on nutrition-specific behaviour-change topics, such as developing a more balanced diet or incorporating different food groups, in the other half. For women in the AGRI-NUT+PLA arm (arm 3), half of the meetings focus on nutrition topics, while the other half are based on nutrition-specific content derived from discussions in follow-up visits (PLA meetings), therefore making the subject matter different from what the AGRI-NUT arm covers.

The videos were screened at a central location with participant engagement facilitated by members of the community such as Anganwadi (rural childcare centres) and Accredited Social Health Activists (ASHA) workers. Anganwadi and ASHA workers contribute to primary health checkups and immunization, and help educate people about family planning and health. The videos about agricultural- and nutrition-specific content were shared through the use of low-cost Pico projectors. (The projectors are battery operated and pocket sized, making them easy to use and transport in rural communities.) By making it possible to project videos in self-help groups, the Pico projectors enhance the dissemination of information and allow facilitators to have a visual media to convey information. The videos broadcast in the shared spaces are also available on Digital Green's YouTube channel, and facilitators replay requested videos based on the participants' input during meetings.

Because the trial's timing overlapped with the COVID-19 lockdown, the facilitators incorporated WhatsApp groups to continue to share videos with participants. Facilitators sent videos to the groups and encouraged discussion. To reach participants who may not have access to a phone

Figure 4. Formative research activity with women community members to identify difficulties faced by mothers and children, the taboos surrounding certain food items & more to inform community video subjects. (Credit: Digital Green)

or the Internet, a technology called Interactive Voice Response (IVR) was used. IVR works by allowing people to verbally communicate with a computer-operated phone system. Incoming callers access a log of pre-recorded messages using menu options. This helped participants maintain access to information and gave them a resource to consult when they needed guidance on the adoption of an agriculture practice.

Improved Diets, Empowered Women

Overall, the UPAVAN randomized control trial (RCT) results show that a combination of nutrition-sensitive agriculture videos, nutrition-specific videos, and PLA meetings (arm 3 of the RCT) led to improved diets for both mothers and their

Figure 5. Community members learning more about diet & nutrition during the 1000-day period in a PLA (Participatory Learning Activities) Meeting. PLA had improved outcomes even more. (Credit: Digital Green)

children compared to the control. In other words, applying a nutrition-sensitive lens to traditional agriculture interventions can improve dietary outcomes, and the PLA approach can help to accelerate this process.

To gain further insight, we interviewed Digital Green staff who were involved with the UPAVAN trial and similar interventions, implementing partners of the intervention, as well as academic experts in gender empowerment and agriculture. Interviewees consistently noted three keys to the success of the UPAVAN trial:

1. **Training existing front-line workers.** UPAVAN worked within existing government schemes and programs so that front-line workers deliver consistent messaging. Agriculture and nutrition experts trained government front-line workers using gender-sensitive methodologies.

2. **PLA approach and community partnership.** Employing the PLA approach and ensuring that local community members were partners in all stages of video development (selecting relevant topics, filming, acting, and dissemination), not only ensured that content was relevant to that specific demographic, but also helped to establish trust and a good working relationship between community members and implementing partners.

3. **Taking a gender-sensitive approach to agricultural interventions.** By modelling household conversations, teaching negotiation skills, partnering with women's self-help groups, and including women extension agents and front-line workers, the UPAVAN trial was able to build women's confidence and problem-solving skills, and promote collective action. Trial implementers acknowledged that gender is a barrier, so they specifically tailored their intervention to provide women smallholder farmers with the tools they need to be successful in overcoming these systemic disadvantages.

Participatory Learning and Action

Many experts in the field identify the PLA approach as the core of Digital Green's UPAVAN's success. The approach helps to increase the

relevance of sessions for community members. As one interviewee put it, "if it's not what the community wants, they will not continue afterwards." Digital Green targets main issues in communities based on demands, scientific evidence, and community and cultural context. PLA ensures that the message is going to be timely and relevant, but it also allows the community members to see people of similar means and backgrounds on the screen performing the task. This aids in creating a sense of self-efficacy and increases community members' confidence in their ability to adopt and implement different agricultural practices.

Community Partnership

Digital Green began this intervention by working at the grassroots level, establishing partnerships with local experts and organizations already working in these communities. They made a conscious effort to involve community members at all points of the intervention design, from planning to feedback. The community was actively involved in answering the question "what do we do with the information we are finding?"

While the UPAVAN trial had seven major partner organizations, they also wanted to create synergies with existing health infrastructure and government programs. Digital Green was conscious to work in tandem with front-line workers and support the use of local health services. Anganwadi and ASHA workers know their communities best. They understand the complex social and cultural norms and the devastating impacts of the class system. They were key to reaching the most marginalized community members — women smallholder farmers who are often overlooked and left out of traditional extension services.

The resulting message consistency and championing of local experts greatly contributes to the sustainability of Digital Green's

programming. This is evident in the ongoing engagement with communities following the UPAVAN intervention. While success in this context is often difficult to measure, Digital Green demonstrates the importance of amplifying voices and promoting agency within communities.

Digital Green's ongoing involvement and accountability established trust with communities to help support ongoing change. Many communities are distrustful of outsiders coming in to conduct research because once they have concluded trials or finalized research, the partnership with the community is terminated. By contrast, one expert from the field told us that "Digital Green doesn't break promises — they keep showing up."

Trust

To partner with communities to successfully implement an intervention, an organization must first establish trust with community members. Involving the community and allowing them to equitably contribute to the intervention process at all stages helps to decolonize and mitigate biases from the research process. But trust is not built overnight. Allocating the appropriate time and resources to building trust by involving existing community organizations and creating efficient feedback systems ensures that communities can depend on the implementing partners.

Experts in the field give the following advice for establishing trust with communities:

1. **Partner with people who community members can relate to**. Rather than seeing individuals from higher socioeconomic backgrounds or different lived experiences, individuals respond better to those who can relate to their circumstances or have similar backgrounds. Women are more likely to interact with women they feel can relate to or understand their situation or issues. Additionally, when women see other women

who look like them succeeding in a role, they are better able to visualize themselves in similar positions.

2. **Involve the community in all stages of the intervention**. From planning to implementation and feedback, community members should play an active role in decision-making processes. This includes reaching out to those who are traditionally and systemically excluded to ensure that the most marginalized voices are being equitably represented.

3. **Develop trust prior to implementation.** Establishing trust takes time, but you cannot expect to see results without it. Never design an intervention that starts from day 0. Ideally, the first six months of any intervention should be allotted to building trust. As one interviewee states, "you have to establish trust — people have to see that you're genuine and you care. This opens up people's heart and mind to new information."

How to Measure Women's Empowerment

When it comes to SDG 5, Gender Equality, *women's empowerment* is a term at the forefront of literature. However, there are many understandings and definitions of empowerment, including in agriculture. One measure commonly used is the Women's Empowerment in Agriculture Index (WEAI). WEAI was first launched in 2012 by the International Food Policy Research Institute (IFPRI), Oxford Poverty and Human Development Initiative (OPHI), and USAID's Feed the Future. The index provides a standard for measuring women's empowerment and inclusion within the agricultural sector. The tool has been further

modified to a version known as Project WEAI (Pro-WEAI), which has been adapted to include qualitative measures to better understand social and cultural factors in project-specific contexts (see figure for comparison of WEAI vs. Pro-WEAI).[7] Although these indices are a good starting point for thinking about and measuring empowerment, they still have limitations. Many experts critique the lack of information relating to sexual and reproductive rights, difficulty translating the index to different cultural contexts, and limitations relating to the index being an individual-based measure.

Without a clear consensus on the definition of "women's empowerment" and an effective tool to measure it in different contexts, there is ongoing difficulty with quantifying the efficacy of efforts and programming relating to gender equality. When using the term "women's empowerment," it's important to keep in mind that:

1. **Women are inherently powerful**. They do not need organizations or agencies to empower them. However, after generations of living in patriarchal societies, women have barriers in their day-to-day lives. Discriminatory laws and social norms place women at a disadvantage and compound existing inequalities. While organizations can support women's empowerment by contributing resources and tools needed to overcome these barriers, no one can accomplish "women's empowerment" other than women themselves.

2. **Gender equality involves more than just women**. Collective action and supporting advocacy are critical components to achieve long-lasting gender equality programs.

Women's empowerment requires structural, institutional, and transformative change. It involves reforming systems traditionally designed

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7   "Women's Empowerment in Agriculture Index (WEAI)," IFPRI, 2012. ↗

Figure 6. WEAI and Pro-WEAI Measures (Adapted from The Women's Empowerment in Agriculture Index [WEAI], IFPRI, 2021)

by and for men so that they better serve women. This work is ongoing, and change is slow. But for our global community to thrive, we must ensure that even the most marginalized populations have equitable access to resources. Women are not a monolith. There is not one approach to empowerment that will be successful for women everywhere, and targeting women alone is not sufficient to enact sustainable change. The transformative change needed for women, communities, and ultimately the world to thrive requires collective action, challenging social norms, and making room for women to advocate for themselves and make their voices heard.

Key Program Components

Self-Help Groups (SHGs)

India's self-help groups are a national initiative led by the National Rural Livelihoods Mission (NRLM)

and designed to connect community members and promote social and financial inclusion.[8] Although the over 6 million women's groups across India are designed to be accessible, women still face many barriers to participation.[9] Self-help groups are not apolitical — people who self-select to participate are likely to have significant social capital. The groups require membership and a commitment, which means many women are held back by responsibilities such as household chores and childcare.

By partnering with these groups, organizations like Digital Green can better establish trust and working relationships with community members. Once a working partnership has been established, they can ask the question "who isn't here?" and strategize ways to reach them. Partnering with self-help groups allowed Digital Green to go where the groups couldn't, such as home visits, to spread the reach of the project to as many community members as possible.

8   Neha Kumar, Kalyani Raghunathan, Alejandra Arrieta, Amir Jilani, and Shinjini Pandey, "The Power of the Collective Empowers Women: Evidence from Self-Help Groups in India," *World Development,* 146 (2021): 105579. ↗

9   Sapna Desai, Madhavi Misra, Aikantika Das, Roopal Jyoti Singh, Mrignyani Sehgal, Lu Gram, Neha Kumar, and Audrey Prost, "Community Interventions with Women's Groups to Improve Women's and Children's Health in India: A Mixed-Methods Systematic Review of Effects, Enablers and Barriers," *BMJ Global Health,* 5, no. 12 (2020). ↗

Figure 7. Arm-1 of UPAVAN focused on nutrition-sensitive agriculture. Women community members are growing and harvesting paddy on their own after watching a series of videos on paddy and cowpea cultivation. (Credit: Digital Green)

Gender Dynamics

One of the highlights of Digital Green's UPAVAN intervention was its approach to transformative change at the individual, household, and community levels. Digital Green recognized that women are not the sole conduit to improving intra-household and intergenerational dynamics. Gender norms are often hidden, and many may not be aware of the subtle ways that social norms and inequalities affect their day-to-today lives. Women in rural communities in India are often raised to think that they are less valuable or important than their husbands and mothers-in-law. This type of thinking is greatly influenced by policies and regulations, as well as informal structures that lead to deep-rooted and discriminatory social norms. Gender equality cannot be achieved solely by tasking women with learning, negotiating with family members to adopt new practices, and implementing new practices as well. There needs to be family- and community-centric approaches to achieve substantive and sustainable change.

The Power of Role Modelling

UPAVAN tried to overcome the barriers created by gender norms by incorporating negotiation skills into their learning sessions. Unfortunately, these skills are often hard to learn and require consistent practice, so a group session or training videos proved insufficient. Something that was successful in promoting change at the household level was representation and role modelling. Digital Green showcased local women in their videos and role-modelled healthy intra-household communication and negotiation. Once women saw others succeeding, it was easier for them to picture themselves in those roles as well. Not only did this increase the confidence and self-efficacy for the women, but men were able to recognize it as well.

There is strength in numbers. An individual woman with ideas may be shot down, but by combining the sense of belonging and agency that self-help groups create with the "collective power of the collective," Digital Green took the first steps necessary to challenge deep-rooted inequities and enact transformative change.

Hybrid Programming

Due to the COVID-19 pandemic and subsequent government measures, Digital Green had to adapt their heavily in-person programming. Needing to continue to provide support to communities, they implemented an adapted version of their intervention called M-UPAVAN (Mobile UPAVAN). Rather than preparing in-person facilitations, Digital Green focused efforts on providing virtual interventions through sending videos via WhatsApp groups with engaging and participatory elements.

Interviewees were able to determine how their diverse preferences would be best served through a hybrid approach. Some women preferred being able to pause/replay parts of videos and being able to share them with family members such as their husbands. Others preferred engaging with women during the in-person facilitations.

Unfortunately, phone ownership continues to be a barrier to mobile interventions. Phone ownership is affected by factors such as gender, education, caste, age, and wealth. But these factors do not exist in silos; their intersections lead to great heterogeneity between communities. Digital Green aimed to address this barrier by pairing women who had smartphones with families who did not have access to increase the intervention's reach. Unfortunately, monitoring and evaluation of this adaptation was predominantly done via smartphone. This exposes obvious gaps in being able to evaluate the effectiveness of this intervention's mobile adaptation in truly reaching the most marginalized community members.

While in-person PLA programming and the mobile adaptation each have their respective benefits and barriers, to effectively reach as many community members as possible, a hybrid approach better accommodates accessibility needs and varying preferences among women. Offering in-person facilitation allows community members to connect with the information and ask questions of the facilitators while also reaping the benefits of belonging to a group. Meanwhile, mobile video dissemination brings the freedom of accessing the videos on the participants' terms and aids in overcoming barriers relating to attending in-person sessions. By implementing dual delivery methods, organizations can better scale interventions to better reach target communities.

Lessons Learned

During the UPAVAN trial, Digital Green and implementing partners employed a unique combination of social and technological innovations to reach rural and marginalized women working in agriculture. The following lessons about working to achieve gender equality within agri-food systems can be learned from both the challenges and successes of the UPAVAN project's implementation.

1. **Enacting sustainable change requires men, family, and community members to see themselves as beneficiaries of women's empowerment.**

To enact change, gender-based responses that target and include decision makers, such as husbands and mothers-in-law, are crucial to enacting long-lasting change. In contrast to gender-agnostic approaches, men and others in the community must see themselves as beneficiaries of women's empowerment. Interventions will remain successful only if members in the community, especially those with power and influence, see value in sustaining practices after the intervention has taken place.

2. **Gender-responsive interventions cannot take a "one-size fits all" approach and must include women and men in all phases of the interventions.**

When designing interventions for women farmers, one interviewee stated "women are not a monolith," outlining that a single approach to women's empowerment will not be relevant or appropriate for all women. This applies to all stages of interventions from design to implementation to evaluation. For example, UPAVAN implementors noted that while some women preferred and responded better to virtual programming, others responded better to in-person facilitation — pointing to the potential success of a hybrid approach to better accommodate heterogeneous preferences. Gender-responsive interventions should also be looking beyond quantitative measures such as yields and income, and scale beyond the individual context to include intra-household and community-level factors of gender empowerment as well. When men and women from local communities are engaged, they are better equipped to provide relevant programming and provide insights for sustaining programming beyond the intervention timelines.

3. Gender-sensitive content must be designed to spotlight accurate representations of women.

Digital Green designed content that used role modelling, videos centered around local women and women's participation in community discussions. Participants are emboldened to engage with content and adopt desired practices when they see local women act in relatable situations with traits like self-esteem and confidence. Additionally, men and leaders in the communities are exposed to these representations as well, encouraging them to recognize the abilities of the women in their lives such as their mothers, wives, sisters, or daughters.

4. Successful and sustainable interventions require a strong foundation of trust and partnerships with the communities they serve.

Underserved and rural communities naturally face skepticism and hesitancy in the face of intervention. This is largely a result of the frequency with which interventions are abandoned or concluded without processes in place to continue support of programming. Digital Green's UPAVAN trial involved building trust prior to the intervention through partnerships, as well as continued support through engaging local stakeholders. Trials should maintain consistency by building long-lasting relationships with community members and organizations as well as integrating communities within decision-making processes.

5. Effective technology interventions consider and are responsive to the social, political, and cultural factors they operate in.

Despite rapid advancements in technology, technological interventions for hard-to-reach populations have had varying levels of success and failure. Successful interventions are not those that employ the latest technologies, but those that combine social innovations with technological innovations. Digital Green's UPAVAN trial was designed with context-based considerations, such as deep grassroots-level partnerships, hyper-localized content and representation, and context-specific gender responses.

Research Team

Zainab Ali is working toward her bachelor's degree in applied science in mechanical engineering at the University of Toronto. She is specializing in mechatronics and solids, and hopes to work in mechanical design once she graduates. Zainab is interested in sustainable and accessible design, and looks forward to contributing to the design of products for hard-to-reach communities.

Olivia Kuhlmann completed her master of public health degree at the Dalla Lana School of Public Health at the University of Toronto, where she completeted a collaborative specialization in women's health. Olivia also holds an undergraduate degree in applied human nutrition from the University of Guelph. As a registered dietitian working in community health, she is passionate about designing sustainable community-based programs, and addressing the various social determinants of health at the individual, community, and population levels.
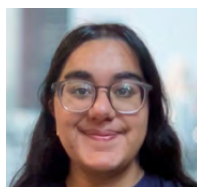
Aisha Shafaqat completed her honours bachelor of arts degree at the University of Toronto, where she specialized in political science. Currently, Aisha works as an analyst within the finance sector with an interest in innovation and entrepreneurship. She is passionate about working on creative solutions to achieve greater financial inclusion, economic empowerment, and access to safe and meaningful work.
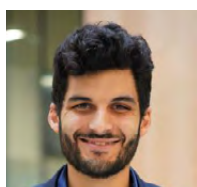
Ahmed Mahmoud was the program manager for the Centre for Global Engineering (CGEN) at the University of Toronto and a lecturer on engineering and its role in global development. At CGEN, he worked closely with engineering faculty to define research initiatives that tackle major global challenges, such as food insecurity, water scarcity, and energy poverty, and he helped connect those faculty with changemakers on the ground. In addition, he helped administer and oversee CGEN's student engagement opportunities, including the Global Engineering Capstone program, as well as the annual CGEN Fellowship, which places a recent engineering graduate with a social enterprise in the Global South. His research interests include engineering innovation in aquaculture, agriculture, remote monitoring, and impact assessment. Currently, Ahmed is the director of the Innovation Space at ventureLAB where he oversees the strategy for maintaining and expanding the Innovation Space, providing members with an exceptional experience, and building a tight-knit community of practice around hardware development.

David Meyer is an assistant professor of civil engineering at the University of Toronto and is cross-appointed to the Centre for Global Engineering. His research focuses on how water and wastewater distribution infrastructure behave in the Global South. His PhD at MIT invented new ways of understanding, managing, and modelling intermittently operated water networks in large Indian cities. Prior to MIT, Meyer worked in Tamale, Ghana, for Engineers Without Borders Canada as a strategy consultant on a USAID-funded agriculture project. He is an alumnus of Engineering Science (Energy Option) at the University of Toronto.

The Reach Alliance began in 2015 at the University of Toronto as the Reach Project, a student-led, faculty-mentored multidisciplinary research initiative. The Reach Alliance has since scaled to include the University of Oxford's Saïd Business School and Blavatnik School of Government, the University College London, and Tecnológico de Monterrey. Reach's unique approach uncovers how and why certain programs are successful (or not) in getting to some of the world's hardest-to-reach populations. Research teams, comprised of top students and faculty from across disciplines, spend twelve months investigating each case study. Once the data collection process is complete, teams write case reports that are published and disseminated across the Reach Alliance's diverse network of policymakers, practitioners, academics, and business leaders.

Inspired by the United Nations' call to eliminate global poverty by 2030 as part of a set of Sustainable Development Goals (SDGs), our mission is to pursue the full achievement of the SDGs by equipping and empowering the next generation of global leaders to create knowledge and inspire action on reaching the hardest to reach.

Reach Alliance