An Evaluation of Digital Green's Agricultural Extension Program in India

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Sector(s): Agriculture

Location: Bihar, India

Sample: Female farmers in 420 villages

Target group: Farmers

Outcome of interest: Technology adoption Productivity Profits/revenues

Intervention type: Extension services Technology

AEA RCT registration number: AEARCTR-0000313

Research Papers: Improving Smallholder Agriculture via Video-Based Group Extension

Partner organization(s): Digital Green, Gates Foundation, Ministry of Rural Development, India

Although agricultural extension services aim to improve farming practices, their effectiveness depends on many factors including the content and delivery method. In partnership with Digital Green and Jeevika, researchers conducted a randomized evaluation in Bihar, India, to assess the impact of a video-based training on female farmers' adoption of a climate-smart technique called System of Rice Intensification (SRI), and their yields and profits. Farmers increased their yields and estimated profits and the intervention demonstrated cost-effectiveness. The intervention did not increase the overall adoption of SRI, which the researcher noted may be due to surveys not capturing partial adoption of the multi-step technique.

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Agricultural extension services aim to provide farmers with information and training to improve their agricultural practices, however, many existing services are top-down, in-person initiatives with limited resources to meet demand among small-scale farmers. Digital tools like text messages can increase the reach of extension services, but this approach requires farmers to own phones and be literate. Farmers, especially women in remote areas, face barriers to accessing these innovations due to low literacy rates and limited access to mobile phones.

Incorporating videos into in-person extension services could assist with both overcoming literacy barriers and controlling the content of the messages. Furthermore, featuring local farmers in the videos could help farmers trust the recommendations and encourage them to adopt technologies and practices. However, relying on videos also risks prioritizing uniform messaging over the personal interactions found in person-led extension. Can integrating video screenings featuring local farmers into face-to-face group extension services increase the effectiveness of extension services and ultimately support farmers' productivity and profitability?

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Bihar is one of the states with the lowest average income in India, with a per capita GDP of US$1.20 per day. Farming is the primary source of income for people in Bihar, particularly in the states of Nalanda, Muzaffarpur, and Purnia where the study took place, and plays a crucial role in both generating income and providing food security. The region has been increasingly affected by extreme weather events, particularly unpredictable rainfall, which has led to a steady decline in rice production.

New resilient-building farming techniques like System of Rice Intensification (SRI), a technique that requires less water, yet has the potential to increase yields, can help farmers adapt to climate change. However, SRI is a complex, multi-step, and labor-intensive technique not widely adopted among farmers in Bihar. At the start of the intervention, about a third of households knew about SRI, and 10 percent reported having implemented some form of it. Women are integral to farming in the region and farmed on average 1.8 acres of land and 638 kgs of rice in 2013 at the start of the intervention.

Digital Green is a non-profit organization created by Microsoft India focused on developing technological solutions to improve extension services. They created short how-to videos featuring local farmers implementing productive agricultural practices like SRI. The National Rural Livelihood Mission (NRLM), one of the largest poverty reduction programs in the world, run by the Indian Ministry of Rural Development and supported by the World Bank, established Jeevika, a state-funded NGO in 2011. Jeevika developed a network of women self-help groups (SHGs) where women met regularly in groups of ten to twenty members to engage with programming covering microcredit, nutrition, and agriculture, among others. Jeevika integrated agricultural extension services into the SHG structure, where extension officers offer advice and answer questions during group meetings.

Farmers receiving video training in Bihar, India in 2014

Photo: Digital Green

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Researchers partnered with Digital Green and Jeevika to conduct a randomized evaluation to test the impact of incorporating how-to videos into existing group-based extension services. Researchers randomly assigned 420 villages into five groups where all villages were offered the same information on three SRI techniques including seed treatment, nursery bed preparation, and transplantation, yet through different mediums:

1. *Video group (70 villages, 420 farmers)*: Farmers were offered group agricultural extension by locally hired facilitators that incorporated a video screening about SRI featuring female protagonists from the same castes as the farmers to make the content more relatable.
2. *Self-efficacy video group (70 villages, 420 farmers)*: Farmers were offered the same extension services and video screening about SRI. Additionally, this group's video included a message about improving self-efficacy, or the confidence in their ability to independently carry out the steps in SRI to support the women to feel capable of implementing a more complex farming technique.
3. *Labor cost video group (70 villages, 420 farmers)*: Farmers were offered the same extension services and video screening about SRI. Additionally, this group's video included a message on labor costs required to implement the steps in SRI to reduce hesitancy among women to invest in the increased labor required.
4. *Self-efficacy + labor cost video group (70 villages,420 farmers)*: Farmers were offered the same extension services and video screening about SRI. This group's video included both a message to improve farmers' self-efficacy and on the expected labor costs.
5. *Comparison group (120 villages, ~420 farmers)*: Farmers were offered group agricultural extension services that incorporated SRI training with a locally hired facilitators but no video screening.

Farmers were offered the variations of extension services between June and August 2014 and June and August 2015 . Researchers randomly surveyed approximately six women in each village at four different times between May 2014 to March 2016. They collected information including SRI adoption, yields, and labor and input expenses, among others, and estimated farmers profits by multiplying the output stored by the farmer by the retail price and adding the amount of output sold by the self-reported farm gate price it was sold for.

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While farmers offered the videos did not increase their adoption of SRI practices, they increased their rice yields and estimated profits. The video model also demonstrated cost-effectiveness relative to the in-person only extension.

Adoption of SRI: Farmers who were offered the videos showed no difference in adoption of SRI practices compared to those who received the standard extension training after one year. Researchers posit there was no increase in adoption because the DG and control groups were both introduced to the SRI technique. Furthermore, the survey did not allow for partial adoption of SRI. SRI has several steps, and it is likely that many farmers implemented some but not all SRI steps.

Yields: After one year, farmers yields did not increase in any of the four video groups when researchers used a conventional statistical model. However, researchers acknowledged the estimates are imprecise using this model. When researchers account for the large range of yields across farmers using an alternate statistical method (Bayesian approach) , farmers offered the regular video message increased their yields by 228 kg/acre; farmers offered both additional self-efficacy and labor messages increased yields by 156 kg/acre (a 12-18 percent increase). When only the self-efficacy message was added, farmers' yields were not likely to increase, demonstrating the complementarities between the two messages. Researchers posit that the self-efficacy message alone could result in farmers being overly confident and less prepared without receiving the messaging on the labor costs.

Estimated profits: Similar to yields, the results from the conventional statistical model find that farmers offered the videos did not increase their profits. However, using a Bayesian approach, after one year, farmers who were offered the regular video and both additional messages increased their profits by 9 percent and 24 percent, respectively. Labor and input expenditures : Both one and two years after the intervention, farmers who were offered the videos did not spend more days on cleaning, pesticide, threshing, and harvesting, all expected to increase with SRI.

Cost-effectiveness: Using both the standard and Bayesian approaches, the video without the additional messaging and the video with both additional messages was cost-effective relative to the in-person only extension. Specifically, the videos cost 96 Rupees (US$1.60) per farmer while the benefits per farmer vary between 5224 - 590 Rupees (US$84-9) for the regular videos, and between 2386 -1620 Rupees (US$38-26) for the videos with both additional messages, depending on the model used. These calculations demonstrate that a farmer's average additional profit as a result of the video model was about 16 times greater than the additional cost of implementing the video approach.

Digital Green, in collaboration with government and NGO partners, has since scaled the video model throughout India and adapted it to twelve countries, reaching 8.1 million small-scale farmers to date. To learn more, see the evidence to policy case study.