



MRR INNOVATION LAB PROJECT IN BRIEF

CROP INSURANCE INNOVATIONS TO BUILD TRUST IN FINANCIAL SERVICES FOR AGRICULTURE IN ETHIOPIA

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Project Partners
Bahir Dar University, Ethiopian Institute for Agricultural Research, International Food Policy Research Institute (IFPRI), World Food Programme R4 Rural Resilience Initiative

Development Innovation
Digital innovations to improve agricultural index insurance

Commodity
Multiple

Targeted Population
Small-scale farmers

Country/Location
Ethiopia

Timeline
2022-2025

Funding
\$749,983 (USAID)

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Climate change increasingly exposes small-scale farming families to hazards such as drought, heat, floods, hail, pests and diseases.¹ Agricultural index insurance could help manage these risks, but in some areas may fail to pay accurately. MRR Innovation Lab researchers have partnered with the R4 Rural Resilience Initiative (R4) in Ethiopia to test innovations that improve the accuracy and responsiveness of index insurance, including crop simulations that incorporate farmers' management practices and a picture-based insurance that contributes to fail-safe audits.

The Challenge

In 2011, the World Food Programme (WFP) and Oxfam America launched the R4 Rural Resilience Initiative (R4) to enable vulnerable agricultural families to increase their food and income security with tools to manage climate-related risks. At the center of R4 efforts is agricultural index insurance that triggers payments for estimated crop losses based on rainfall measured by satellite.

Index insurance, which has been scaled in developing countries for nearly 20 years, makes insurance payouts cheap, fast and objective. Rather than base payouts on verified losses, index insurance triggers payments based on a remotely measured index of conditions that affect crop yields, such as rainfall or weather.

One challenge for index insurance programs like those implemented by R4 is known as downside "basis risk," which is the chance a contract will not pay out accurately for losses.² Basis risk is particularly difficult in countries such as Ethiopia, where the topography of the areas in which it works limits how well satellite measures of rainfall can be used to estimate losses.

Another challenge for R4 is how to optimize its index insurance for farmers who adopt farming practices that reduce their risk of losing crops to drought. R4 offers to pay the cost of insurance

RESEARCH INNOVATION

A major component of this project is to reduce the costs and improve the affordability of agricultural index insurance. This includes identifying how farmers' risk-mitigating actions affect their risk exposure, and under which types of weather events farmers will no longer need payouts. It is critical, however, that the insurance contract still pays out when farmers suffer losses. If farmers pay their insurance premium without receiving a payout for crop damage or if they receive payouts when they did not suffer actual losses can both reduce the potential welfare impacts of insurance and lower farmers' demand for it.¹

With a picture-based insurance (PBI) audit, farmers or agents regularly submit geo-referenced smartphone pictures of insured crops, from planting to post-damage. The resulting time-lapse provides the insurance provider "eyes on the ground" to verify losses and pay affected farmers if the index did not trigger. Ground images complement other indices and could help improve tangibility and validation of products that use satellite imagery to settle claims.²

¹ Clarke, D. 2016. "A theory of rational demand for index insurance." *American Economic Journal: Microeconomics*.

² Ceballos, F., et al. 2019. "The feasibility of picture-based insurance (PBI): Smartphone pictures for affordable crop insurance." *Development Engineering*.



premiums if farmers contribute to public works projects, such as planting trees and watershed management, that reduce drought risk community-wide and reduce the frequency at which payouts need to be made. This could lower premiums but could also increase downside basis risk, since the product would trigger payouts less often, including in some bad years.

Research Design

MRR Innovation Lab researchers are testing multiple approaches to improving the accuracy and responsiveness of R4 index insurance for small-scale farmers in Ethiopia. Biophysical crop simulations will make it possible to quantify the effects of farmers adopting risk-reducing practices. A picture-based insurance (PBI) approach that crowd sources smartphone images of insured crops will contribute to seasonal crop monitoring and can be used to settle claims if the index does not trigger a payout.

The project will use a randomized controlled trial (RCT) to evaluate the impacts of these innovations. The RCT includes 1,280 households in 80 villages in the Amhara region of Ethiopia. Forty villages each are randomly assigned to one of two groups.

The first group will be exposed to the regular R4 program. The second group receives the same program, but now the index insurance design will incorporate farmers' adoption of risk-reducing practices and picture-based insurance to support a fail-safe contract. Within both groups, randomly selected households are encouraged to sign up for mobile banking to receive insurance payouts. Mobile banking can significantly speed up those payouts, which farmers could use to reduce their total crop losses during the season.

The team is studying farmers' take-up of the newly designed index insurance, both in terms of willingness to participate in the R4 insurance-for-work program, and to pay the cost of insurance premiums. The project is also generating insights

on how to design gender-responsive insurance. Insurance coverage is often found to be lower among women, who face additional risks outside of agriculture, such as health risks in fertility and childcare.

Development Impact

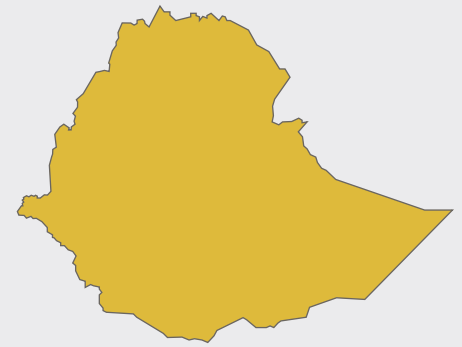
This project seeks to address a number of objectives in the USAID Country Development Cooperation Strategy for Ethiopia. These include objectives related to disaster risk management (DO1), resilience among vulnerable populations (DO2), private-sector-led economic growth (DO3) and essential service delivery to women and girls (DO4).

Agricultural productivity improvements, which can be made possible by implementing high-quality agricultural index insurance, are key to achieving Feed the Future goals of eliminating hunger and extreme poverty. With lower basis risk and more timely payouts, index insurance can enable farmers to increase their use of fertilizer, plant new seed varieties and adopt complementary farm management practices. Such changes in practices can perhaps make smallholder farming profitable, which can then ensure long-term food security.

This study will also ensure that R4 insurance products meet the needs of both men and women. R4 targets 30-40 percent of program participants to be female-headed households. In R4 savings and credit components, at least half of program participants must be women. This study will show how R4 can promote women's empowerment particularly in access to and decisions on credit and leadership.

¹ Porter, J.R., et al. 2014. "Food security and food production systems." Climate Change 2014: Impacts, Adaptation, and Vulnerability. Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

² Hill, R.V., et al. 2016. "Demand for a simple weather insurance product in India: theory and evidence." *American Journal of Agricultural Economics*.



Development Opportunity: Ethiopia

- 117.9** : Population in millions (2021)
- 27%** : Poverty rate at \$2.15/day, 2017 PPP (2015)
- 91.7** : Rural population in millions (2021)
- 67%** : Total employment in agriculture (2019)
- 25%** : Prevalence of undernourishment (2020)
- 36.8%** : Prevalence of stunting for children under 5 years (2019)

Source: World Bank

Ethiopia has reached its limits in enhancing agricultural productivity by land expansion.¹ In 2017, Ethiopia adopted a National Financial Inclusion Strategy (NFIS), in part to encourage the use of digital technologies to provide financial access to rural families. Agricultural productivity improvements are key to achieving Feed the Future goals of eliminating extreme poverty.

Improvements in agricultural productivity involve the monetary and time investments of increasing fertilizer use, planting new seed varieties and adopting complementary farm management practices. Such changes can make smallholder farming profitable and commercially viable, which can then ensure long-term food security. In addition, as farmers adopt new seeds and increase their use of fertilizer, input markets would respond to increases in demand.

¹ USAID 2019

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