



## MRR INNOVATION LAB PROJECT IN BRIEF

# PROMOTING RESILIENT AGRICULTURAL GROWTH WITH AREA REVENUE INDEX INSURANCE IN GHANA

### Lead Principal Investigator

Ashish Shenoy, UC Davis

### Project Partners

The Catholic University of America,  
Chr. Michelsen Institute, Rhema Tidings,  
University of Alabama, University of Ghana

### Development Innovation

Agricultural revenue index insurance

### Commodity

Maize, soybeans, cowpeas and groundnuts

### Targeted Population

Small-scale farmers and agricultural  
laborers

### Country/Location

Northern Ghana

### Timeline

2022-2024

### Funding

\$749,941 (USAID)

Agricultural index insurance can provide a critical safety net in developing countries for households at risk of losing their livelihoods to drought, flood and other climate-related shocks. However, existing insurance contracts overlook the risk of shifts in crop revenues. This project in Ghana is bundling loans to buy agricultural inputs like improved seeds and fertilizer with a new index insurance contract that covers crop price and revenue risk. The team is measuring the bundle's impacts on farm and non-farm households in terms of agricultural production, food security and wellbeing.

### The Challenge

Agricultural risk can have devastating effects on rural families in developing countries, making it difficult for them to break the cycle of poverty. Risk can reduce investments in profitable technologies and suppress both demand for and supply of credit. In the wake of a disaster, poor households often are forced to cope by liquidating their productive assets. If they limit meals and other forms of consumption, a disaster can have long-term effects on the nutrition, health and the education of their children.

One solution for this risk is insurance. Over the past 30 years, weather-based index insurance has been heavily marketed and studied throughout the developing world, and numerous studies have documented their positive effects on a range of development outcomes. These include increasing the adoption of advanced productive technologies, improving access to credit and helping families to better cope with shocks.<sup>1</sup>

Despite these benefits, this first generation of index insurance contracts has been met with surprisingly low demand largely due to high "basis risk," which is the likelihood a contract will fail to pay out accurately for losses.<sup>2</sup> Despite significant quality improvements in recent years, even the most reliable production-based contracts leave

### RESEARCH INNOVATION

Fluctuations in crop and food prices are a significant source of risk with wide-reaching consequences. If the risk is sufficiently high households may consume what they produce to avoid paying high prices.<sup>1</sup> Local risk sharing mechanisms are ineffective at dealing with price risk because it is almost exclusively covariant.

Comprehensive insurance can help protect producers but it leaves out those indirectly affected by agricultural risks, including landless laborers and net consumers. Insurance may exacerbate conditions for those left out of the market if well-insured farmers take on more risky technologies. For instance, agricultural wages in India are more sensitive to local rainfall when rainfall-based index insurance is available to producers.<sup>2</sup>

This project addresses these gaps with a comprehensive set of risk-management tools for traditional producers as well as a wider range of community members, including landless laborers and net consumers of staple crops. This could make it possible to address rural poverty and improve resilience across entire communities.

<sup>1</sup> Fafchamps, M. 1992. "Cash Crop Production, Food Price Volatility and Rural Market Integration in the Third World." *American Journal of Agricultural Economics*.

<sup>2</sup> Mobarak, A. M., et al. 2012. "Selling formal insurance to the informally insured." *Economic Growth Center Working Paper*.

FEED THE FUTURE INNOVATION LAB  
FOR MARKETS, RISK & RESILIENCE

[basis.ucdavis.edu](http://basis.ucdavis.edu)



households exposed to other important sources or variation in income such as price risk. Risk in both prices and local production is also critical to rural non-farming families whose incomes depend heavily, albeit indirectly, on local agricultural systems.

## Research Design

An MRR Innovation Lab research team is bundling agricultural index insurance with agricultural input loans and testing the impacts of these interventions with a randomized controlled trial (RCT) in Northern Ghana. Participants include small-scale farming households as well as households who indirectly rely on stable agricultural prices, such as retailers and agricultural laborers without their own land to farm.

The team is testing three different types of agricultural index insurance. The first is an area-yield index insurance contract that covers negative shocks to local production, an extension of what has previously been offered by the Ghana Agricultural Insurance Pool (GAIP). This contract makes payments based on a district-level average crop yield index measured using crop cuts. Second is a price insurance contract that insures against price volatility in local markets. Third, a revenue insurance contract combines price and yield triggers designed to protect against income losses stemming from either source.<sup>3</sup>

The RCT includes 3,960 farmers and an additional 3,960 who are not farmers. To measure the project's impacts, the 132 villages included in the study are divided into four groups that receive:

- T1: Price and yield data, group loans bundled with area-yield insurance with the option to purchase additional area-yield insurance.
- T2: Price and yield data, group loans are bundled with both area-yield and price insurance with the option to purchase additional area-yield insurance, price insurance or both.
- T3: Price and yield data, group loans

bundled with revenue (combined price-and-yield) insurance with the option to purchase additional revenue insurance.

- Control: Price and yield data alone.

The RCT will measure impacts in a number of areas. These include impacts on agricultural production, household income and wellbeing, local market spillovers and potential insurance demand among non-farmers. The analysis will also measure resilience based on productivity compared to households in control-group villages.

## Development Impact

The development impacts of this project will be to introduce more comprehensive insurance products to the rural Ghanaian market, to expand the scope of the market beyond producers to include other vulnerable communities, and to increase overall agricultural output by alleviating the need for farmers to self-insure with inefficient technological choices.

This project fits squarely into USAID and Feed the Future objectives. Ghana is one of the countries of focus specifically identified by the Global Food Security Strategy. The project takes place in districts in the Northern, North East, Upper West, and Upper East regions that have been designated high-priority zones of influence in the country plan. The insurance covers crop value chains identified as high priority. Expanding the project to include agricultural laborers and net food buyers will provide evidence on how to protect households with the lowest asset wealth and therefore the smallest internal capacity to deal with shocks.

<sup>1</sup> Janzen, S. A., et al. 2018. "After the drought: The impact of microinsurance on consumption smoothing and asset protection." *American Journal of Agricultural Economics*.

<sup>2</sup> Clarke, D. 2016. "A Theory of Rational Demand for Index Insurance." *American Economic Journal: Microeconomics*.

<sup>3</sup> Flatnes, J. E., et al. 2019. "Fail-safe index insurance without the cost: a satellite based conditional audit approach." Working Paper.



## Development Opportunity: Ghana

- 29.8** : Population in millions (2018)
- 13.3%** : Poverty rate at \$1.90/day, 2011 PPP (2016)
- 13** : Rural population in millions (2018)
- 33.9%** : Total employment in agriculture (2019)
- 6.1%** : Prevalence of undernourishment (2017)
- 18.8%** : Prevalence of stunting for children under 5 years (2015)

Source: World Bank

Ghana's strong economic growth over the past two decades helped cut the country's poverty rate from 56.5 percent in 1991 to 13.3 percent in 2016. Agriculture is the main source of livelihood for the majority of the country's poorest families and provides a critical source of employment. Ghana is particularly reliant on rain-fed smallholder agriculture as a critical source of domestic food supply, with domestic production of cereals providing 60 percent of national consumption needs.<sup>1</sup>

In northern Ghana, where small-scale producers of staple crops dominate the agricultural system, rural populations and poverty rates are highest. Northern Ghana is also particularly vulnerable to unpredictable rainfall. Like neighboring countries in Africa's Sahel region, northern Ghana is experiencing increasingly erratic rainfall that threatens livelihoods.

<sup>1</sup> Ghana Statistical Service. 2016.

*This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID) cooperative agreement 7200AA19LE000004. The contents are the responsibility of the Feed the Future Innovation Lab for Markets, Risk and Resilience and do not necessarily reflect the views of USAID or the United States Government.*

FEED THE FUTURE INNOVATION LAB  
FOR MARKETS, RISK & RESILIENCE   
[basis.ucdavis.edu](http://basis.ucdavis.edu)

2133 Social Sciences & Humanities  
University of California, Davis  
1 Shields Avenue | Davis, CA 95616  
(530) 752-7252 | [basis@ucdavis.edu](mailto:basis@ucdavis.edu)

[www.feedthefuture.gov](http://www.feedthefuture.gov)

The Feed the Future Innovation Lab for Markets, Risk and Resilience generates and transfers knowledge and innovations that promote resilience and empower rural families, communities and markets to share in inclusive agricultural growth.