

Disseminating Innovative Resources and Technologies to Smallholder Farmers in Ghana: Results of the Weather Forecasting Program



Photo: Mohammed Ibrahim

In Ghana, and many other countries in sub-Saharan Africa, farmers invest little in inputs, such as improved seed, fertilizer, and other chemicals to improve their yields. One reason for this may be risk associated with factors out of their control, such as weather. As part of the “Disseminating Innovative Resources and Technologies to Smallholder Farmers” project, researchers partnered with a weather forecasting firm to test the impact of providing daily short-term weather forecasts by SMS.

Key Findings

After 1 year:

- Farmers who received the forecasts, as well as farmers living nearby, used this information to change their behavior, timing planting and chemical application for days when light rain was forecast.
- However, there was no discernable impact of the service on farmers’ overall profits.
- Overall, the results suggest that forecasts are inexpensive and effective at changing farmer behavior, but they were not sufficient to increase overall profits alone.

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Timeline: 2014-2018

Study Sample: 3,240 households in 162 farming communities in Northern Ghana

The Challenge

Smallholder farmers in Ghana and around sub-Saharan Africa often have to manage scarce resources and contend with many risks. Among the many factors out of their control is how much rainfall they may get.

Not knowing if or when rains will come may limit farmer's ability or willingness to invest their limited

resources into inputs, such as fertilizer or improved seeds. While farmers do adjust their behavior in response to rainfall over the course of a growing season and try to match their cultivation practices to conditions, their ability to do so is limited. Improved information about weather could allow them to better optimize their behavior and improve yields.

The Program & Evaluation

The research team partnered with Ignitia Ghana to test the impact of their highly accurate daily local forecasts of weather for the next 48 hours on farmers' planting and application of fertilizer, as well as profitability.

As part of a more comprehensive evaluation of a set of other agricultural interventions in Northern Ghana, researchers collected plot level input and output data from a panel of farmers between the 2013 and 2016 farming seasons. The sample included 3,236 farm households in 162 communities spread across the Northern Region.

From the 162 sample communities, 108 were randomly assigned to get weather forecasts, while 54 served as comparison communities. Within each community that received forecasts 20 households were chosen, out of which 10 were randomly chosen to directly receive the SMS messages with forecast information. The other 10 households in the forecast communities remained as comparison households in those same communities. This allowed the researchers to evaluate the impacts of receiving weather forecasts directly and of being in a community with others who were.

Preliminary Results

Note: These results are preliminary and may change after further data collection and/or analysis.

Overall, the forecasts effective at changing farmer behavior, and they were accurate and inexpensive to administer. However, on their own, they were not sufficient to increase overall profits.

Forecasts: Independent calculations show that 83 percent of the one day ahead forecasts were correct; 82 percent of the two-day forecasts were correct as well.

Farmers' response: On days when rain was forecast, farmers in communities without access to forecasts were less likely to plant or apply chemicals; this response indicates that even without formal forecasts, farmers anticipate rainfall, especially heavy rainfall. However, in communities with forecasts, both those who got the forecasts and those around them were more likely to plant or apply chemicals. While light rainfall is good for planting and fertilizer application, heavy rainfall is not. It may be that in the absence of forecasts, farmers trying to avoid planting before a heavy rainfall also miss the optimal light rainfall because

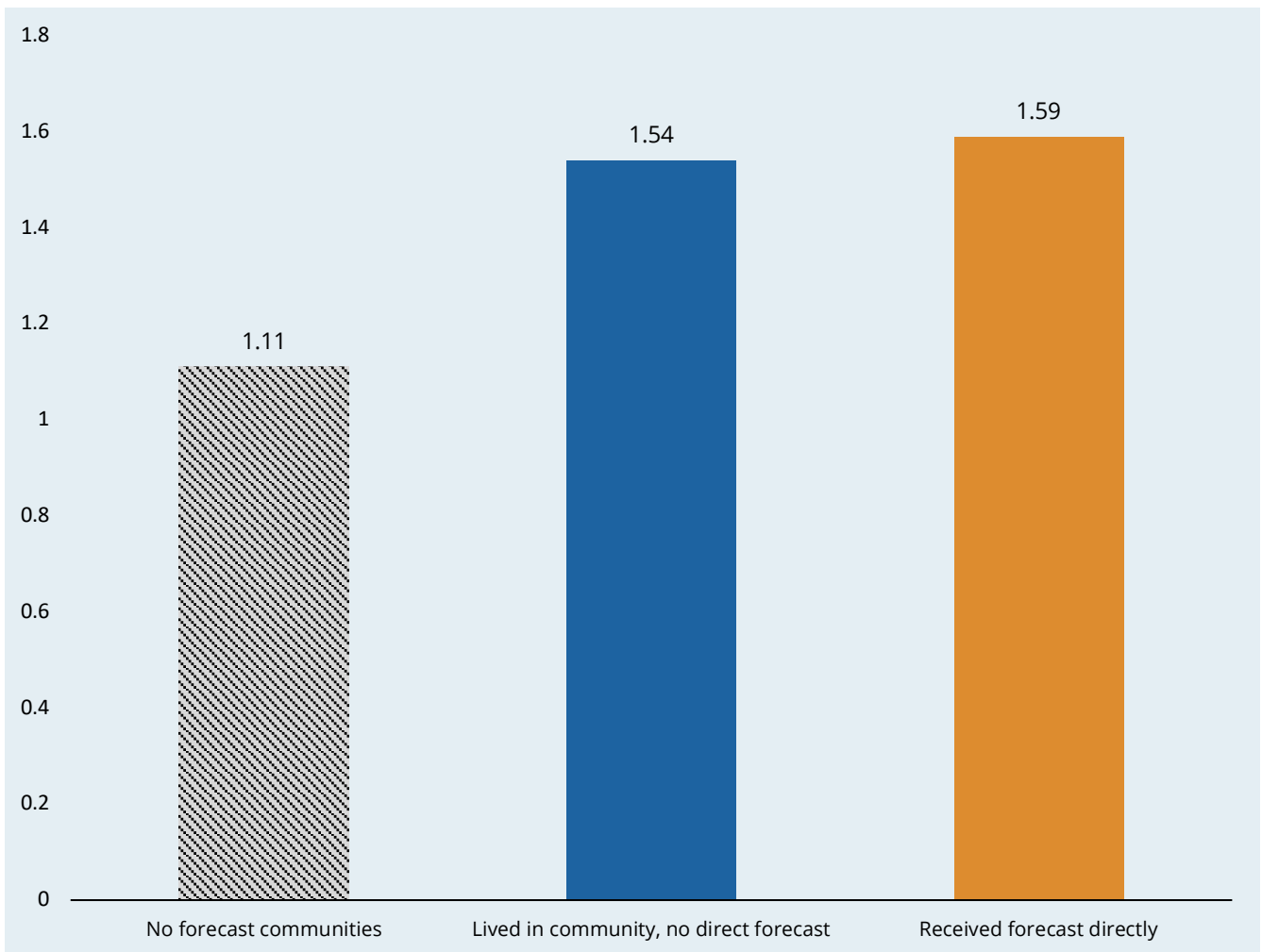
they have difficulty forecasting light rain themselves. Because the responses are nearly identical for farmers who actually received the forecasts and others in their community, the results suggest that information spreads quickly among farmers in the same communities—likely within hours.

Given that the alerts changed behavior and are inexpensive to administer, they appear to hold promise; further research should explore how they

can be harnessed, possibly with other interventions, to improve farmers’ yields and profits.

Profitability: Consistent with farmers’ behavior, profitability was higher when planting was done on a day of light to moderate rain. In contrast, profits were lower when fertilizer or plant protection chemicals were applied on those days. Overall, the effects of the forecasts were too small to detect for the sample as a whole.

Figure 1: Likelihood of planting on a day when rain is forecast.



Conclusion

Forecasts were inexpensive and effective at changing farmer behavior. However, on their own, they were not sufficient to change overall profits.



Photos: Mohammed Ibrahim

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