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**Timeline**

2016-ongoing

**Sample Size**

570 villages, 395 fertilizer sellers, 1630 farmers

**Research Implemented by IPA**

Yes

# Market Linkages, Trade Costs and Technology Adoption in Rural Tanzania

## Abstract

Agricultural yields for farmers in sub-Saharan Africa tend to be lower than the rest of the world, and African farmers tend to use fewer productivity-enhancing agricultural technologies like fertilizer. This may be because of poor access to markets for farmers in remote rural areas, leading to higher delivered prices for inputs, lower net prices for output, and therefore, lower profitability of yield-enhancing technologies. To understand the severity and magnitude of these barriers to technology adoption faced by rural farmers, researchers conducted surveys along the entire supply chain of fertilizer and maize in all of the 570 villages in the Kilimanjaro region of Tanzania. They found that farmers in the most remote areas were nearly 50 percent less likely to use fertilizer and 36 percent less likely to have access to maize-buying intermediaries. High travel costs emerge as an important contributing factor: accounting for these costs, 20 percent of the villages face travel cost-adjusted fertilizer prices that are at least 30 percent higher than the lowest-cost village; for 40 percent of the villages, the best travel cost-adjusted maize price is 30 percent lower than the best price in the region.

## Policy Issue

Farmers in sub-Saharan Africa have significantly lower average crop yields than the rest of the world<sup>1</sup>. Research has shown that fertilizer, which few African farmers use, can improve yields<sup>2</sup>. However, the adoption of fertilizer is affected not just by its potential increase in yields but also by its relative cost, which has been less studied. Farmers in rural areas may

face higher relative prices for fertilizer because of barriers to market access, such as higher costs of transportation and fewer options of where to purchase products. Further, these farmers may also be limited in their access to output markets and therefore, the price that they can receive for their harvest. This suggests that not only have the relative costs of fertilizer been understudied, but also the monetary returns may have been mismeasured, by conflating them with yield returns. This study seeks to quantify the relationship between access to input and output markets and fertilizer adoption in the Kilimanjaro region of Tanzania.

## Context of the Evaluation

This study took place in the Kilimanjaro region of Northern Tanzania. Virtually all fertilizer in the region is imported through the port of Dar-es-Salaam, and then distributed to regional hubs, such as the town of Moshi in Kilimanjaro. Farmers buy inputs at agro-input retailers – “agrovets”- in their local market. Access to markets varies greatly amongst farmers in the region, with some living just a few kilometers away from retailers in the city of Moshi while others live on the far side of the Pare Mountains, hundreds of kilometers away from population centers. Only 55 percent of farmers in the region use fertilizer, and those who do only use about one third of the FAO-recommended amount on average. Agricultural productivity appears very low among farmers in the region, with the average harvest valued at about \$180, a yield too low to survive on alone.

## Details of the Intervention

*[Note: This is not a randomized controlled trial.]*

Researchers conducted a study of the fertilizer and maize supply chains in the Kilimanjaro region to investigate barriers to market access for rural farmers, with a special focus on fertilizer adoption.

The first part of this study was a survey of 395 agrovets in the region. Surveyors asked these sellers questions about the price and quantity of fertilizer sold as well as their wholesale costs of acquiring stock from the importer, in order to estimate the markup that each agrovet applied to their product.

Researchers also conducted a survey of farmers from a randomly selected set of 97 villages in the region. On average, surveyors interviewed 18 farmers in each village. They asked questions about fertilizer use and prices, maize sales, harvest output, and related questions.

Surveys were also conducted with maize-sellers in all markets to create a retrospective, monthly panel of maize buying and selling prices.

Last, researchers estimated the distance, duration, and costs of transportation between all villages and markets as well as major urban centers in the region using a combination of field

observations, interviews with public transportation operators, and Google Maps road data.

## Results and Policy Lessons

Results forthcoming.

## Sources

[1] World Bank. 2017. *Enabling the Business of Agriculture 2017*. Washington, DC: World Bank.

[2] Duflo, Esther, Michael Kremer, and Jonathan Robinson. 2008. *How high are rates of return to fertilizer? Evidence from field experiments in Kenya*. American Economic Review 98 (2): 482-488

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