



## The impact of agricultural technology adoption on farmer welfare in Uganda and Tanzania

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### Key messages

- New agricultural technology can improve the welfare of the rural poor in both Uganda and Tanzania.
- Uptake among smallholder farmers remains low due to a lack of information and credit, which should be addressed.
- Support for smallholder farmers in terms of access to information and credit should encourage agricultural technology adoption.

### Agricultural growth insufficient to address poverty in East Africa

Accounting for 75% of the labor force, 43% of GDP and 60% of exports in East African states, the agricultural sector is arguably the most important engine for achieving economic growth, development, job creation, and poverty reduction in East Africa.

Nearly 70% of the East African population, and about 90% of the region's poor, rely heavily on agricultural production. Recognizing this, for around 40 years many African countries have been implementing reforms of their agricultural sectors aiming to ensure high, sustainable economic growth, food security, and poverty reduction. Unfortunately, agricultural sector growth has remained insufficient to address poverty, achieve food security, and lead to sustained economic growth.

Technology adoption (time-saving equipment, modern seeds etc.) has been touted as the key to improving productivity and addressing poverty and food insecurity. However, as in the rest of sub-Saharan Africa, East Africa has low adoption rates of agricultural technology and smallholder farmers remain poor and largely concentrated in rural areas.

Currently, smallholder farms account for around 75% of agricultural outputs, with average farm sizes of 2.5 hectares producing mainly for home consumption and using traditional technologies. Furthermore, less than 4% of the total land area is irrigated. As such, East African agriculture is characterized by low productivity.

While low adoption rates might seem irrational when looking at promised yields, they may well be a result of the various constraints farmers face such as low levels of education and lack of credit.

Local researchers sought to examine and understand the constraints behind the low adoption rate of agricultural technology in East Africa as well as the impact of adoption on household welfare.



## Data and methodology

The research team analyzed nationally representative panel data from the World Bank's Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) for Uganda and Tanzania from 2005 to 2015. This data source is particularly rich, including detailed information on agriculture as well as demographics such as employment, income, consumption, assets, and nutrition.

The team used both a probit and linear probability model to identify the determinants for using new seed varieties, and endogenous switching regression to assess the impact of technology on welfare. In this study, “adopters” are classified as farmers who planted improved seeds in any crop whereas the “non-adopters” are farmers who used traditional seeds. Welfare is measured through consumption of foodstuffs, energy, clothing, medical bills, education and other social contributions.

## Key findings

**The team's analysis indicates that using improved seed varieties can help households, particularly those in rural areas, increase their level of wellbeing and that the adoption rate of improved seed varieties is higher in Uganda than in Tanzania.**

The findings indicate that farmers who plant improved seed varieties get more yields than non-adopters which may explain why adopters also tend to have a larger active labor force than non-adopters. However, average farm size in both countries tends to be smaller for adopters than non-adopters. This could indicate that new technology comes with extra cost, meaning that farmers cannot afford to cultivate as large an area. Accordingly, access to credit is also important for new technology adoption in both countries.

The results show that many farmers are slow to adopt new technology. This is attributed to farmers not being aware of the benefits new technology can provide, the technologies not being available at the time they are needed, or not being profitable due to land and labor allocation.

In both Tanzania and Uganda, adopters are relatively younger than non-adopters, suggesting that as farmers age they are less open to adopting new technology.

Access to non-farm activities, farming as the main economic activity, and availability of improved crop varieties increases the likelihood of new technology adoption in Uganda, but not in Tanzania. In both countries, belonging to a farmers' association and contact with government agencies increase the likelihood of a farm adopting modern agricultural technology.

Average consumption expenditure is higher among adopters than non-adopters in both countries, indicating that the level of welfare among adopters is higher than among non-adopters.

In both countries, the determinants for adopting new seed varieties include farm size, contact with government agencies, number of improved seed varieties, and access to credit. Factors such as age, distance to market, family size, farmer association membership and access to the media also contribute but significantly more so in one country than the other.



## Implications for policy

The results of this study identify the determinants for adoption of new agricultural technologies in terms of improved seed varieties in Tanzania and Uganda. By looking at the impact the use of improved seed varieties has on household welfare, the study provides fresh insights that can assist with setting priorities and guiding policymakers.

While this study shows that the use of improved seed varieties has the potential to help households – particularly those in rural areas – to raise their levels of welfare and reduce poverty, it also shows that many farmers are slow to adopt new technology. As such, it is vital that this new information on the determinants of technology adoption is used to encourage greater uptake. **This may be achieved through providing better information to farmers regarding the possibilities the new technologies offer such as more yields and hardier crops.** Similarly, **access to credit must be assured so that farmers are able to purchase new technologies.**

Improving access to new agricultural technology not only improves welfare for the smallholder farmer, but can also have spillover effects for the rural poor as greater productivity leads to a drop in price for essential items such as maize and rice.



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