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Quasi-experimental impact evaluation (ex-post) of AD2M

Policy Brief

Background

Farmers in western Madagascar live in an arid region that makes it difficult to survive on their own production. As in many other regions in less developed countries, there is a big initiative to improve agricultural production. Agricultural development is particularly important for a country like Madagascar, with 77.8% of the population living in rural settings (Rasambainarivo and Ranaivoarivelo, 2003). In such a dry region, it is important to understand whether large-scale investments in irrigation infrastructure can improve outcomes for smallholder farmers. AIR and Lead Analytics' evaluation examined the impacts of irrigation on crop yields, cropping in multiple seasons and improved agricultural practices. We identified these outcomes as key indicators of improved agricultural livelihoods.

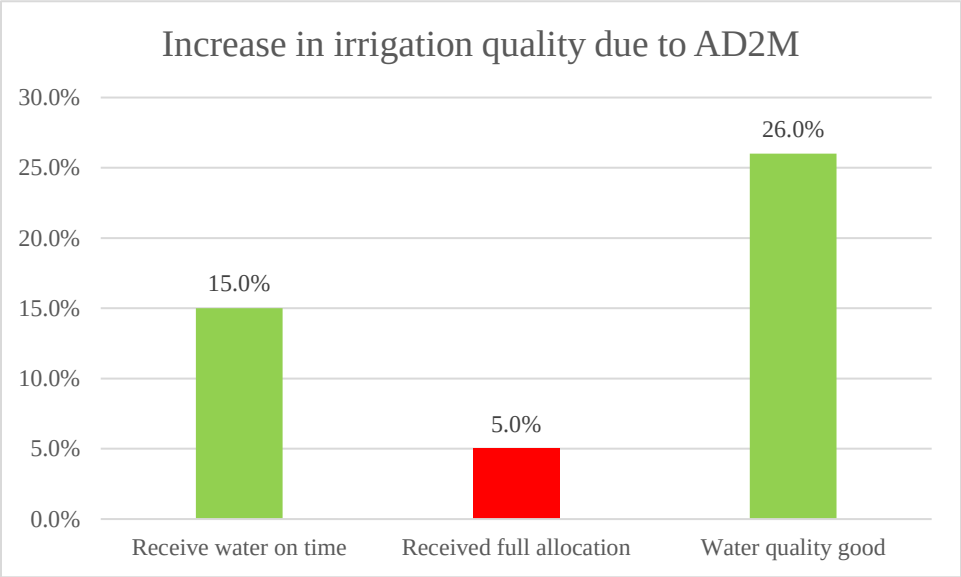
Appui au Développement du Menabe et du Melaky (AD2M) farmers had the opportunity to change the way that they grow crops. The programme created new irrigation infrastructure in areas that had been unirrigated and rehabilitated existing irrigation infrastructure when possible. The irrigation allowed farmers to use better agricultural techniques which they were trained on through AD2M. In theory, improved irrigation infrastructure should improve water flow to crops during the primary growing season and could support a second growing season if the water supply is used more efficiently. We would expect crop yields to increase with improved water flow and improved agricultural practices.

Evaluation findings

Intermediate Outcomes

AD2M was effective at improving the delivery of water. Farmers in AD2M communities were 15 percentage points more likely to report receiving irrigated water at the appropriate point in the growing season. The timing is important because crops can fail if water is unavailable at key points in the growing cycle. Farmers also were 26 percentage points more likely to report that their irrigated water was of good quality and free of sediments. Access to irrigation can only improve farming outcomes if it is of sufficient quality.

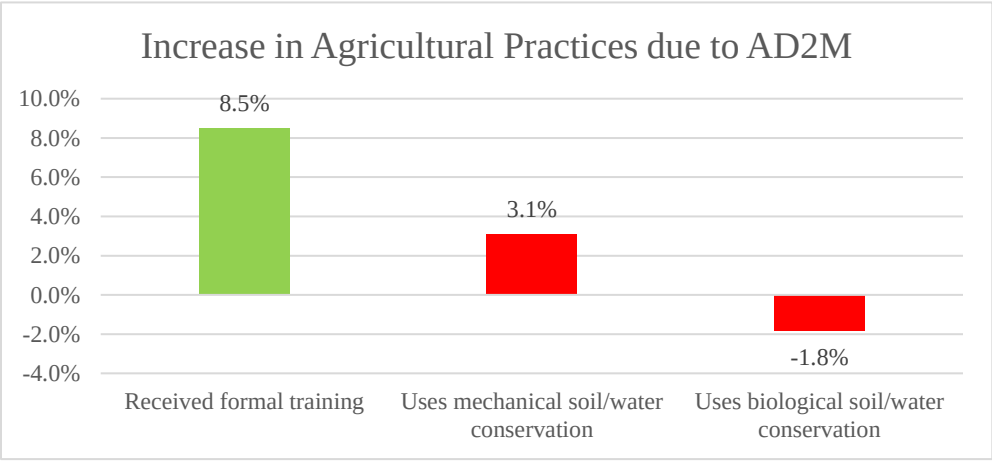
Figure 1: Irrigation quality



Note: Green results are statistically significant while red results are insignificant

Our findings suggest that beneficiary farmers did receive more agricultural training but that they did not always maintain the practices on which they were trained. Farmers in AD2M areas were 8.5% more likely to receive formal agricultural training. They were more likely to use pesticides (5.6%) and herbicides (3.4%). However, Figure 2 shows that they were no more likely to use soil conservation of any kind.

Figure 2: Agricultural practices



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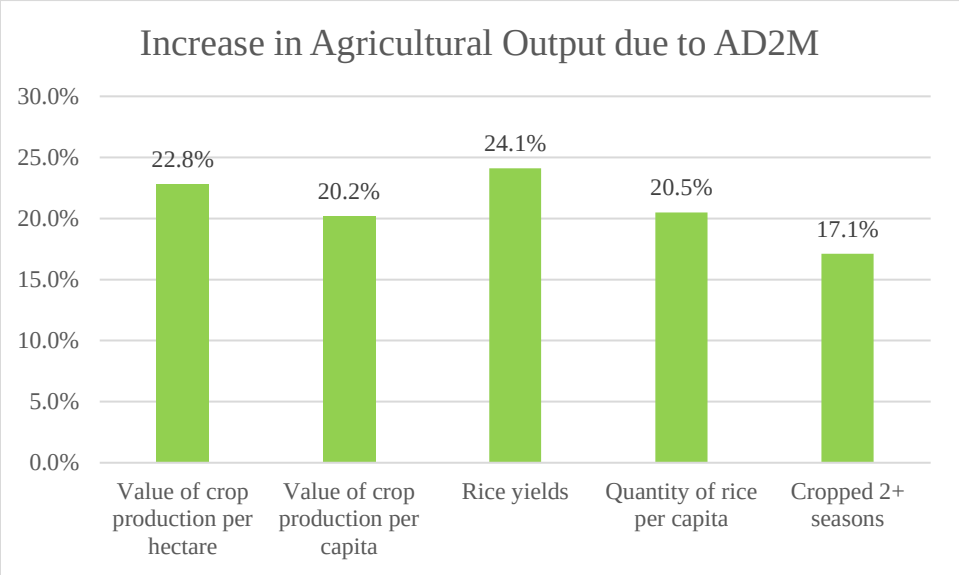
On the negative side, some respondents reported increased tension as a result of AD2M. There appears to have been a division between farmers that cooperated with AD2M and those that did not, as well as a general mistrust of WUA members among non-WUA farmers. Despite the tensions between AD2M, farmers in intervention areas were 10% more likely to engage with extension workers. So, farmers still felt it worthwhile to engage with extension workers.

Main Outcomes

We found there were meaningful improvements to the AD2M project's beneficiaries' agricultural productivity. Annualised rice yields were estimated to be about 26% greater for treated versus control households, whereas annualised total value of crop production per hectare was estimated to be about 23% higher for treated versus control households. Focus group discussions with farmers revealed that they primarily attribute the increased rice production to improved irrigation and adoption of the row-cropping method. Evidence also suggested that most of the gains in the treated communities came from the ability to crop in the second season; treated households were much more likely to crop more than one season. AD2M also improved access to extension services and trainings, as well as the use of purchased inputs. Finally, treated households also worried less about finding food than did untreated households.

Figure 3: Agricultural Output



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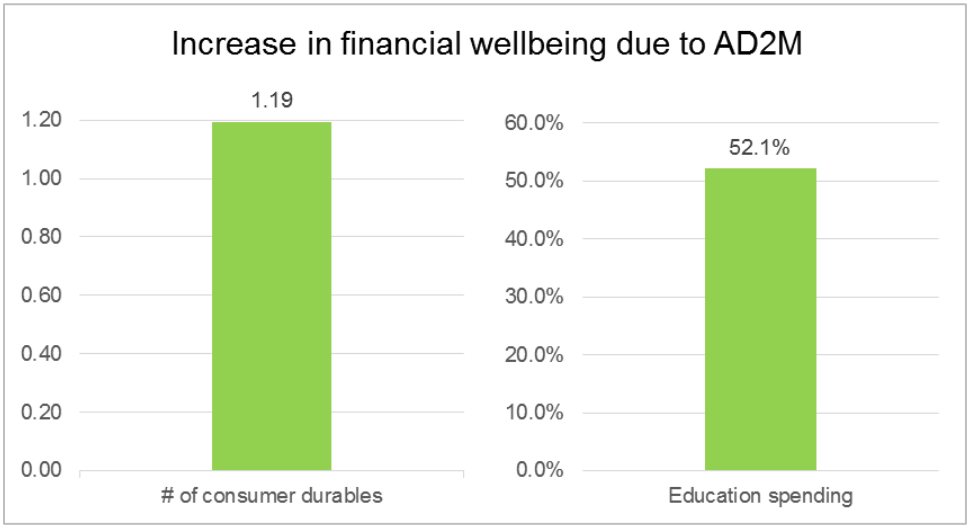
Results suggest that household welfare increased due to the transfer. The value of crop production per capita increased by 13.6% for AD2M beneficiaries. Agricultural production is a primary source of income for rural farmers. Thus, we expect the increased value of crop production will contribute to greater income. Furthermore, non-monetary measures of household welfare improved. Households reported worrying about food 10.3% less often over the prior week. Households benefitting from AD2M owned 1.19 more durable consumer items than comparison households. Qualitatively, respondents reported that individual incomes indeed increased as a result of increased rice yields. Respondents indicated that purchasing power increased and more people now live in stone or brick houses. Expenditures also went towards education, with the average beneficiary spending over 50% on schooling than comparison households.

Figure 4: Financial wellbeing



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Qualitative data confirmed that AD2M introduced and encouraged farmers to grow new crops, the most frequently mentioned being onions, beans, peanuts and tomatoes. Farmers in focus group discussions shared their belief that multi-cropping improved soil quality and many reported continuing to grow these new crops today. Curiously, the farmers reported little crop expansion during the quantitative survey. Rice, cassava, and beans/pulses were common crops in the area for all farmers. Other crops were far less common.

Recommendations

As with other ex-post evaluations, one must consider the limitations of the study. The Appui au Développement du Menabe et du Melaky project was allocated to areas that were more agriculturally and hydrologically promising. Therefore, we cannot rule out that there were underlying differences between treatment areas and comparison areas, despite our efforts to avoid this discrepancy. Nonetheless, there are important opportunities to learn for future irrigation projects.

Plan activities carefully around the growing seasons.

Farmers expressed frustration that some AD2M activities were poorly timed, such as dam reparations in Mahabo during the rainy season. When water flow was disrupted by infrastructure construction and maintenance, farmers found it challenging to properly irrigate their crops. When possible, work should be done during periods in which cropland lays fallow. This is a greater challenge because farmers are 17% more likely to be growing during a second season, increasing the length of time they need steady water flow.

Invest in higher quality irrigation materials.

Qualitatively, farmers reported it was difficult to maintain irrigation infrastructure after AD2M ended. Quantitatively, only 40 percent of treated farmers felt the irrigated water was of good quality. Although higher than control areas, this rate remains low. Finally, the findings from our evaluation underscore the importance of maintaining clear communications with community members throughout program implementation (especially when taking an important action such as a water cut) and including modes of communication appropriate for illiterate community members.

Place more emphasis on initial sensitization to the program and community engagement.

Some farmers felt they were not sufficiently consulted about program activities and were left out of key decisions. Community surveys suggest that AD2M WUAs may have even simply replaced existing functioning farmers' associations.

Teach farmers about the long-term impacts of climate change.

Beneficiaries may be more willing to embrace changes if they learn about the potential risks of climate change. In rural areas, many farmers have a mentality of minimizing risks rather than maximizing profit. If households are warned about the risks posed by climate change, they may better appreciate the challenges they will likely face in upcoming years. This knowledge of future climate risk may lead households to adopt better practices, especially regarding irrigation, line cultivation, fertilisers and crop rotation.

Initiate a sustainable source of financing so farmers can continue with improved methods.

Future programming must incorporate lasting financial support to help farmers access the improved but more expensive methods AD2M promoted. Acquiring higher quality seeds, fertilisers, tools, and marketing of non-rice products requires farmers to commit significant funds over a long period of time. The project should therefore include a reliable micro-finance system. Eventually, the government could implement an insurance system to protect farmers from largescale crop losses due to natural disasters, plagues of pests, or other widespread shocks. Without these financial supports, many farmers will return to their traditional methods of farming.