



Reducing rural poverty in West Bengal

*Findings and recommendations from an impact
evaluation of the World Bank Accelerated
Development of Minor Irrigation Project*

Sujoy Bhattacharyya
Sophie Gardiner

*Policy Brief accompanying Second Year Policy Analysis in
completion of the Master in Public Administration in
International Development at the Harvard Kennedy School*

The Challenge of Irrigation in West Bengal

Farmers of West Bengal remain among the poorest citizens of India, with 28% of rural households living below the national poverty line. One of the fundamental challenges facing farmers is a lack of water, particularly during the dry seasons of Rabi and Pre-Kharif. The state has responded through widespread provision of irrigation infrastructure, though structure maintenance has been significant challenge.

The Accelerated Development of Minor Irrigation (ADMI) Project, launched in 2012 with World Bank support, differs from existing irrigation programs in that participating farmers are mobilized into Water User Associations (WUAs) and receive supplementary agricultural training. These additions are intended to improve the sustainability of the infrastructure and amplify the impact of the new water availability, respectively.

This policy brief presents findings from a quasi-experimental impact evaluation of the ADMI program and recommends next steps for the project to further improve farmer well-being.



Findings

- ADMI structures are much more likely to maintain functionality over time—89% of ADMI irrigation structures built in the past five years are still functional, compared to 50% of traditional irrigation structures. The WUA structure is a likely driver of this difference.
- ADMI has more than doubled farmers' agriculture revenue, providing them with an additional INR 28,275 (USD 382) in revenue per year.
- Survey data suggest that the adoption of improved agricultural practices, increased productivity in rice paddy, and crop diversification are the most important drivers of this impact.

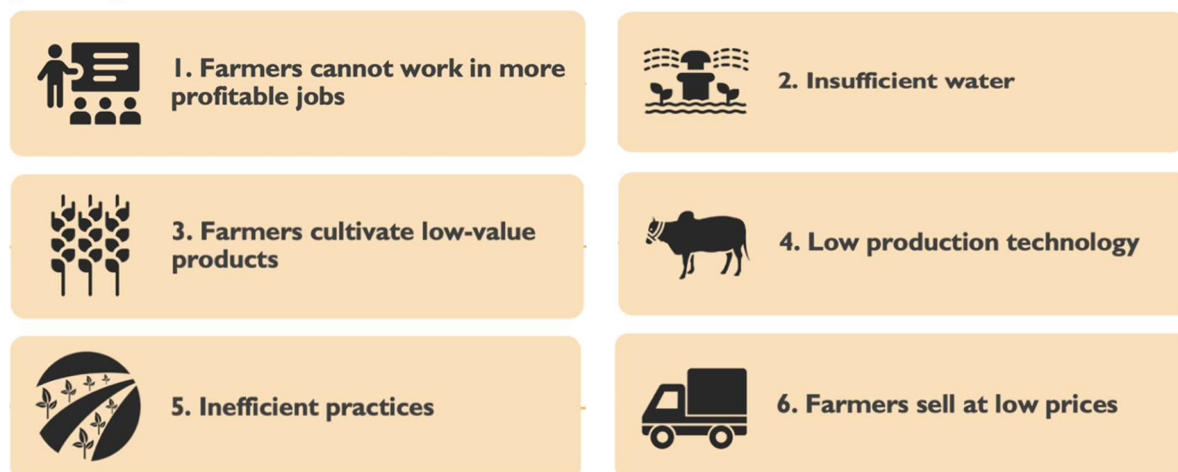
Recommendations

- Use data to target WUAs reporting low likelihood of sustainability with additional support.
- Incorporate structured pilot projects and linked data systems across Water Resources Investigation and Development Department (WRIDD) activities.
- Scale-up the ADMI package to farmers across West Bengal, incorporating a large-scale randomized evaluation to understand spillover effects and administrative hurdles.
- Explore whether different models of collective sales can increase farmer market power.
- Explore whether the WUA institutional structure can facilitate the adoption of other welfare programs.

Conceptual Framework

There are a number of challenges documented in the literature and described anecdotally by farmers that could potentially contribute to the low income of farmers. These could all be rooted different fundamental market or government failures, including coordination failures, incomplete credit markets, imperfect information, and externalities. We group these potential contributors into the six categories in Figure 1.

Figure 1. Hypothesized contributors to low farmer income



Typical irrigation programs only resolve the constraint of insufficient water, whereas ADMI's intervention targets insufficient water, low-value products, inefficient practices, and low production technology. As each constraint would warrant a different policy response, we use a recent randomly sampled survey of farmers to identify the constraints that are most pressing and where future efforts would have greatest impact.



Impact of ADMI

ADMI has dramatically increased farmers' agricultural revenue. Since the program was introduced, on average ADMI farmers have experienced an INR 28,275 greater increase in annual revenue than farmers that did not participate, controlling for district, scheme, and individual characteristics. The average revenue of both ADMI and non-ADMI farmers is presented in Figure 2.

This additional revenue comes from increases in cultivated area and yield of rice paddy in the monsoon (Kharif) season and diversification into vegetable cultivation in the Pre-Kharif season. Farmers that began growing an additional crop had an average increase in revenue of INR 29,751 greater than those that did not.

Water availability is an important contributor to ADMI farmers' expanded cultivation. ADMI farmers have a 37-percentage-point higher likelihood of receiving sufficient water than their non-ADMI neighbors. Furthermore, the irrigation structures are more likely to sustain functionality over time: 89% of ADMI schemes built in the last five years remain functional, compared to only 50% of traditional irrigation schemes. Seventy six percent of ADMI farmers report that the formation of a WUA led to better maintenance.

ADMI's agricultural support is a critical complement to irrigation infrastructure. Irrigation alone is insufficient to increase revenues – there was no statistically significant difference in revenue between farmers based only on water availability. ADMI farmers experienced a higher uptake of improved agricultural practices, particularly rice intensification and intercropping (Figure 3). Non-ADMI farmers also increased their use of these improved practices, indicating potential spillover effects.

Figure 2. Observed difference in revenue from agriculture (INR)

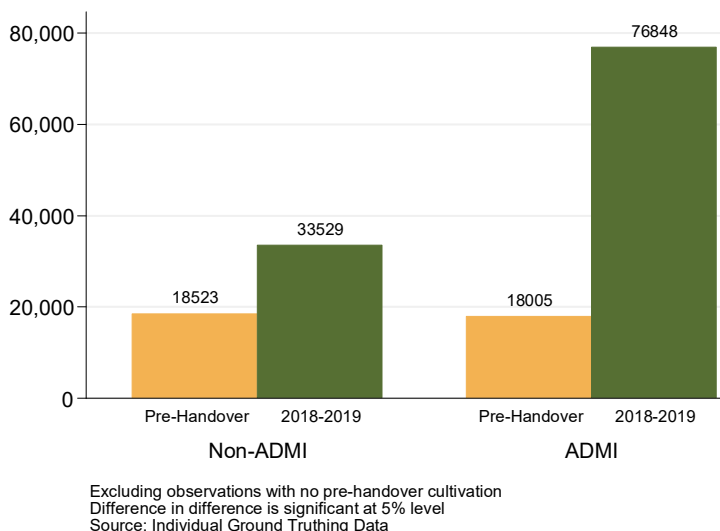
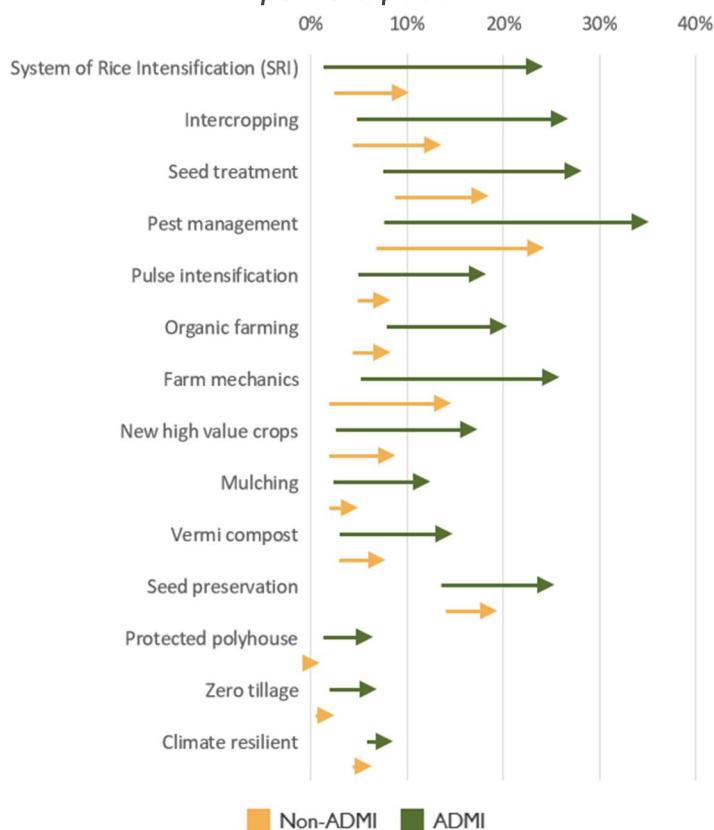


Figure 3: Changes in % of farmers using improved agricultural practices, pre-ADMI to present



Start of line represents % of farmers practicing pre-ADMI, arrowhead represents % of farmers practicing at present.
Source: Individual Ground Truthing Data

Policy Recommendations

1 Scale ADMI to additional farmers

The WRIDD plans to expand the ADMI package to farmers who are currently eligible for traditional irrigation structures, which is supported by the causal increase in income and agricultural productivity found in the impact evaluation.

The Department should **leverage the scale-up for learning through a large-scale randomized evaluation** designed to understand mechanisms, capture potential general equilibrium effects and help refine the administrative systems of the department.

2 Facilitate collective sales

WRIDD should explore whether they can increase the limited market power of farmers, which continues to be a concern of farmers and policymakers. As there might be considerable hurdles in transitioning WUAs directly into Farmer Producer Organizations, ADMI should **partner with an external agency to develop potential interventions more tailored to the needs of WUAs and the capabilities of the department**. These could include providing price information to farmers, subsidizing transportation, or forming farmer collective groups.

If the studies suggest potential for market access interventions, we recommend that the partner conduct A/B testing of at least two alternatives for each segment of ADMI farmers to learn what works best. Throughout this process, ADMI should ensure that they maintain ties with other agencies dedicated to farmer market power; e.g., the Agricultural Marketing Board.

3 Converge with other government programs

WRIDD can further improve farmer welfare by leveraging WUAs as a platform for increasing the take-up of other government programs that provide benefits such as microcredit, crop insurance, and livelihoods training. The ADMI program has increased beneficiary legibility and local organizational capital, both of which ease the constraints on welfare program adoption.

The Department should first conduct a needs assessment of farmers and map them onto relevant welfare programs. ADMI should then collaborate with the relevant agencies to garner political support for convergence.

ADMI should **test between three possible implementation mechanisms – phone information campaigns, in-person information campaigns, and customized assistance in completing applications – through a series of rapid randomized pilots** to understand the costs and benefits associated with increasing administrative burden.