THE IMPACT OF WEATHER INDEX INSURANCE ON FOOD AND NUTRITION SECURITY AND LIVELIHOODS

Evidence from impact evaluations in Ethiopia and Ghana

Overview

Weather index insurance (WII) and climate-smart agricultural practices (CSAPs) such as crop insurance, irrigation, and organic fertiliser are promoted to help smallholder farmers manage climate risks and improve household welfare. This research bite is drawn from the Evidence and Gap Map of Climate Change Adaptation Interventions for Enhancing Food Security and Livelihood in Sub-Saharan Africa. It reports the impacts of WII on food consumption and household income based on impact evaluation studies in Ethiopia and Ghana, highlighting where these interventions work, for whom, why outcomes vary, which evidence gaps exist, and what the findings mean for policy and practice. A brief overview of the impact evaluation studies surveyed is as follows:

Ethiopia (Belissa, 2024): Assessed the impact of weather index-based insurance (WII) adoption on household food consumption and investment in high-risk, high-return agricultural inputs using a difference-in-differences (DiD) estimator with panel data (2015 & 2017) from 149 persistent adopters and 543 never-adopters in the Rift Valley zone.

Ghana (Agbenyo et al., 2022): Examined the effects of adopting irrigation, crop insurance, and organic fertiliser on cocoa farmers' household income, farm income, and off-farm income using an endogenous switching regression (ESR) plus telasso average treatment effect estimation with 600 farmers in the Ashanti Region.

Interventions

Intervention: Weather index-based insurance (WII) and crop insurance.

- Ethiopia: index-based crop insurance (payout based on NDVI satellite data; premium ETB 100/policy; marketed through village insurance promoters and extension agents)
- Ghana: crop insurance, with dissemination through radio, extension officers, and farmer associations

Summary of Key Findings

- Both studies show that WII and crop insurance can improve household welfare, but effects are not universal and depend on the practice, outcome measured, and complementary resources.
- Repeated uptake matters. In Ethiopia, one-time adoption had limited effects, but three to four years of sustained WII adoption significantly increased food consumption and investment in improved seed.
- Crop insurance increased household income by 16%, farm income by 14%, and off-farm income by 18% in Ghana. In Ethiopia, WII adoption increased per capita weekly food consumption by ETB 48 (US$0.85) and annual total consumption by ETB 3007 (US$53.20).
- Access to credit, extension services, and farmer group membership are enablers of WII adoption across both countries.

Key Findings: Ethiopia (Belissa, 2024)

- Adopters of WII increased per capita weekly food consumption by ETB 48 (US$0.85 at the time) and per capita annual total consumption by ETB 3007 (US$53.20), compared to non-adopters.
- Repeated adoption has cumulative lasting effects. Three years of WII adoption increased total weekly food consumption by ETB 73 (US$1.29); four years added ETB 4746 (US$84.00) and ETB 52 (US$0.92), respectively. One-year adoption alone did not produce significant welfare gains.
- Self-selection bias was present (persistent adopters had higher baseline welfare), but the DiD design removed time-invariant unobservables. Programme placement bias was not detected.
- Farmers used WII payouts and reduced risk to intensify production, particularly by purchasing improved seed varieties.

Conclusion in Ethiopia: WII improves food consumption, but only with sustained, repeated uptake. One-time adoption is insufficient.

Key Findings: Ghana (Agbenyo et al., 2022)

- Crop insurance adoption increased household income by 15.9%, farm income by 14.2%, and off-farm income by 17.9% compared to non-adopters.
- Access to credit raises the probability of adopting crop insurance by 0.45 percentage points.
- Farm membership association increases adoption of crop insurance by 77.4%.
- Extension officer access significantly increases adoption of crop insurance.

- Gender, farm experience, age, household size, and farm size do not significantly influence adoption of crop insurance – unlike many other agricultural technology studies.

Conclusion in Ghana: Crop insurance positively affects cocoa farmers' incomes. Credit and extension are key enablers.

What this means for policy

Sustained adoption matters. In Ethiopia, one year of WII was not enough. Policies should subsidise renewal, offer multi-year policies, and provide automatic rollover to encourage repeated uptake.

Credit and extension are critical complements. Both studies show that access to credit and extension services consistently increase adoption and positive welfare outcomes. Bundling insurance with credit (e.g., loan-linked insurance) could be effective.

Evidence Gaps

No study measured child stunting, wasting, or micronutrient levels. Only food consumption expenditure (Ethiopia) and household income (Ghana) were reported. Nutrition outcomes beyond dietary diversity remain absent.

Long-term effects (more than 4 years) are unknown. Ethiopia followed farmers for two periods (2015-2017); Ghana used cross-sectional data. Cumulative learning, multi-year yield impacts, and sustained behaviour change are not yet documented.

Mechanisms are not fully understood. In Ethiopia, why did IBI affect improved seed but not fertiliser? In Ghana, why is organic fertiliser not statistically significant? Formal mediation analysis is missing.

About this Research Bite

This is a visual summary of impact evaluation studies of the cells "Climate and disaster risk insurance" → "Food and nutrition security" and "Livelihoods" from ICED's Evidence and Gap Map of Climate Change Adaptation Interventions for Enhancing Food Security and Livelihood in Sub-Saharan Africa. For the full map, visit https://products.iced-eval.org/egm-cca.html

References

Agbenyo, W., Jiang, Y., Jia, X., Wang, J., Ntim-Amo, G., Dunya, R., Siaw, A., Asare, I., & Twumasi, M. A. (2022). Does the Adoption of Climate-Smart Agricultural Practices Impact Farmers' Income? Evidence from Ghana. *International Journal of Environmental Research and Public Health 2022, Vol. 19, Page 3804*, *19*(7), 3804. https://doi.org/10.3390/IJERPH19073804

Belissa, T. K. (2024). Effects of weather index insurance adoption on household food consumption and investment in agricultural inputs in Ethiopia. *Journal of Agriculture and Food Research*, *16*, 101043. https://doi.org/10.1016/J.JAFR.2024.101043