

Sowing Resilience: Impact Evaluation of Drought-Resistant Sorghum Seeds on Food Security in Honduras

HUMANITARIAN ASSISTANCE EVIDENCE CYCLE

Activity Background

Honduras faces a critical food security crisis, with 2.3 million people (24%) struggling at emergency levels.¹ This vulnerability is particularly severe in Región 13 Golfo de Fonseca (R13), where impoverished households grapple with chronic malnutrition exceeding the national averages. In response, the Adventist Development and Relief Agency (ADRA) implemented the Integrated Actions for Sustainable Food Security (TRANSFER) project, funded by USAID/BHA. The project supports 5,700 households to improve their food security. One of the key strategies is the reintroduction of sorghum to the region through providing seeds and implementing innovative activities, like field schools, exhibitions, workshops, and recipe books for promoting sorghum consumption.

1 Integrated Food Security Phase Classification. (2023). Honduras: Análisis de inseguridad. https://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/docs/IPC_Honduras_AcuteFoodInsecurity_Dec2022Aug2023_Report_Spanish.pdf.



Notable Results

The provision of sorghum seeds as part of the TRANSFER project created a chain of impacts that strengthens food security. One of the most significant impacts was that households that received sorghum seeds maintained sorghum reserves for future consumption. The project boosted the percentage of households with enough sorghum to last over three months by an impressive 60.4% as compared to those who did not receive seeds. This precautionary behavior could be crucial in addressing food crises in 2024. The ADRA team estimates that the harvest of the first cycle of 2024 will not be suitable due to the weather conditions and that an intense drought will affect the Dry Corridor of Honduras for the rest of the year. As such, the increase in sorghum reserves may provide households with consumable food and a source of income, as they can consume the sorghum they produce or sell it.

What Did We Find and How Will We Use the Evidence?

FINDING 1: Providing sorghum seeds led to clear improvements in food security among households. These households experienced the following

- A 19.2% reduction in their reduced coping strategy index (rCSI).
- A 35.2% decrease in the Household Hunger Scale (HHS).

The decrease in the rCSI shows that providing sorghum seeds empowered households to adopt less drastic coping mechanisms during food shortages. Specifically, receiving seeds led to a decline in three common strategies:

Crucial to address food crisis
due to intense drought



60.4% increase in availability of
sorghum to last
over three months

19.2% reduction

in their reduced
coping strategy
index (rCSI)

35.2% decrease

in the Household
Hunger Scale (HHS)

- Restricting adult food consumption to prioritize children's meals (40.8%).
- Reducing portion sizes for all household members (14.8%).
- Decreasing the number of meals eaten per day (47.4%).
- Borrowing food or relying on help from friends and family (18.9%).

The endline survey found a clear difference: **only 55.3% of households receiving seeds (treatment group)** reported using at least one of these severe coping strategies in the past week. This is significantly lower than the **80.8% of households in the control group** who relied on these more drastic measures to address food security.

The decrease in the HHS shows that households that received sorghum seeds were less likely to experience severe insecurity events. These events include the following:

- Lack of food due to an inability to afford it (15.8%).
- Going to sleep hungry because there isn't enough food (33.8%).
- Spending a full day and night without eating due to food scarcity (83.6%).

The impact evaluation found that sorghum seeds improved food security for households in the treatment group. **Only 41.0% of households receiving seeds (treatment group)** reported experiencing at least one of these severe events in the past 30 days. This is a considerable improvement when compared to the **57.4% of households in the control group** who faced similar challenges.

Actions by Implementing Partner (IP):

These findings show that providing sorghum seeds reduces households' exposure to food insecurity events and they are therefore less likely to rely on extreme behaviors and practices to cope with food crises. Based on the impact findings, ADRA should continue promoting the use of sorghum for human consumption by implementing the following actions:

Fully integrate sorghum into basic assistance programs: The evaluation provides a clear evidence base for ADRA to integrate sorghum into basic assistance programs for smallholder farmers in drought-prone areas worldwide. This integration will be reflected in program designs, allowing farmers to have more diverse crops and adopt better strategies to adapt to climate change and improve food security.

Document and share best practices: ADRA will document and share best practices and lessons learned from its sorghum seed distribution and food security initiatives to contribute to evidence-based programming and inform future interventions by ADRA, government stakeholders, and other IPs.

Monitor and evaluate impact: ADRA will implement robust monitoring and evaluation systems to track the ongoing impact of sorghum distribution on household food security. This will include regular surveys and data collection to ensure the benefits observed in the initial evaluation are sustained and enhanced over time and that ADRA can identify further learning opportunities.

Actions with Policy Makers:

Socialize results with local authorities: ADRA will hold socialization days with the local authorities of the communities included in this evaluation to disseminate the results and impact of the project, as the findings are highly relevant to the growing conditions and areas impacted by malnutrition.



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FINDING 2: Providing sorghum seeds boosted agricultural activities as a means to improve household food security.

Planting grew by 35.2%, as more households that actively received seeds planted sorghum in the last harvest cycle (2023) than those who had not. Production grew by 28.6%: Households with seeds saw a more substantial increase in their sorghum harvest than the control group. A significant portion of the sorghum produced by households receiving seeds was specifically allocated to present and future food consumption (this grew by 44.0%).

The evaluation endline survey found that 78.6% of the treatment households planted sorghum, producing 2.7 quintals per household. Meanwhile, 58% of control group households grew sorghum in the same period (28.7 p.p. less than the treatment group), obtaining an average of only 2.1 quintals.

In the last postharvest cycle, beneficiaries who received sorghum seeds (treatment) kept more sorghum (2.1 quintals for human consumption, comprising 79.3% of their sorghum production), compared with those in the control group (who kept only 1.5 quintals, or 70%, of the sorghum production).

Actions by IP:

Expand sorghum seed distribution: ADRA Honduras will increase the distribution of sorghum seeds to more households in climate-prone dry regions. Given the proven benefits (providing seeds led to a cost-effective increase in production and a reduction in food insecurity),² expanding the reach of this intervention will help more families reduce their food insecurity and dependence on extreme coping mechanisms.

Enhance training on sorghum cultivation: ADRA will provide extensive training on sorghum-cultivation techniques, including planting, crop management, and harvesting. This training aims to maximize sorghum yields and improve overall production efficiency.

Actions with Policy Makers:

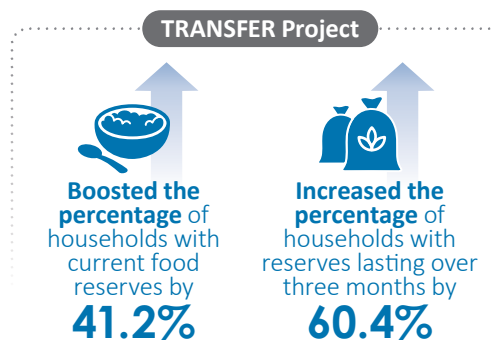
Promote the inclusion of sorghum in local food security strategies: ADRA will work with local authorities to ensure the inclusion of sorghum in food security and agricultural development strategies. This involves highlighting the benefits of sorghum, such as its resilience to climate change and its role in improving food security.

FINDING 3: Providing sorghum seeds significantly influenced household decisions to maintain sorghum reserves, which can be used for consumption or sale.

Compared to households that did not receive seeds, the TRANSFER project achieved the following:

- Boosted the percentage of households with current food reserves by 41.2%.
- Increased the percentage of households with reserves lasting over three months by 60.4%.

The endline evaluation survey found 68.2% of households receiving seeds reported having sorghum reserves in March 2024. This is compared to only 48.2% in the control group. Among those with reserves, a strong 40.6% of TRANSFER households anticipated their stock lasting until June 2024 or beyond. This positive outlook sharply contrasts with that of the control group, where only 25.3% expected their reserves to last three months. Sorghum can be stored for a long time (up to two years) without losing its qualities for human consumption or as seeds for sowing.



² The costs per household or participant per increase in one point reduction in the rCSI is USD \$8.4.

Actions by IP:

Sorghum reserves can be crucial in addressing expected food crises in 2024. The Honduras ADRA team estimates that the overall harvest of the first cycle of 2024 will not be suitable due to weather conditions, and an intense drought will affect the Dry Corridor of Honduras for the rest of 2024. As a result, households with sorghum reserves may be better placed to respond to these conditions, which may impact their food security. ADRA expects to reinforce the use of reserves as follows:

Strengthen reserve management training: ADRA will design and provide a specific training on effective sorghum-stockpile management. This training will cover best practices for storing sorghum, ensuring its extended shelf life and safety for consumption, with a particular emphasis on drought preparedness. During 2024 ADRA Honduras plans to provide each producer with a silo to improve the storage of basic grains.

Actions with Policy Makers:

Strengthen collaboration with local authorities and nongovernmental organizations (NGOs): ADRA will collaborate with local authorities, NGOs, and community organizations to coordinate efforts and resources. This collaboration aims to maximize the impact of interventions and ensure a cohesive response to the anticipated food crisis, raise awareness about the importance of sorghum, and promote its use.

FINDING 4: The impact evaluation did not reveal a direct link between the provision of sorghum seeds and increased sorghum consumption.

While households receiving seeds (the treatment group) showed a higher rate of sorghum consumption in the last seven days (by 12.5 percentage points), the propensity score methodology applied showed that this difference is not statistically different. While the TRANSFER project provided sorghum seeds, two factors may explain why they did not directly increase consumption of sorghum:

- **Complementary sorghum activities:** All beneficiaries (in both the treatment and control groups) participated in field schools, sorghum fairs, and workshops, and they received recipe manuals. These activities likely generated interest in sorghum consumption, even among those who did not receive seeds. This is evidenced by the high consumption rate (43.0%) and recipe knowledge (preparing five to six recipes out of the eight recipes provided) in the control group.
- **Beneficiary decisions:** Beneficiaries may have chosen to store their sorghum seeds for future needs rather than use them for immediate consumption (See the section entitled Finding 3).

Actions by IP:

ADRA will continue to promote complementary sorghum activities. Complementary sorghum activities will be reinforced as follows:

Strengthen and expand complementary activities: ADRA will continue to enhance and expand sorghum-related complementary activities (field schools, sorghum fairs, workshops, and recipe manuals). These initiatives are designed to further elevate awareness and knowledge about sorghum, ultimately encouraging more households to integrate sorghum into their regular diets.

Integrate nutrition education: ADRA will integrate comprehensive nutrition education into sorghum-related activities, emphasizing the health benefits of consuming sorghum. This education will be delivered through community workshops, educational materials, and cooking demonstrations.

Actions with Policy Makers:

Integration of nutrition programs: ADRA will work with local authorities, food security volunteers, and local promoters to integrate the benefits of sorghum into their local promotion strategies. This integration will ensure that the promotion of various nutritious crops, which now include sorghum, is prioritized within broader frameworks.



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Why Conduct this Impact Evaluation?

The evaluation assessed the marginal impact of distributing sorghum seeds (called sorghum reintroduction) on household food security, sorghum production, and human consumption in regions prone to climate change in Honduras. The evaluation also sought to assess the cost-effectiveness of distributing sorghum seeds among those who had access to the full project benefits.³

For ADRA, this evaluation offers an opportunity to gather evidence to increase the effectiveness of agricultural assistance. In contexts where climate conditions are increasingly extreme, it is essential for small farmers to identify crop alternatives that are more resilient to the extreme weather resulting from climate change. Sorghum has high drought resistance and has historically existed in the Dry Corridor of Honduras. The TRANSFER project promoted a variety of sorghum that is more suitable for human consumption than *maicillo*, which has historically been used in the region to feed animals.

ADRA will use the findings from this impact evaluation to improve farming practices and future assistance worldwide. ADRA expects to integrate sorghum into its basic assistance programs for smallholder farmers in drought-prone regions. This intervention will allow for greater crop diversification and better adaptation to climate change, thereby strengthening the long-term food security of vulnerable farming communities.

Research Methods

International Advisory, Products and Systems Ltd. ([i-APS](#)) designed and conducted this evaluation in collaboration with ADRA to assess the impact of reintroducing sorghum through the TRANSFER project.

The primary research question was: *“What is the marginal impact of reintroducing sorghum to households on their annual sorghum production, food consumption, and food security?”* The marginal impact is framed as the additional effect of providing sorghum seeds on top of the other outputs delivered by the TRANSFER project to all the beneficiaries in the agricultural component. Outputs include unconditional cash transfers, other basic grains seeds, and sorghum-complementary activities (field schools, workshops, community awareness fairs, and recipe books).

During the project’s implementation, ADRA was not able to provide all those eligible in the agricultural component with sorghum seeds, due to limited supply. As a result, field staff sometimes applied additional selection criteria. Ultimately, about every two out of three eligible persons received sorghum seeds. To address the nonrandom distribution of sorghum seeds, the evaluation team collected an endline survey in March 2004 to use a robust propensity score methodology—namely, inverse probability weighting (IPW). This method creates a control group of households (439 who did not receive seeds) that had similar characteristics to those who did receive seeds (434, constituting the treatment group). The IPW allows the evaluation team to assess the impact of receiving seeds in the proposed outcomes. The baseline collected by ADRA in June 2022 was available, allowing the application of difference in differences (DID) as a robustness check. The evaluation team used this secondary analysis on a subsample of 139 treatment households, as compared with the 103 comparison households who had information from a baseline collected by the program.



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³ All beneficiaries had access to unconditional cash transfers, other basic grains seeds, and sorghum-complementary activities (e.g., field schools, workshops, community awareness fairs, and recipe books).