

Evaluator's Lessons Learnt Series Brief 6, December 2020

Evaluation Findings: Zambia Biofortified Maize Challenge Project

This brief summarizes findings from the close-out assessment of AgResults' Zambia Biofortified Maize project (the full close-out report can be found [here](#)). The brief describes how the project contributed to the development of a niche market for PVA maize although limited development impact is expected. It also presents key lessons learnt from our assessment of the Zambia project about best practices in designing a challenge project.

Challenge project objective and theory of change

The AgResults Biofortified Maize Challenge Project in Zambia sought to test payment-for-results as a means of catalyzing the development of a sustainable, smallholder-inclusive market for pro-vitamin A (PVA) maize. Increased consumption of PVA maize by both farmers and urban consumers was expected to reduce the incidence of Vitamin-A deficiency, a public health issue in Zambia. The challenge project's design was predicated on the understanding that demand for PVA maize was limited by a lack of information about vitamin-A deficiency and PVA maize as a way to reduce vitamin-A deficiency. Furthermore, many Zambians perceive non-white maize to be inferior to white maize, potentially biasing them against PVA maize, which is orange in color. On the supply side, by providing incentives to market PVA maize, the project was intended to motivate millers to provide an outlet for smallholder farmers' surplus PVA maize production while offsetting the cost and risk that millers faced in entering the market. Early evidence showed that, once exposed to and educated about PVA maize, both farmers and consumers were receptive to it, and at times even preferred it. With the potential of that market established, the project offered incentives to maize millers and seed companies¹ to invest in developing the market for PVA maize and PVA maize seed². Specifically, they offered cash prizes to maize millers and seed companies for every unit of milled PVA maize and PVA maize seed sold, provided that the companies reached pre-specified minimum thresholds. The project also offered complementary supports, such as marketing assistance to help millers create demand for PVA maize, and interventions with farmers to ensure that production of PVA maize would meet millers' demand.

Key Findings



Market: AgResults helped develop a niche market for PVA maize, although the market did not engage many vitamin-A deficient consumers and therefore had limited development impact.



Sustainability: Our research suggested that the market would be sustained in the short to medium term, but was unlikely to move beyond its 'niche' status to become mainstream.

¹ The original project design included only millers as competitors; however a 2017 revision added a two-year incentive for seed companies to market PVA maize seed domestically.

² The initial project design targeted urban and peri-urban consumers of milled maize as beneficiaries, with the expectation that a mainstream market for milled PVA maize would benefit nutritionally vulnerable consumers—defined as pregnant women and children under 5 years of age—in the urban and peri-urban market. Smallholder farmers who were expected to be more likely to plant (and subsequently consume) PVA maize if they had a market for their surplus were initially defined as indirect beneficiaries. As preparations were made for project launch, emerging evidence brought into question the prevalence of vitamin-A deficiency among the urban population, and led to increased interest in smallholder farmers, the poorest and most isolated of whom were expected to have significant vitamin-A deficiency—as project beneficiaries.

The project's theory of change posited that strategically targeted cash incentives would offset the major sources of market failure (mainly low expressed demand, limited supply, and market coordination issues) that limited private sector investment in the PVA maize market. The cash incentives were expected to induce private sector actors to invest at scale in the procurement, processing, and marketing of PVA maize and maize seed. This investment would lead to development of a large and sustainable consumer base, a fairly small percentage of whom (7% in the short-term and 3% over the long-term) were expected to be nutritionally vulnerable urban and peri-urban consumers. Robust demand, in turn, would encourage smallholder farmers to grow PVA maize by assuring them of the availability of an offtake market for any surplus production. These farmers would both consume the PVA maize, thereby reducing prevalence of Vitamin A deficiency among nutritionally vulnerable smallholder farmers, as well as sell it, helping ensure a supply to millers.

Evaluation design and methods

The competition did not elicit sufficient response among millers—altogether eight participating millers procured and marketed less than one metric ton of PVA maize over three project years, whereas the minimum threshold that would have qualified an individual miller for an AgResults incentive payment was itself one metric ton of PVA maize. The project was terminated on August 31, 2018, one year early. Given the project's limited results, the evaluation team implemented a scaled-down qualitative close-out assessment rather than a comprehensive mixed-methods evaluation as detailed in the original evaluation design (Abt Associates, 2015). The close-out assessment utilized both primary (field) and secondary (desk) research, including two weeks of primary data collection in Zambia in the month following the project's conclusion. The team fielded semi-structured questionnaires to gather data from interviewees, who included the challenge project management team, Advisory Council members, project competitors, and PVA maize value chain actors (e.g., seed distributors and retailers, maize processors and retailers). (By design, the close-out assessment did not collect data directly from farmers, and results generalized to farmers are derived from other value chain actor interviews and/or secondary data.) The report also drew on the baseline assessment (Abt Associates, 2015), challenge project manager updates, Secretariat presentations to the AgResults Steering Committee, and external research and statistical reports. The team analyzed data using qualitative methods, including thematic summaries of responses organized along the major lines of inquiry. All key findings reported reflect majority perspectives as reported by our interviewees.

Evaluation findings



Market Impact

Despite the fact that the project was terminated early due to its insufficient results, our close-out assessment found that AgResults played a role in the development of a niche market for PVA maize, and that progress had been made towards increasing both demand and supply at the time that the project closed. Nonetheless, at the point when the project closed, there was little evidence of the market for milled PVA maize having significant development impact as it attracted more commercially oriented smallholder farmers and urban consumers, who were less likely to be nutritionally vulnerable. That said, seed company and agro-input dealer interviewees did report farmers buying PVA maize seed to grow for their own consumption. This indicated that there was some demand more closely linked to the project's development objectives—production for consumption by VAD consumers—even if that market segment was not a large share of total PVA maize produced. While AgResults played a clear role in developing this niche market, it is not possible to identify the magnitude of its effect relative to the complementary role played by 'push' initiatives that were operating at the same time.

HarvestPlus, in particular, played a prominent and complementary role in introducing PVA maize to Zambia farmers and shares credit for the market's development.



Sustainability

Our research suggested that the market would be sustained in the short to medium term, with private sector respondents describing their intent to continue in the market, their specific plans for doing so, and their sense of burgeoning demand for PVA maize. Nonetheless, our research also suggested that under current conditions, the market would continue to operate as a niche market only, i.e., there was no indication that the production and consumption of PVA maize would become mainstream under current market conditions and without significant public sector involvement. Thus, for this reason and for reasons discussed in our lessons learnt below, PVA maize is unlikely to reach the most nutritionally vulnerable consumers that the project sought to benefit as a result of the project.

Lessons Learnt

Choosing a development problem and solution to address it

The solution to the targeted development problem should have the potential to directly and significantly impact the project's intended beneficiaries.

Vitamin-A deficiency is a significant issue in Zambia; however existing public programs—such as mandatory sugar fortification and a Vitamin A supplementation program for pregnant women and infants—already reach a significant portion of the population. Poor, rural consumers can be missed by these programs, and production and consumption of biofortified maize by maize farmers has the potential to reduce Vitamin-A deficiency in rural areas. However, the AgResults project did not directly target these rural consumers as beneficiaries, instead envisioning them to be indirect beneficiaries in its original design. Similarly, only a small share (approximately seven percent) of the urban and peri-urban consumers that the business plan anticipated would consume PVA maize were anticipated to be vulnerable to Vitamin-A deficiency, likewise limiting the project's potential to have a direct and significant impact even if the market for urban and peri-urban market developed as envisioned by the project. It can be risky for a project to depend on 'trickle down' benefits or a long chain of linkages to achieve a significant development impact.

Incentivizing competitors

Competitors should see a business case for investing in the market for the innovation.

In Zambia, both seed companies and millers were adequate in number to create the foundation for a competitive and sustainable market for PVA maize. Millers, however, did not initially perceive a business case for working with PVA maize and they had limited capacity to address key constraints to the market's development. Thus, the pace and scale of their investment was far more gradual and limited than was anticipated in the project design. In contrast, seed companies had both financial and business management capacity and perceived a business case for PVA maize, in particular because of existing demand for seed from government and nongovernmental organisations (NGOs) and perceived potential demand among smallholder farmers. However, AgResults' incentive to seed companies rewarded sales to any domestic buyer rather than commercial channels that sell directly to smallholders, so it had a limited impact on the development of commercial channels for seed.

Crafting a theory of change

The theory of change should articulate how the PfR scheme will induce competitors to address the constraints limiting the development of a sustainable market, and reach its potential beneficiaries.

While no explicit theory of change existed for the Zambia project, the project's implicit theory of change was predicated on transactions among weakly linked value chain actors, and did not adequately account for the effects of government activity in the maize market. Specifically, nutritionally vulnerable smallholder farmers are not well integrated into the market for milled maize, and urban and peri-urban consumers who are vulnerable to Vitamin-A deficiency likewise only represented a fraction of the consumers that were expected to purchase PVA maize from the millers. This meant that large volumes of sales and extensive market penetration would be necessary for the market to reach these farmers and consumers. The incorporation of seed companies into the project strengthened linkages to farmers, although it could have had a stronger impact by specifically rewarding sales to farmers through commercial channels rather than rewarding sales to all domestic buyers (including government actors and NGOs who then re-distributed the seed to smallholder farmers on a subsidized basis).

Defining the incentive structure

The project incentive structure should minimize trade-off between market impact and development impact by defining criteria for PfR awards that closely link to the project's development objective.

Qualifying criteria for the PfR awards were based on sales of milled PVA maize and maize seed. Basing the miller prize on sales of milled maize may have strengthened the market impact by targeting the urban consumers that are likely to demand PVA maize. However, it weakened the development impact with smallholder farmers, who rarely buy milled maize. The focus on milled maize also excluded many potential institutional buyers of PVA maize—such as schools and health clinics—who also serve nutritionally vulnerable consumers but often buy unmilled maize due to its lower cost. The seed company incentive favoured market impact because it rewarded sales to any domestic buyer including the government and NGOs. It could have had greater development impact, however, if it had been more directly linked to farmers as beneficiaries. Specifically, if it had rewarded sales to commercial sales channels that marketed primarily to smallholder farmers, it may have promoted the development of a more robust smallholder-inclusive commercial market.

Conclusion

The Zambia Biofortified Maize Challenge Project can be credited, in conjunction with the HarvestPlus project, with catalyzing the development of a niche market for PVA maize, with potential for this market to be sustained if demand for the product continues to develop. That said, the market that was developed offers limited potential to reach the most nutritionally vulnerable consumers, whose integration into maize markets is limited. Design changes that might have enhanced the results of the project include tailoring the seed company reward to sales to domestic commercial channels and rewarding intermediaries' sales of any PVA maize, not just milled PVA maize.

Lessons learned from the Zambia Biofortified Maize Challenge Project contribute insights into best practices in designing challenge projects. These insights include the importance of developing a robust theory of change, selecting optimal competitors, and defining outcomes on the basis of which incentives will be awarded to most effectively promote the desired market and development impacts.

References

Abt Associates (2015) 'AgResults Baseline Report: Zambia Biofortified Maize Pilot.' Bethesda Maryland: Abt Associates, March. Available at <https://agresults.org/learning/35-evaluation-baseline-report-zambia-biofortified-maize-challenge-project/file>.

Abt Associates (2015) 'AgResults Evaluation Design: Zambia Biofortified Maize Pilot.' Bethesda Maryland: Abt Associates, July. Available at <https://agresults.org/learning/32-evaluation-design-zambia-biofortified-maize-challenge-project/file>.

Dalberg (2012) 'Agricultural Pull Mechanism Initiative: Biofortification Pilot.' Washington, DC: World Bank.

Mainville, Denise and Tulika Narayan (2017) 'Pull Mechanisms for Overcoming Market Failures in the Agriculture Sector.' Evaluator's Lessons Learnt Series, Issue 2, Bethesda, MD: Abt Associates and Denise Mainville Consulting, November. Available at: <https://agresults.org/learning/26-evaluator-lessons-learned-2-pull-mechanisms-for-overcoming-market-failures-in-the-agriculture-sector/file>.

Mainville, Denise and Tulika Narayan (2020) 'AgResults Zambia Biofortified Maize Challenge Project –Close-out Assessment.' Rockville, Maryland: Abt Associates, May. Available at <https://agresults.org/learning/50-evaluation-close-out-assessment-zambia-biofortified-maize-challenge-project/file>.

Recommended Citation

Mainville, Denise and Tulika Narayan (2020) 'Zambia Biofortified Maize Project Close-out Assessment.' Evaluator's Lessons Learnt, Brief 6, Rockville Maryland: Abt Associates and Denise Mainville Consulting, December.

Contact

Please send questions or comments on this brief to Denise Mainville: denisemainvilleconsulting@gmail.com.

AgResults is a \$152 million multilateral initiative incentivizing and rewarding high-impact agricultural innovations that promote global food security, health, and nutrition through the design and implementation of Challenge Projects, which provide payments for results intended to foster the creation of sustainable markets benefitting smallholder farmers. The AgResults initiative is a partnership between the Australian Government, the Bill & Melinda Gates Foundation, the Government of Canada, the United Kingdom's Foreign, Commonwealth and Development Office, the United States Agency for International Development, and the World Bank.

Abt Associates, in partnership with Denise Mainville Consulting, is an external impact evaluator of AgResults. Abt Associates uses rigorous evaluation methods to answer critical questions about the impact of PfR projects and to identify best practices in their design and implementation. These briefs summarize our lessons learnt on individual projects, as well as cross-cutting topics.

The contents of this brief do not necessarily reflect the views of the AgResults partners. For more information about AgResults, visit: <http://www.agresults.org>.

