

A conversation with Maggie Kamau-Biruri, March 15, 2018

Participants

- Maggie Kamau-Biruri – Head of Partnerships, HarvestPlus
- Chelsea Tabart – Research Analyst, GiveWell
- Andrew Martin – Research Analyst, GiveWell

Note: These notes were compiled by GiveWell and give an overview of the major points made by Maggie Kamau-Biruri.

Summary

GiveWell spoke with Ms. Kamau-Biruri of HarvestPlus as part of its investigation into giving opportunities to improve nutrition. Conversation topics included HarvestPlus's core work, its process, monitoring and evaluation of its work, and its room for more funding.

About HarvestPlus

The goal of HarvestPlus is to improve the health of smallholder farmers by breeding staple food crops that are rich in micronutrients. This process is referred to as "biofortification." HarvestPlus brings the potential of climate smart agricultural and nutrition science to bear on the persistent problem of micronutrient malnutrition. Micronutrient malnutrition, primarily the result of diets poor in vitamins and minerals, affects almost one-third of the world's population, especially women and preschool-aged children. The costs of these deficiencies, also called hidden hunger, in terms of lives lost, forgone economic growth and poor quality of life are staggering.

Core work

HarvestPlus addresses micronutrient deficiency in vulnerable populations (approximately two billion people globally) by facilitating the biofortification of crops with zinc, iron, or vitamin A. It does not advocate consumption of any specific crops but instead fortifies crops that are already commonly grown in target countries. HarvestPlus works along the value chain providing invaluable linkages between the plant breeders, in-country government agricultural research organizations and extension agents, small farmers who grow the crops, organizations that provide technical assistance to farmers and food processors, and millers, among others.

Currently, the core micronutrient-enriched crops HarvestPlus works with are iron beans, iron pearl millet, vitamin A cassava, vitamin A maize, vitamin A sweet potato, zinc rice, and zinc wheat. However, it has also supported research on lentil, cowpea, banana, plantain, and sorghum, which are staple foods in many countries.

Organizational structure

The HarvestPlus team in 15 countries includes specialists in crop development, seeds systems, economics, nutrition, advocacy, and marketing. In the last decade, HarvestPlus has transformed itself from a specialized research program into a unique global delivery partner. HarvestPlus is part of the CGIAR Research Program on Agriculture for Nutrition and Health and is coordinated by the International Center for Tropical Agriculture and the International Food Policy Research Institute, both of which are centers of the CGIAR. HarvestPlus has widely been recognized for achievements in research (World Food Prize), impact (USAID Million Lives Club), and capacity to scale (MacArthur *100&Change* Finalist).

Process

Identification of staple crops and micronutrient deficiencies

Since inception, HarvestPlus has engaged in the development and delivery of 12 crops in 14 countries and has the ambition to launch in 60 more. More than 7 million farmers are already growing and more than 30 million people are eating biofortified foods. HarvestPlus utilizes a globally recognized index which it developed, the Biofortification Priority Index (BPI), which is able to relay country-level data on micronutrient deficiencies, the staple crops grown by poor smallholder farmers, and the most widely consumed crops. For example, the BPI demonstrates that maize is the most widely grown and consumed crop in Zambia and that the nation experiences a large vitamin A deficiency. Based on this information, HarvestPlus promotes vitamin A maize in Zambia.

Breeding of micronutrient-enriched seeds

After the micronutrient deficiencies and staple crops in a country are identified, plant breeders begin developing a seed that is enriched with the necessary micronutrients, produces a high agricultural yield, does not require any major change in agronomical technique, and is approximately the same cost as a non-enriched seed. Although HarvestPlus does not actually breed seeds, it does ensure that the breeding process, which traditionally focuses on pest-resistance and achieving a high yield, is centered around making the crop highly nutritious. All breeding is done using conventional techniques.

Distribution of seeds

After breeding has been completed, seeds must be processed through national agricultural centers. For example, in Zambia, the Zambia Agriculture Research Institute must analyze any new crop variety before it can be introduced into the nation's agricultural system.

Once national agricultural centers have completed testing, HarvestPlus works with governments, agricultural extension programs, private sector companies, and non-governmental organizations (NGOs) to ensure distribution of seeds. In Zambia,

HarvestPlus works with several regional and national companies to distribute vitamin A maize.

Prioritization of market channels

To enable wider access and acceptance of a newly introduced crop variety, HarvestPlus sometimes offers smallholder farmers free or subsidized seed samples, just as seed companies do, to catalyze diffusion. However, these are “living loans” that must be paid forward to other farmers. HarvestPlus’ core priority is to ensure that farmers access micronutrient-enriched seeds through market channels, as it believes that regular provision of free seeds is not sustainable.

For crops that can be planted using stems or vines, such as sweet potato or cassava, distribution is much more informal. A common model is for lead farmers (respected farmers who operate successful farms) to grow these crops and sell cuttings for other farmers in the community to plant.

Training for farmers

HarvestPlus works with NGOs and field officers to ensure that smallholder farmers are knowledgeable in the most effective agricultural practices for growing micronutrient-enriched crops.

Promotional activities

HarvestPlus promotes the cultivation and consumption of micronutrient-enriched crops through a variety of channels, including:

- **Lead farmers** – Lead farmers are farmers of high standing in the community who are identified and encouraged to grow micronutrient-enriched crops along visible public paths. When individuals in the community walk past the farms, lead farmers explain what the crops are and how they are more nutritious than non-enriched varieties.
- **Marketing campaigns** – HarvestPlus delivers educational messaging on micronutrient-enriched crops through radio campaigns, cooking shows, and plant-growing competitions. It also conducts blind taste tests of maize, in which participants commonly note that the enriched variety of maize is sweeter and more appetizing than the traditional variety.
- **Messaging tools for farmers** – HarvestPlus helps ensure that farmers can sell their harvests in marketplaces by providing them with information and tools that incentivize customers to purchase micronutrient-enriched crops.

Growing body of evidence

- According to preliminary monitoring data estimates, by the end of 2017 approximately 33 million people were benefitting from biofortified crops in HarvestPlus’ 14 target countries across Africa, Asia, and Latin America and the Caribbean. The evidence that biofortification works is robust and well documented. In 2016, the *African Journal of Food, Agriculture,*

Nutrition, and Development and the *Annals of the New York Academy of Sciences* devoted special issues to biofortification, which summarize the evidence landscape and suggest the way forward for this agricultural-nutrition intervention. Biofortification helps minimize the widespread gap between micronutrient requirements and intake by increasing the proportion of dietary vitamin A, iron, and zinc—three micronutrients of public health significance globally.

- Peer-reviewed published evidence demonstrates that vitamin A sweet potato significantly reduces diarrhea prevalence and duration; vitamin A maize improves night vision; zinc wheat reduces child and maternal morbidity; and iron beans and millet reverse anemia and improve cognitive and physical performance.
- HarvestPlus and its partners measure the impact of biofortified crop consumption on women and children’s nutritional status and functional outcomes, such as mental and physical performance. Delivery progress and the impacts of adoption on livelihoods are captured through HarvestPlus’ rigorous monitoring and evaluation system.

Monitoring and evaluation

Prior to initiating a program, HarvestPlus collects community-level data on number of households, number of smallholder farmers, commonly grown crops, and micronutrient deficiencies.

After micronutrient-enriched seeds have been introduced into a community, it selects a sample of the community and collects data on number of farmers who received enriched seeds, number of farmers who grew enriched crops, and number of households consuming enriched crops.

Interviews and surveys in Rwanda showed that 29% of bean farmers had grown iron beans within four years of introduction. HarvestPlus also conducts interviews with farmers and consumers to determine the health outcomes resulting from consumption of micronutrient-enriched crops. For example, in Rwanda, a randomized clinical trial demonstrated that adolescent girls who consumed iron beans were better able to concentrate.

Room for more funding

Funding from the MacArthur Foundation

With a plan to expand its program to 17 new countries in Africa, HarvestPlus applied to the MacArthur Foundation’s 2017 *100&Change* competition, for a \$100 million award. Out of the 1,904 organizations that applied to the competition, HarvestPlus was one of four finalists and, while it was not chosen as the recipient of the \$100 million grant, it was awarded \$15 million. This support from the MacArthur Foundation will go towards expanding and sustaining HarvestPlus’ work in 6 countries in Africa.

Use for additional funding

As with many disruptive health interventions, biofortification has reached a critical tipping point. Over the next five years, HarvestPlus needs to further improve and expand the availability of biofortified varieties, invest in more crop demand creation, and work with more partners and governments to catalyze awareness and drive widescale adoption.

With its current level of funding, HarvestPlus is not able to fully satisfy the demand from smallholder farmers for micronutrient-enriched seeds. It would utilize additional funding to increase its penetration in countries such as Nigeria, where it promotes enriched cassava and maize crops but could significantly scale up its work, and expand operations to new countries such as Malawi, which has a high burden of vitamin A deficiency. Between now and 2023, HarvestPlus aims to accelerate development and deployment of biofortified crops in all 12 countries where it has active programs (Bangladesh, Brazil, China, Colombia, DRC, India, Nigeria, Pakistan, Rwanda, Uganda, Zambia, and Zimbabwe) and to launch new biofortified varieties in up to ten additional countries where there is persistent burden of micronutrient deficiency.

HarvestPlus believes its program model is highly sustainable, as it is mainly a facilitator and does not actually engage in farming, resulting in a relatively low implementation cost.

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