What Is Hidden Hunger?

More than two billion people in the world—roughly one person in three—do not get enough essential vitamins and minerals, such as vitamin A, zinc, and iron, in their daily diets. Their condition is known as “hidden hunger” because those suffering from this type of undernutrition often appear healthy, but are actually more vulnerable to illness and infections. The impact of vitamin and mineral deficiencies is as follows:

Iron Deficiency
- Impairs mental development and learning capacity
- Increases weakness and fatigue
- May increase risk of women dying in childbirth

Vitamin A Deficiency
- Impairs growth
- Causes eye damage leading to blindness
- Increases risk of infections such as diarrheal disease

Zinc Deficiency
- Causes stunting
- Lowers immunity
- Increases risk of diarrheal disease and respiratory infections

Biofortification: Changing the Game

A diverse diet that includes enough fruits, vegetables, and/or animal products usually provides enough vitamins and minerals for good health. However, millions of people—mostly those living in poorer countries—rely on staple foods such as cassava or rice that fill up their stomachs but provide insufficient vitamins and minerals. More nutritious foods are often expensive or simply unavailable. So HarvestPlus and our partners are tackling hidden hunger using familiar foods that people eat every day, through a strategy known as biofortification. Using conventional breeding methods, scientists have developed new varieties of productive staple food crops that contain higher amounts of vitamin A, iron, and zinc to improve diets and nutrition.

These nutritious crops have several advantages:

- **Targeted**: They can reach rural communities often missed by other nutrition interventions such as dietary supplementation and fortification.

- **Cost-effective**: Breeding the nutrient into a crop variety takes just one up-front investment. Once the trait is bred in, it is retained in successive crop generations. Through further breeding at low cost, the crops can be adapted to thrive in a range of agroecological zones.

- **Sustainable**: This strategy is centered on staple foods that people already eat regularly. Farmers can save the seeds or cuttings to replant, and share them freely with their neighbors.

HarvestPlus Crops

**Bean**
Where We Work: DRC, Rwanda, Uganda
Nutritional Benefits: Provides up to 50% of daily iron needs
Farmer Benefits: High yielding, virus resistant, heat and drought tolerant

**Maize**
Where We Work: Nigeria, Zambia
Nutritional Benefits: Provides up to 25% of daily vitamin A needs
Farmer Benefits: High yielding, disease and virus resistant, drought tolerant

**Pearl Millet**
Where We Work: India
Nutritional Benefits: Provides up to 80% of daily iron needs
Farmer Benefits: High yielding, mildew resistant, drought tolerant

**Wheat**
Where We Work: India, Pakistan
Nutritional Benefits: Provides up to 50% of daily zinc needs
Farmer Benefits: High yielding, disease resistant

**Cassava**
Where We Work: DRC, Nigeria
Nutritional Benefits: Provides up to 40% of daily vitamin A needs
Farmer Benefits: High yielding, virus resistant

**Orange Sweet Potato**
Where We Work: Uganda
Nutritional Benefits: Provides up to 100% of daily vitamin A needs
Farmer Benefits: High yielding, virus resistant, drought tolerant

**Rice**
Where We Work: Bangladesh, India
Nutritional Benefits: Provides up to 60% of daily zinc needs
Farmer Benefits: High yielding, disease and pest resistant
Since its inception in 2003, HarvestPlus has conducted or funded scientific research on all aspects of biofortification. Most of this research has been published in peer-reviewed journals, resulting in a substantial body of knowledge on biofortification. This compendium lists all publications from 2014 that were funded, or otherwise supported, by HarvestPlus. They include peer-reviewed journal articles, technical monographs, books/book chapters, conference proceedings, and bulletins by both HarvestPlus team members and our collaborators. A complete listing of these and other publications on biofortification from prior years can be accessed on our website (www.HarvestPlus.org). Key publications are also published as open access.

HarvestPlus also produces and publishes a number of in-house reports, papers and briefs (see below). These are listed in our 2014 annual report and also available on our website for download. A new series of non-technical briefs aimed at policymakers and practitioners will also be launched in 2015.

#### Technical Monographs

State-of-the-art reviews that help to establish and define HarvestPlus research questions or “gold standard” procedures to be followed in HarvestPlus research.

#### Working Papers

Preliminary material and research results to stimulate discussion and critical comment. Most are eventually printed in peer-reviewed publications.

#### Research for Action

Literature reviews, descriptive analyses, and other findings generated from HarvestPlus research and program activities that are less technical and more applied in nature.

#### Progress Briefs

Launched in 2014, present research evidence and progress on development and delivery of biofortified crops.

### Crop Development

#### Journal Articles


Books


Nutrition

Journal Articles


Proceedings


HarvestPlus


FASEB Journal 28, 1, Supplement

Federation of American Societies for Experimental Biology (FASEB) Journal 28, 1, Supplement


Economics & Policy

Journal Articles
• M. Jain. 2014. India’s struggle against malnutrition — Is the ICDS program the answer? World Development 67(March 2015): 72-89.

General

Books & Reports
IT ALL STARTS WITH A SEED.

One seed. Planting and eating it can mean the difference between blindness and sight. Between a child stunted by poor nutrition, and a child growing to reach her true potential. Between a healthy, productive life, and one compromised at every turn.

Yes, one seed can make a difference.

HarvestPlus is a leader in the global effort to end hidden hunger caused by the lack of essential vitamins and minerals in the diet, such as vitamin A, zinc, and iron.

We develop these nutrient-rich seeds. We make sure they grow as well, if not better, than the ones farmers currently plant. We understand how they will provide better nutrition when eaten in different ways—and we promote them widely, so farmers and consumers know that these seeds mean a healthier future for their families, communities, and country.

All this requires extraordinary cooperation. With diverse partners in more than 40 countries, we bring extraordinary assets to the table. The ‘Plus’ in our name doesn’t merely refer to nutritious crops. It’s a symbol of our tenacity and commitment to bridge the divide between disciplines and sectors in search of robust solutions to hidden hunger. We challenge assumptions, embrace risk, and demonstrate impact—all in the pursuit of a global health revolution.

HarvestPlus and its partners
Seeding a better life. One seed at a time.