



# Addressing Global Hunger: the Role of Biofortification

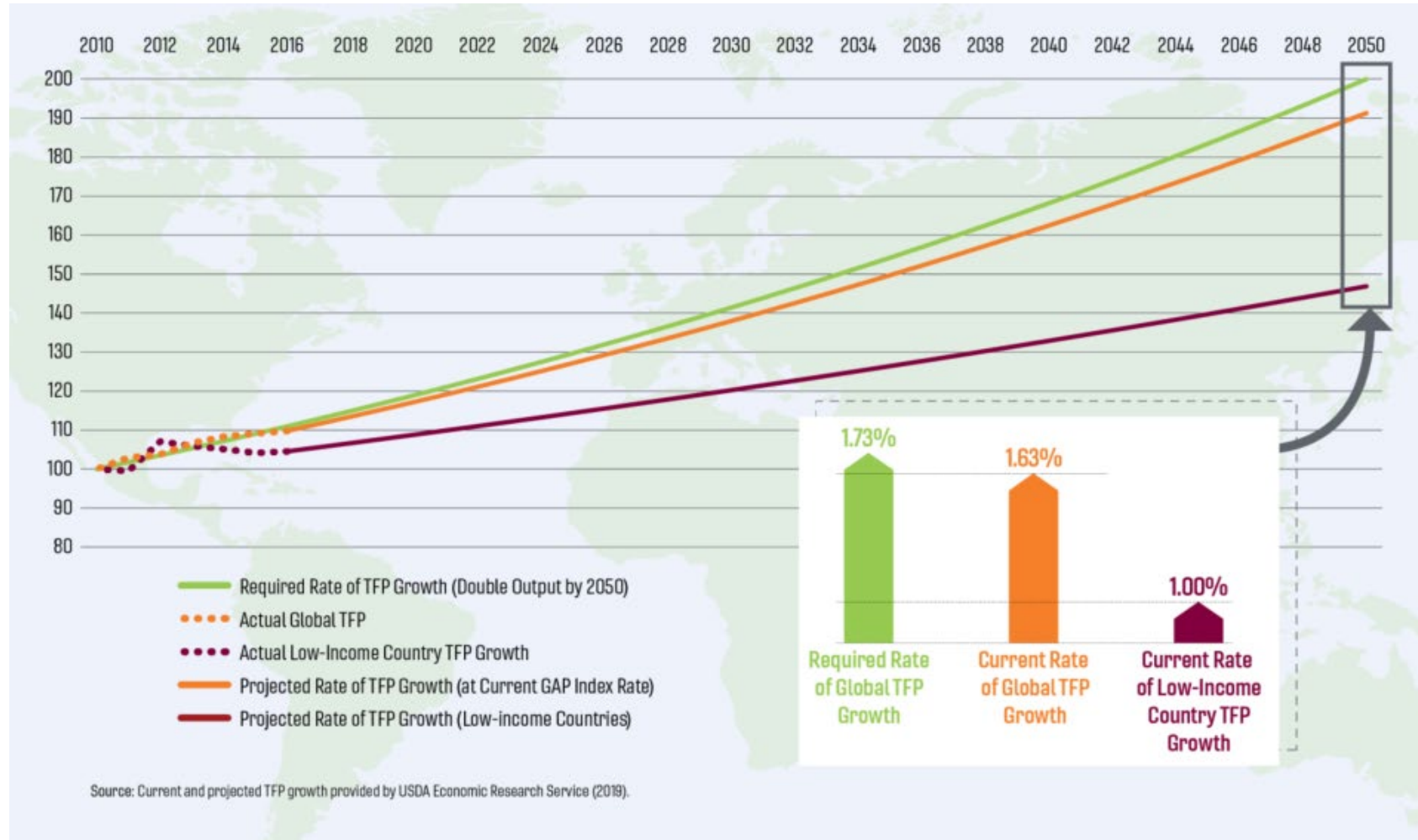
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# Productivity Gaps





# Hunger is on the Rise Again

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**2 billion people** lack  
access to safe, nutritious  
and sufficient food

Globally, **one in four children**  
are physically and cognitively stunted  
due to poor nutrition





# Climate Change lowers Food Security for Smallholders

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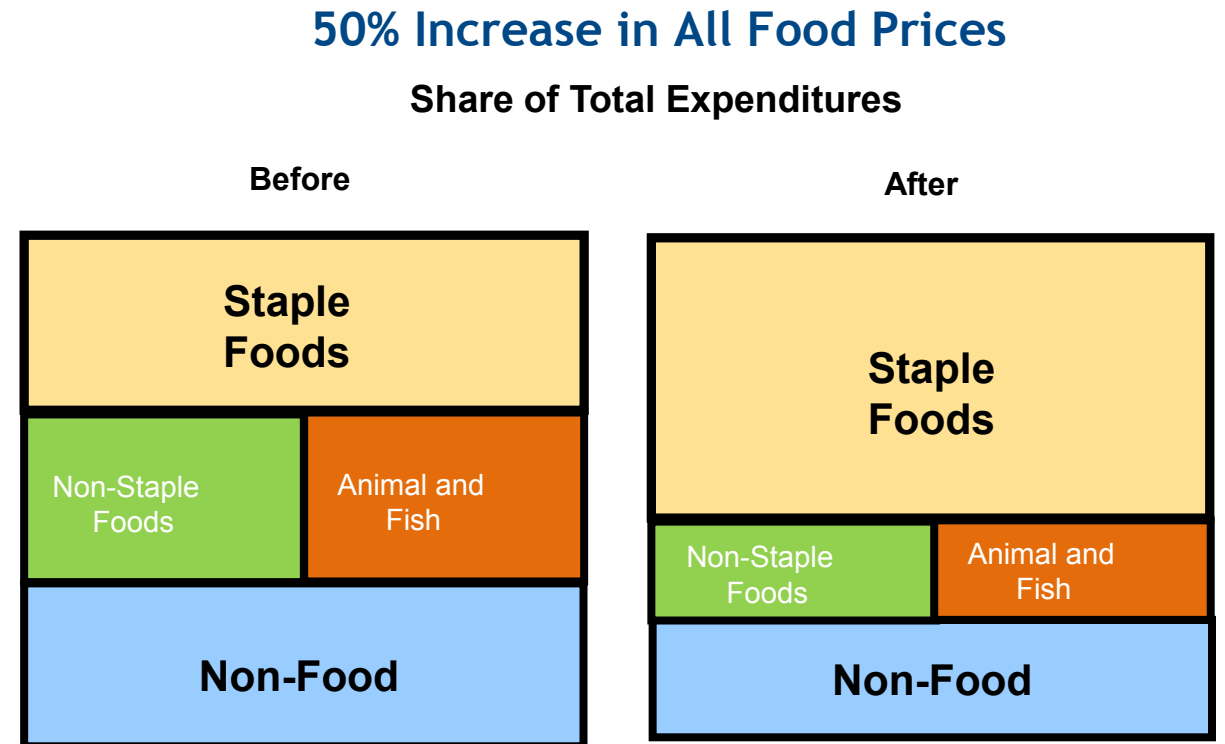
- Rising temperatures, unpredictable rainfall and extreme weather events have negative impacts on:
  - crop yields
  - pest and disease incidence
  - income generation
  - food security
- Dietary diversity is threatened; fruit and vegetable crops are relatively sensitive to environmental changes





# Accessibility of Nutrient Dense Foods

“Unable to afford higher-priced nutrient-dense foods, such as animal proteins and fruits and vegetables, consumers will rely on foods made from cheaper cereal grains for most of their calories” -GAP report

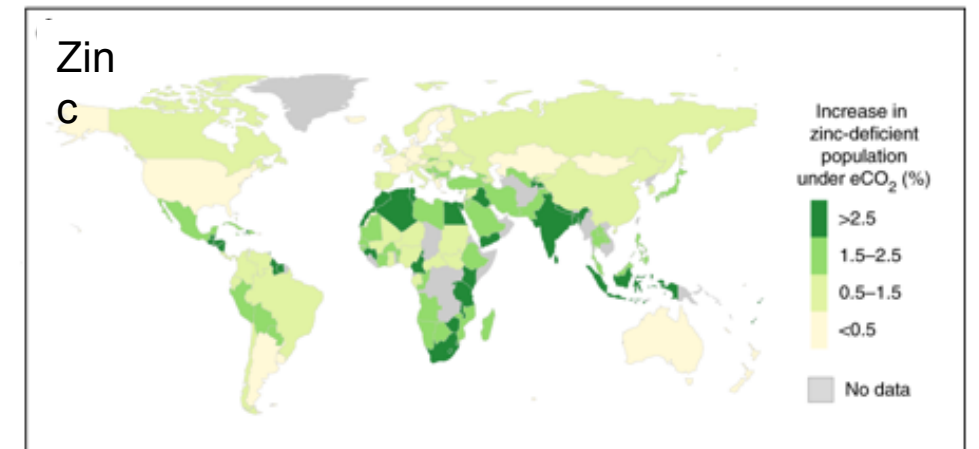
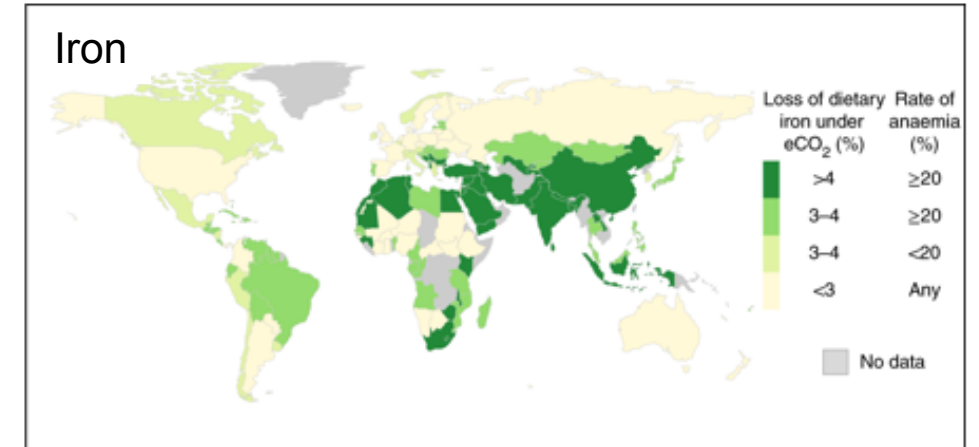


(Bouis, Eozenou, Rahman, 2011)



# Negative Impact of CO<sub>2</sub> Emissions on Crop Nutrition

- **Moreover, rising CO<sub>2</sub> levels will likely cause plants to lose nutritional value**
  - Under rising CO<sub>2</sub> levels, many food crops have iron and zinc contents that are reduced by 3-17% compared with current conditions
  - Elevated CO<sub>2</sub> could cause an additional 175 million people to be zinc deficient
  - 1.4 billion women of childbearing age and children under would lose >4% of dietary iron



Risk of inadequate nutrient intake from elevated atmospheric CO<sub>2</sub> concentrations of 550 ppm. (Smith and Myers 2018).





# A Nutrition Smart, Climate Smart Solution:



**A nourishing, diverse diet  
is the ideal strategy...**

*...but many people can't afford  
or access the right mix of foods (fruits,  
vegetables, grains, animal source foods).*

Complementary nutrition strategies:



**Biofortification**  
of staple foods  
(an up-front investment)



**Fortification**  
added to foods  
(a recurring investment)



**Supplementation**  
Consumed as pills, powders,  
drops, etc. (a recurring investment)



# The HarvestPlus Approach to Biofortification

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HarvestPlus-supported crops are developed through **conventional breeding techniques** (non-GMO) to increase their density of iron, zinc, or vitamin A.

These crops are bred based on the **highest-yielding varieties available**, making them attractive to farmers. Co-development with farmers ensures the crops are fully tailored to their needs.

The crops are **climate-smart**—many varieties carry drought- and heat-resistant traits—boosting farmers' climate resilience.

The crops are **global public goods** distributed through government, NGO, and private sector channels to smallholder farm families who often aren't reached by food fortification and supplementation programs.





# Biofortification is Climate-Smart

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- Biofortified crops are bred and tested:
  - To be high yielding
  - for desirable attributes which include resistance to climate change effects such as tolerance to heat, aridity, and drought
  - for increased levels of micronutrients
  - to ensure their nutritious benefits remain even in adverse climates

## Examples:



Heat and drought  
tolerant iron beans



Drought tolerant  
vitamin A maize



Heat tolerant/ low water  
iron pearl millet



# Proven Effective in Improving Health

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## We need Iron for:

- brain development
- immune function
- good energy levels
- healthy pregnancy

## Iron deficiency causes:

- **Anemia**
- fatigue and weakness
- impaired cognition

## We need Vitamin A for:

- vision health
- preventing infections
- fetal development

## Vitamin A deficiency causes:

- **Impaired vision**
- night blindness
- higher risk of infection/death
- poor pregnancy outcomes

## We need Zinc for:

- growth/development
- immune system function
- protein/DNA synthesis
- reproductive health
- healthy body tissues

## Zinc deficiency causes:

- **Stunting**
- susceptibility to infection (e.g. diarrhea, pneumonia)
- cell damage



# HarvestPlus - Catalyzing Biofortified Food Systems

## Ensuring Supply

- Breed and test seeds with CGIAR and national research centers
- Deliver seeds and support to farmers
- Develop seed value chains
- Strengthen local capacities in extension, aggregation, processing, etc.

## Advancing Enabling Environments

- Advocate for biofortification in policies, programs, and budgets
- Support champions networks
- Promote endorsement by global, regional bodies
- Advance global standards

## Marshaling Evidence

- Support independent research on nutritional impact, adoption, and cost-effectiveness
- Evaluate uptake and reach
- Convene experts and stakeholders to share knowledge, lessons, and know-how

## Stimulating Demand

- Forge partnerships with food and distribution companies
- Provide marketing support
- Include biofortified foods in public support and school feeding programs
- Educate consumers
- Engage media and influencers





# Value Chain Approach for a Transformed Food System







# Partnerships for Sustainability

## Working with SMES:

EX: Bola Adeyemo is the founder of a Nigerian women's empowerment cooperative in to improve livelihoods and health in her community—supplied by a plentiful network of vitamin A cassava farmers and processors.



## HARVEST PLUS/GAIN Partnership

A landmark \$35 million partnership between HarvestPlus and the Global Alliance to Improve Nutrition will accelerate commercial development and distribution of food products made with biofortified ingredients in key Asian and African countries.

The program focuses on nine focus crops in six priority countries.



# Productivity must include Nutrition and Sustainability

**Climate smart interventions to improve productivity can lead to:**

- Increased productivity farm-based incomes
- Enhanced community resilience
- Reduced vulnerability to shocks
- Reduced emissions

**Making them nutrition smart as well helps:**

- Reduce micronutrient deficiencies
- Improve health
- Achieve SDGs and other development goals



*A Zambian farmer enjoys nutritious harvest of Vitamin A maize to eat and sell, despite droughts in his region*



## Stay Connected!

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**HarvestPlus**  
Better Crops • Better Nutrition

