

Call for Action to Address Hidden Hunger: Enabling Biofortification to Address Micronutrient Deficiencies

The Burden of Micronutrient Deficiency in Nigeria

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Nigeria has been implementing a mandatory national fortification strategy for food staples namely flour, sugar, and edible oils with vitamin A, iron, zinc and folic acid for almost two decades. With the exception of products like fortified oil and sugar, the coverage of micro-nutrient interventions like supplementation has remained relatively low.

According to the National Food Consumption and Micro-nutrient Survey (2021) the use of iron/micro-nutrient powder (seven percent) and therapeutic feeds in the 12 month preceding the survey (three percent) was low. At the national level, the prevalence of children (aged 6-59 months) receiving a vitamin A capsule in the past six months was 25 percent. As a result, despite some initial gains significant efforts are still needed to address micro-nutrient deficiencies. Sixty-two percent of children under age five are anaemic and approximately 55 percent of the women of reproductive age are anaemic (National Food Consumption and Micro-nutrient Survey -FCMS 2021).

The rates are higher among adolescent girls, and children in rural areas particularly in the Northwest where 73 percent of children are anaemic. Anaemia is highly correlated with maternal morbidity and mortality and unfortunately nearly 82 percent of pregnant women in Nigeria are anaemic.

Furthermore, 33 percent of children in Nigeria are stunted where deficiencies of zinc, iron and vitamin A are important contributors (FCMS, 2021). Annually, Nigeria loses over USD1.5 billion¹ in GDP to vitamin and mineral deficiencies. The World Food Program² estimates approximately 72 percent of Nigeria's population cannot afford a nutritionally adequate diet and 91 percent cannot afford a healthy diet.

Role of Biofortification in Combating Micro-Nutrient Deficiencies

Biofortification is a process by which the nutritional quality of a staple food crop is improved with additional micro-nutrients (vitamins and minerals) through a conventional plant breeding process (WHO). This differs from food fortification in that fortification is a post-harvest industrial method to enhance the nutritional quality of food products. Biofortification presents an opportunity to reach communities where supplementation and fortification interventions may be costly to implement. Biofortification offers many advantages.

First, biofortification is based on locally available foods which are consumed as staple foods by majority of the people in the country including the poor and vulnerable. Biofortification of staple crops allows large numbers of low income households to affordably and regularly access micro-nutrients as a part of their daily diets. The recently released FCMS highlights that biofortified vitamin A maize is already being consumed by nearly 13 percent of non-pregnant women and there is no significant

1. World Bank Data; [The Guardian](#)
2. SOFI, 2020

difference in access to such products across income quintiles or by rural urban. On the other hand, branded flours and supplementation have struggled to comprehensively penetrate rural areas.

Secondly, biofortification of staple crops is a cost-effective method to reach tens of millions of people on a sustainable basis. Biofortification involves a one-time investment into a crop system that continues to fortify and sustain thereby keeping recurrent costs low. Several studies have used Disability-Adjusted Life Years (DALYs) in cost-effectiveness analyses to quantify the effect of crop biofortification in different countries. All of these studies suggest that biofortification can be a highly cost-effective micro-nutrient intervention, which often costs only a few dollars per DALY saved, far below the World Bank's (2020) threshold of \$270 for cost-effectiveness. After the initial outlay of funds, the recurrent costs are minimal. The beneficiary farmers continue to grow and benefit from the crops.

Third, biofortified varieties are only released once they have reached a highly competitive level of yield. Biofortified crops provide sustainable income gains for poor farmers through yield gains. Importantly a subset of biofortified varieties (vitamin A maize, iron beans and cassava) are climate smart in that they are drought tolerant and mature early against the changing rainfall patterns.

Based on available evidence, biofortification has been recognized as a “game changing solution” by AU-NEPAD under the CAADP/Malabo declaration frameworks. Finally, biofortified products are highly impactful as captured in the [evidence document here](#).

HarvestPlus, with its public and private sector partners, has led the delivery of biofortified crops in Nigeria since 2013. HarvestPlus puts Nigerian smallholder farmers at the center of the African agriculture agenda, while providing employment for women and youth in rural and urban communities. Leading the expansion of biofortified crops on the continent, HarvestPlus' interventions have resulted in:

- Over 3 million farmers in Nigeria reached with biofortified crops to date, improving their nutrition, health, and food security.
- More than one million people in Nigeria making significant income from full time jobs as producers, market facilitators, bulking agents, processors and distributors of biofortified planting materials and food products.
- Facilitated by HarvestPlus Nigeria, hundreds of Nigerian food businesses specializing in biofortified food products have been launched, a model that is being replicated across the continent.
- 50 nutrient-enriched food products have been developed, 10 of which have been commercialized.

As the leading voice on the scale up of biofortified crops, HarvestPlus Nigeria continues to multiply the impact of an innovative and sustainable solution at the nexus of agricultural research, food security, and nutrition. Since 2013, eight varieties of vitamin A maize, six varieties of vitamin A cassava (VAC), and three varieties of vitamin A sweet potato have been released, while iron pearl millet and zinc rice are currently in testing in Nigeria.

Policy Progress and Future Priority Actions (“Recommended Solution”)

Nigeria has made initial progress in explicitly identifying and defining biofortification as a key strategy to address micro-nutrient deficiencies. See for example the national guidelines on Micro-Nutrient Deficiency Control (MNDC) by the Federal Ministry of Health 2014 – 2019, the National Agricultural Technology and Investment Plan (NATIP) 2021 – 2024 and the Agricultural Sector Food Security and Nutrition Strategy (AFSNS) by the Federal Ministry of Agriculture and Rural Development 2016 – 2025. The recently drafted National Science Technology and Innovation policy also includes biofortification in a substantive way. These positive supports provide an important framework for intervention for biofortification.

Table 1. Policy Findings, Implications and Proposed interventions for Scaling Biofortification

Key Policy Finding	Proposed Action
<p>The NATIP includes HarvestPlus under the Food, Consumption and Nutrition Security component, where the target is to make nutritious foods available at local level through, nutrition enhancement of foods through breeding, quality control, school feeding programs, promotion and awareness creation and post-harvest management.</p>	<p>Direct planning and investment to scale biofortification is required to follow up on the provisions under NATIP 2021-2024.</p>
<p>The AFSNS captures biofortification as strategic priority area 1 where the focus is to increase nationwide consumption and utilization. The AFSNS also provides significant budgetary support for biofortified crops.</p>	<p>The spends against budgetary allocation are currently unclear. Desk officers need guidance to help them allocate resources across R&D, extension and promotional activities.</p> <p>Planning, technical updating with the leadership of the Ministry of Agriculture can provide significant traction to the implementation of the policy.</p>
<p>National Agriculture Seed Council Act 2019 and Plant Varieties Protection Act 2021 advises the national research system on the changing pattern of seed demand and farmers needs. NASC is the regulator for the seed industry in Nigeria. The Acts also envisage reforms for varietal release. Biofortification is not explicitly supported within the Acts.</p>	<p>Introduce an addendum to ensure the inclusion of biofortification to provide supports for early generation seed, certification and quality supervision.</p> <p>Support the inclusion of varietal release standards for minimum micronutrient content to help mainstream biofortification.</p>
<p>National Guidelines on Micronutrient Deficiency Control (MNDC) by the Federal Ministry of Health 2014 – 2019 recognized biofortification as one critical intervention for micronutrient deficiency control.</p>	<p>These guidelines received technical input from HarvestPlus for the incorporation of biofortification. The reviewed document was validated and approved in 2021. The guidelines identified issues for scaling biofortification but did not propose a detailed policy prescription or guidance to collaborating ministries for coordinated efforts.</p>
<p>The Central Bank of Nigeria's efforts under Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) – including the guarantee and technical schemes and lending activities under NIRSAL PLC have so far not been leveraged in commercialization activities for biofortification.</p>	<p>A dedicated program to finance seed entrepreneurs and other value chain actors in biofortified crop value chains can be a critical support for commercialization and scaling.</p>

However, a strong planning process and coordination in investments can ensure adequate implementation of policy measures. Very recently the Ministry of Agriculture has initiated a cell or unit where Nutrition interventions, especially biofortification, is being championed as a part of the forward planning and implementation by a dedicated resource.

Summary Roadmap

Significant policy measures were being undertaken since 2018 in Nigeria, with elections coming up in 2022 there will likely be another window of opportunity for special initiatives to move forward.

- Debriefing on key recommendations from landscape study has been conducted as part of progress review with FMARD.
- Develop an overall framework for allocating spends under the AFSNS and National Science and Technology Policy.
- Conduct FMARD desk officer training and jointly develop milestones and plan for spending existent allocations for biofortification.
- Partner with IFPRI to facilitate integration of biofortification in Nigeria Agenda 2050.
- Scenario and investment analysis for R&D Policy to advocate for dedicated line for biofortification with medium term budgetary support.
- Support reforms at the level of the varietal release committee to ensure minimum micronutrient content for iron millets and Vit A maize.
- Actively engage with NIRSAL and MoF for technical assistance and special financing guarantees for biofortified crops.