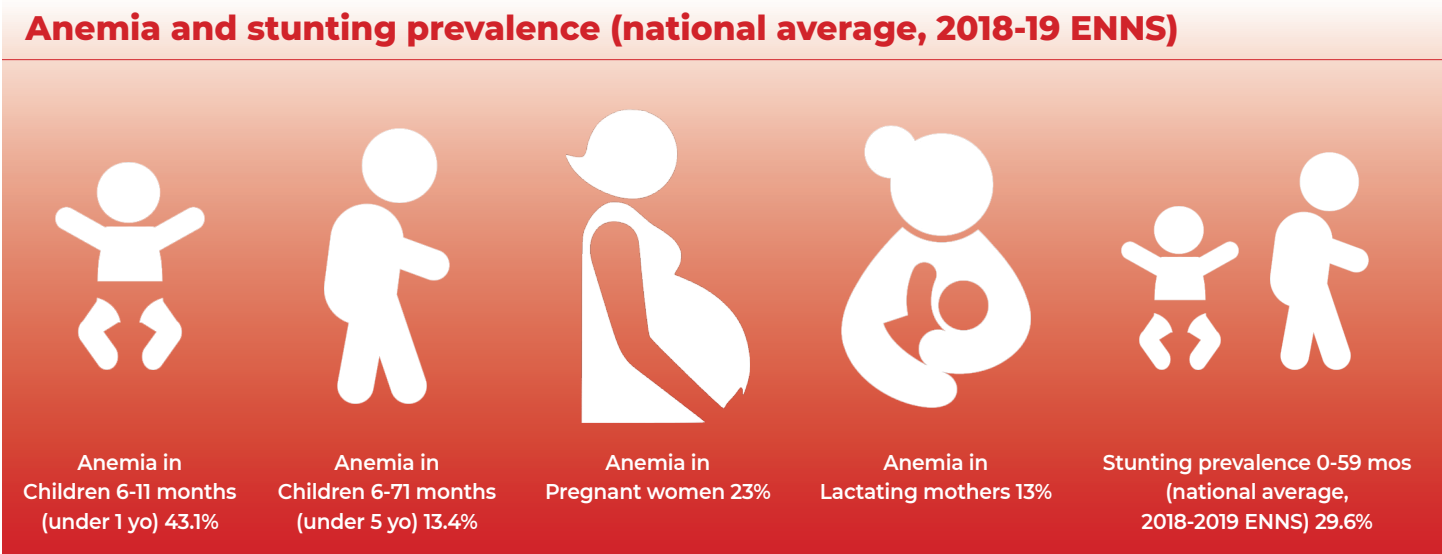




HEALTHIER RICE VARIETIES HIGH IRON AND ZINC RICE

Deficiencies in iron and zinc are the most pervasive form of malnutrition. The International Rice Research Institute (IRRI) and its national partners in Bangladesh, Indonesia, and the Philippines are developing high iron and zinc rice (HIZR) as a novel, food-based approach to complement current interventions that aim to alleviate iron and zinc deficiencies. IRRI scientists and collaborators were successful in developing a proof of concept—a product delivering the desired levels of iron and zinc in milled rice.



Iron and Zinc deficiencies

Iron and zinc deficiencies are the most pervasive forms of malnutrition worldwide, and are key causes of anemia and stunting. According to the 2021 Global Nutrition Report, an estimated 30% of the world's population is anemic and 162 million children under the age of five are stunted. Iron deficiency can affect productivity and cause serious health consequences, including impaired mental development and learning capacity, increased weakness and fatigue, and adverse pregnancy outcomes. Similarly, zinc deficiency is a major cause of stunting among children, putting them at risk of compromised cognitive development and physical capability, and a weak immune system.

In the Philippines, data from the 2018-19 Expanded National Nutrition Survey (ENNS) shows that iron and zinc deficiencies continue to be a public health issue across all age groups, with iron as the micronutrient with the lowest supply in the typical Filipino diet. Anemia is especially pervasive among infants 6-11 months old (43.1%) and pregnant women (23%). Meanwhile, 1 in 3 Filipino children under the age of 5 is stunted. A UNICEF study on the economic consequences of malnutrition, published in 2017, revealed that stunting costs the Philippines over \$3.1 billion annually in terms of productivity losses

Strategies for reducing zinc and iron deficiency

- Dietary diversification. The ideal way to ensure sufficient iron and zinc intake is to consume a diverse diet that includes good sources of iron and zinc.
- Supplementation. Iron and zinc pill or syrup.
- Food fortification. Fortified food items include rice, flour, cereal, or noodles.
- Crop biofortification. Biofortification is the process by which the nutritional quality of food crops is improved through agronomic practices, conventional plant breeding, or modern biotechnology. Biofortification offers a sustainable and economic approach particularly to people with limited access to other dietary interventions.

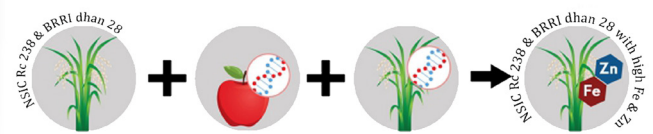
Why rice for iron and zinc biofortification?

In countries like Bangladesh, Indonesia, and the Philippines, rice is deeply embedded in social and cultural aspects of society and is the major staple food. In the Philippines, rice and related products remain the top consumed food

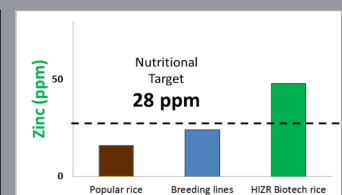
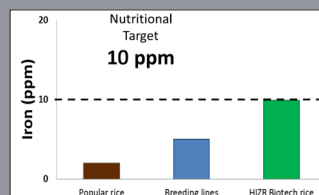
group among all ages and social classes, and is the top source of energy, protein, and essential micronutrients like iron and calcium. Enriching iron and zinc in rice will improve the dietary intake of these micronutrients in populations whose main source of nutrients is rice.

In the process of developing HIZR, IRRI scientists and collaborators added a gene from rice responsible for iron and zinc movement from plant roots and leaves into the rice grain. This was combined with ferritin genes from bean or apple to enhance iron storage capacity of the grain. This particular protein is a primary source of iron for people following vegetarian diets and is readily absorbed by the human body.

HIGH IRON AND ZINC RICE PROCESS



HIZR targets the development of rice lines with at least 10ppm iron and 28 ppm zinc in the milled grain. This level potentially meets the nutritional target to provide 30–50% of the estimated average requirement for at-risk populations.



<https://irri.org/hizr-faqs>

IRRI aims to improve livelihoods and nutrition, alleviate poverty, hunger, and malnutrition among those who depend on rice-based agri-food systems. In doing so, IRRI's work protects the health of rice farmers and consumers, and the environmental sustainability of rice farming in a world challenged by climate change. IRRI's work promotes the empowerment of women and supports opportunities for youth in an equitable agri-food system.

IRRI is a member of CGIAR.

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