# FOOD FORTIFICATION: COMBATING MICRONUTRIENT DEFICIENCY IN INDIA

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#### Abstract

Micronutrient deficiency, often termed as 'hidden hunger,' affects a significant portion of the Indian population. Essential nutrients like iron, iodine, vitamin A, and folic acid are critical for growth, development, and disease prevention. Food fortification, the process of adding micronutrients to commonly consumed foods, has emerged as a proven public health strategy to address these deficiencies at a population level. This review explores the historical background, implementation strategies, s...

KEYWORDS - food fortification, micronutrient deficiency, India, anemia, public health, nutrition policy

#### Introduction

Despite being self-sufficient in food production, India faces widespread undernutrition and micronutrient deficiencies, especially among vulnerable groups like children, women, and rural communities. Iron deficiency is a leading cause of anemia, while vitamin A, iodine, and folic acid deficiencies lead to compromised immunity, developmental delays, and preventable blindness. According to NFHS-3, over 70% of preschool children and 55% of women are anemic. These alarming figures underscore the need for sustainable and population-wide interventions. Food fortification offers a passive yet powerful approach, delivering essential nutrients through staple foods without altering dietary habits.

#### The Burden of Micronutrient Deficiency in India

Micronutrient deficiencies in India contribute to anemia, impaired cognitive development, and increased maternal and child mortality. The most common deficiencies include iron, iodine, vitamin A, folic acid, and zinc. According to NFHS-3 (2005–06), 70% of children aged 6–59 months were anemic, and 55% of women aged 15-49 years had moderate to severe anemia. Iodine deficiency remains endemic in certain regions, and vitamin A deficiency continues to cause preventable blindness. These deficiencies reduce productivity and increase the national disease burden, resulting in an estimated economic loss of 2–3% of India's GDP.

## **History and Rationale of Food Fortification in India**

India's first large-scale food fortification initiative began with iodized salt in the 1960s under the National Goitre Control Programme. By the 1990s, mandatory iodization of salt

significantly reduced goiter prevalence. Over time, technological advances and increasing awareness led to broader efforts to fortify other staples. Food fortification is scientifically backed by WHO and FAO as a low-cost and scalable solution, especially in countries with large, vulnerable populations. Fortification requires minimal behavior change and can be integrated into industrial food processing systems.

**Fortification of Commonly Consumed Foods in India** 

Salt: Iodized salt and double fortified salt (iron + iodine) have significantly reduced iodine deficiency and anemia.

Wheat Flour: Fortified with iron, folic acid, and B12, wheat flour fortification programs in states like Punjab and Madhya Pradesh have reduced anemia in adolescent girls.

Rice: Fortified rice kernels (FRK) mixed with normal rice improve iron intake. Used in school and public distribution meals.

Edible Oil: Fortified with vitamins A and D, especially in Gujarat and Rajasthan, reducing night blindness and improving immunity.

Milk: Fortified with vitamin D to address widespread deficiency, distributed through cooperatives and school programs.

## **Scientific Evidence and Public Health Impact**

Studies have confirmed the effectiveness of fortified foods in improving nutritional indicators. Fortified wheat and rice improved hemoglobin levels; fortified oil improved vitamin A status; and fortified milk boosted vitamin D levels. The Indian Council of Medical Research (ICMR) and WHO have endorsed fortification as a vital public health tool. Pilot studies across multiple states show consistent outcomes in reducing anemia, improving cognitive outcomes in children, and enhancing general health.

## **Challenges and Limitations**

Challenges include uneven access to fortified foods, limited awareness among consumers, and inadequate quality control across decentralized food processing units. Resistance from smallscale manufacturers and lack of mandatory fortification policies also hinder progress. Further, monitoring and evaluation mechanisms need strengthening to ensure effectiveness. The cost of premixes and technological constraints in rural milling and oil units add complexity.

## **Government Initiatives and Policy Support**

The Food Safety and Standards Authority of India (FSSAI) launched the 'Food Fortification Resource Centre' to guide and support fortification efforts. States have integrated fortified foods into the Public Distribution System, Mid-Day Meal Scheme, and Integrated Child

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Development Services (ICDS). Support from global organizations like GAIN, UNICEF, and the World Bank has helped scale projects. National Nutrition Strategy (NITI Aayog) and the National Health Policy (2015) recognize food fortification as a priority intervention.

## Conclusion

Food fortification is a scientifically proven, economically viable, and socially acceptable intervention to tackle India's widespread micronutrient deficiencies. By leveraging commonly consumed staples like salt, wheat, rice, oil, and milk, India can significantly improve the nutritional status of its population. With robust policy support, industry participation, and public awareness, food fortification can contribute to achieving national nutrition and health goals, fostering a healthier and more productive population.

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