IZiNCG

Quick facts about zinc fortification

More than one billion people are at risk of inadequate zinc intake.

- Zinc is an essential nutrient for immune function, child health and development, and reproductive health (1).
- An estimated 15% of the global population (1.13 billion individuals) is at risk of inadequate zinc intake (2).
- Based on available biochemical, food consumption and child growth data, zinc deficiency is estimated to be a public health problem[1] in 40 countries, concentrated primarily in sub-Saharan Africa and South Asia (2).

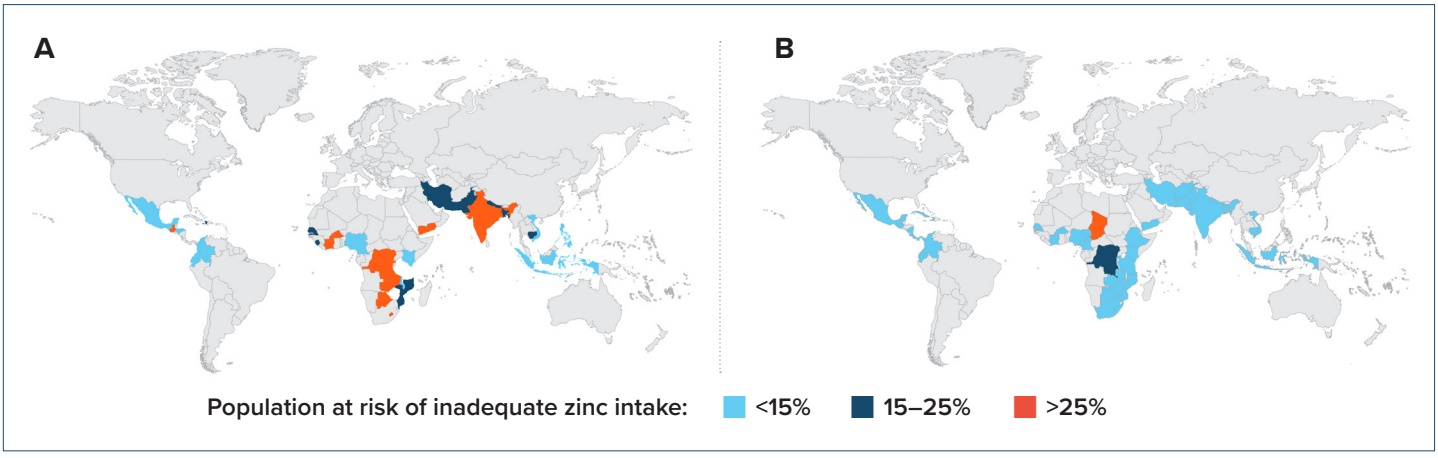
Large-scale food fortification (LSFF) with zinc can halve the proportion at risk of inadequate zinc intake globally.

In May 2023, the World Health Assembly passed a resolution that calls on Member States to accelerate LSFF as a critically important tool in the fight against micronutrient deficiencies (4). If LSFF of staple foods with zinc was adopted and/or optimized in all 40 countries where zinc deficiency is a public health problem, we could reduce the percentage of the population at risk of inadequate zinc intake by 50% **(Figure 1)**.

Large-Scale Food Fortification:

World Health Organization (WHO) defines fortification as the practice of deliberately increasing the content of one or more micronutrients (i.e., vitamins and minerals) in a food or condiment to improve the nutritional quality of the food supply and provide a public health benefit with minimal risk to health (3). It is one of the most scalable, sustainable, and cost-effective tools available to reduce micronutrient deficiencies and improve nutrition worldwide.

Figure 1. Estimated percentage of the population at risk of inadequate zinc intake, considering current LSFF programs **(Panel A)** and universal application of zinc fortification standards and full industry compliance **(Panel B)**, for 40 countries where zinc deficiency is considered to be a public health problem (2).



1 Zinc deficiency was considered a public health problem in low- and middle-income countries where the percentage of the population at risk of inadequate zinc intake due to inadequate zinc in the national food supply was >25% and the prevalence of stunting among children less than 5 years of age was >20%, or where the percentage of pre-school children or women of reproductive age with low plasma zinc concentration was > 20% according to available national surveys.

Zinc fortification is not a silver bullet for eliminating zinc deficiency but has the potential to improve dietary zinc intake and related health outcomes at the population level.

LSFF with zinc is effective, safe and cost-effective.

- A systematic review from 2021 showed that zinc fortification, alone or together with other micronutrients, led to a 24-55% decrease in the prevalence of zinc deficiency with no adverse outcomes reported (5).
- It costs as little as $0.44 per child over a 10-year period to achieve adequate dietary zinc intake through fortification (6).

LSFF with zinc can serve as a key nutrition strategy in countries where zinc deficiency is a public health problem.

At present, LSFF with zinc is an underutilized strategy for addressing zinc deficiency in the 40 countries where zinc deficiency is a public health problem **(Figure 2)**:

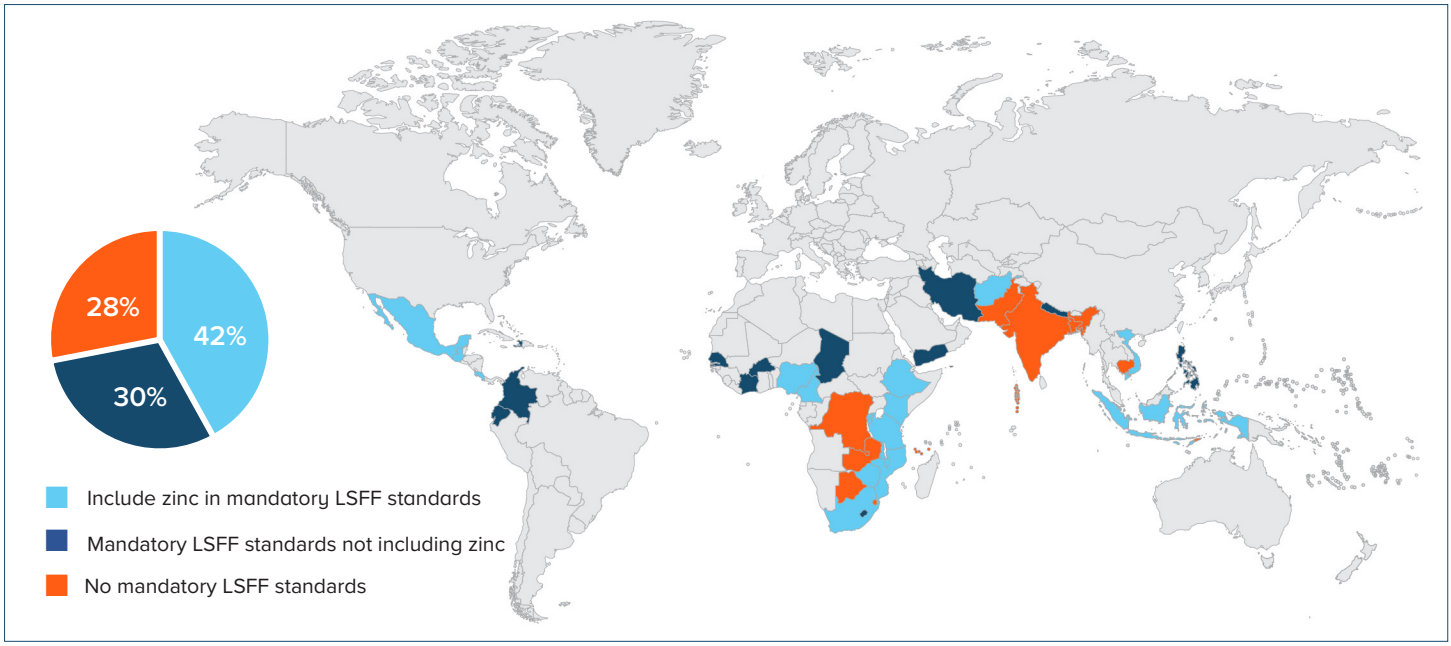
- **Only 17 countries include zinc in mandatory LSFF standards.** These countries could benefit from optimizing the program, food vehicles for zinc, and/or zinc fortification levels.
- **12 countries have mandatory LSFF but are not including zinc in the standard.** These countries could benefit from including zinc.
- **11 countries do not have a LSFF program or have voluntary standards.** These countries could benefit from establishing mandatory LSFF.

Guidelines are available for the fortification of wheat flour, maize flour and rice with zinc.

WHO guidelines are available for the three food vehicles currently used for large-scale food fortification (LSFF) with zinc – wheat flour, maize flour, and rice. For maize flour (7) and wheat flour (8), the WHO guidelines suggest the amount of zinc to be added according to extraction rate and average per capita consumption level. In addition to the WHO guideline for rice (9), publications are available for suggested zinc amounts for fortification (10).

For further guidance, refer to general guidelines on food fortification with micronutrients (3), instructions for production of extruded fortified rice kernels (11), and the manual for monitoring of wheat flour fortification (12).

Figure 2. Zinc fortification status (maize flour, wheat flour, rice) in 40 countries where zinc deficiency is considered a public health problem.



When is zinc fortification recommended?

- Zinc deficiency has been identified as a public health problem based on plasma/serum zinc data (recommended) or based on food consumption data (which provides an estimate of zinc intake and is a proxy indicator for zinc status).
- A landscape analysis has assessed other zinc sources available to the target population and confirmed a need that can be met by fortification (in the context of complementary interventions).
- A suitable food vehicle exists that is both widely consumed (e.g. wheat flour, maize flour, rice) and centrally processed, making it "fortifiable".
- Fortified foods can be made available, affordable and in compliance with fortification mandates.

What if LSFF of cereal staples isn't an option?

In countries where the proportion of industrially processed wheat flour, maize flour and rice and/or consumption of these foods is low, alternative fortification vehicles such as salt and bouillon cubes should be considered. Zinc biofortification of maize, rice, sorghum or wheat is another alternative. In addition to these population-based strategies, dietary diversification, micronutrient powders or supplements are likely to be needed by higher-risk populations.

Key reference documents

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7. WHO Guideline: fortification of maize flour and corn meal with vitamins and minerals. Geneva: World Health Organization; 2016.
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About IZiNCG

IZiNCG is the International Zinc Nutrition Consultative Group whose primary objectives are to promote and assist efforts to reduce global zinc deficiency through interpretation of nutrition science, dissemination of information, and provision of technical assistance to national governments and international agencies. IZiNCG focuses on identification, prevention and treatment of zinc deficiency in the most vulnerable populations of low-income countries.

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