



## ZINC DEFICIENCY, IZiNCG AND THE ZINC FORTIFICATION TASK FORCE

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# ZINC 101

<b>Biological role:</b>	<ul style="list-style-type: none"><li>• Catalyst, structural element or regulatory ion in several metabolic processes, including DNA transcription, gene expression, signal transduction, and endocrine function</li><li>• Important for immune function, reproductive health, child growth and development</li></ul>
<b>Groups vulnerable to deficiency:</b>	<ul style="list-style-type: none"><li>• Infants, young children, pregnant women</li></ul>
<b>Dietary sources:</b>	<ul style="list-style-type: none"><li>• Animal-source foods (organ meats and flesh from mammals, poultry and seafood are highest in zinc)</li><li>• Fortified foods</li><li>• Lentils, beans, seeds (note that phytate in plant sources of zinc can impair absorption)</li></ul>
<b>Recommended indicators of Zn status:</b>	<ol style="list-style-type: none"><li>1. Dietary zinc intake</li><li>2. HAZ of growing children</li><li>3. Plasma/serum zinc concentrations</li></ol>

# ADVERSE OUTCOMES ASSOCIATED WITH ZINC DEFICIENCY

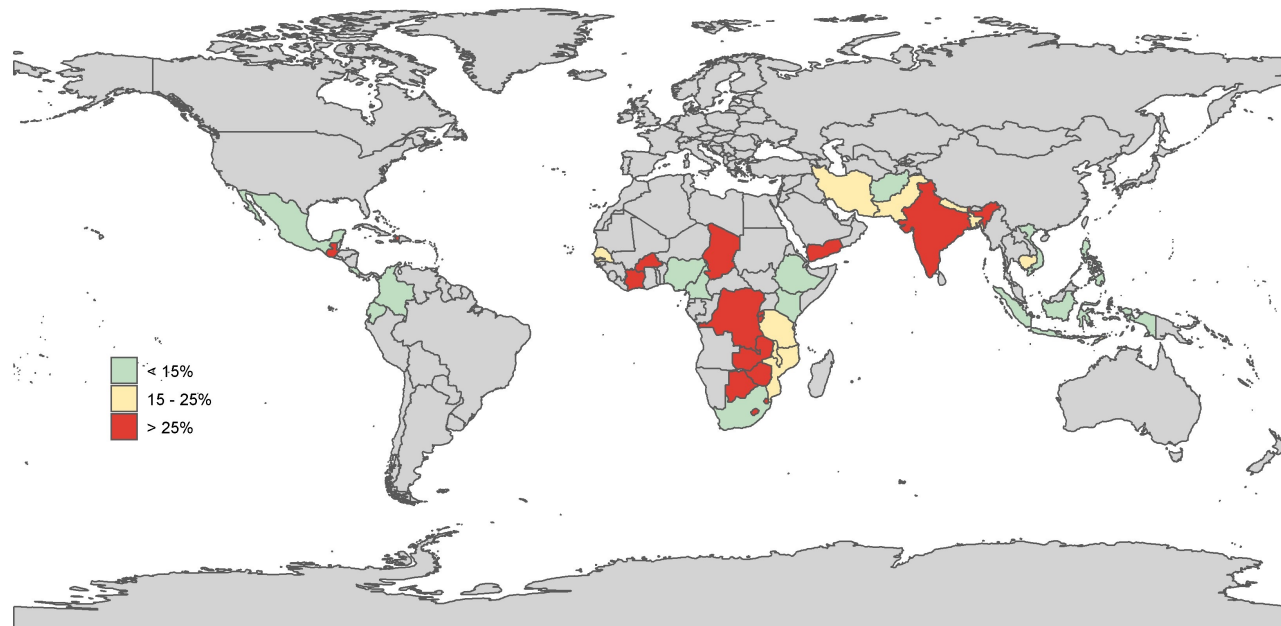
	Attributable deaths with UN prevalences*	Proportion of total deaths of children younger than 5 years	Attributable deaths with NIMS prevalences†	Proportion of total deaths of children younger than 5 years
Fetal growth restriction (<1 month)	817 000	11.8%	817 000	11.8%
Stunting (1-59 months)	1 017 000*	14.7%	1 179 000†	17.0%
Underweight (1-59 months)	999 000*	14.4%	1 180 000†	17.0%
Wasting (1-59 months)	875 000*	12.6%	800 000†	11.5%
Severe wasting (1-59 months)	516 000*	7.4%	540 000†	7.8%
<b>Zinc deficiency (12-59 months)</b>	<b>116 000</b>	<b>1.7%</b>	<b>116 000</b>	<b>1.7%</b>
Vitamin A deficiency (6-59 months)	157 000	2.3%	157 000	2.3%
Suboptimum breastfeeding (0-23 months)	804 000	11.6%	804 000	11.6%
Joint effects of fetal growth restriction and suboptimum breastfeeding in neonates	1 348 000	19.4%	1 348 000	19.4%
Joint effects of fetal growth restriction, suboptimum breastfeeding, stunting, wasting, and vitamin A and zinc deficiencies (<5 years)	3 097 000	44.7%	3 149 000	45.4%

Data are to the nearest thousand. \*Prevalence estimates from the UN. †Prevalence estimates from Nutrition Impact Model Study (NIMS).

**Table 2: Global deaths in children younger than 5 years attributed to nutritional disorders**

- ▶ ↑ incidence of diarrhea and respiratory infections in children
- ▶ ↑ risk of child stunting
- ▶ ↑ risk of preterm birth
- ▶ ↑ risk of child mortality

# ZINC DEFICIENCY IS A PUBLIC HEALTH PROBLEM IN 40 LMICs



- ▶ 18 countries with an estimated prevalence of inadequate zinc intake > 25% and prevalence of stunting > 20%
- ▶ 18 countries with a prevalence of low plasma zinc concentration among WRA or PSC > 20%
- ▶ 4 countries meeting all 3 criteria

# WHAT IS IZiNCG?

- ▶ International **Z**inc **N**utrition **C**onsultative **G**roup
- ▶ An international group whose primary objectives are to promote and assist efforts to reduce the global burden of zinc deficiency.
- ▶ IZiNCG focuses on the identification, prevention and treatment of zinc deficiency in the most vulnerable populations in low-income countries.



# WHAT DOES IZINCG DO?

TECHNICAL ASSISTANCE, INTERPRETATION & DISSEMINATION OF RESEARCH	
Applied Research	Programmatic & Policy Guidance
<ul style="list-style-type: none"> <li>• RCT of different doses, forms, and frequencies of zinc supplementation in young Bangladeshi infants</li> </ul>	<ul style="list-style-type: none"> <li>• Technical briefs posted to IZiNCG website</li> </ul>
<ul style="list-style-type: none"> <li>• Efficacy trial of multiply-fortified salt among WRA</li> </ul>	<ul style="list-style-type: none"> <li>• FAO/INFOODS/IZiNCG global food composition database for phytate &amp; evaluation of lab methods for phytate assessment</li> </ul>
<ul style="list-style-type: none"> <li>• Kinetic modeling for zinc metabolism in stunted, zinc-deficient infants</li> </ul>	<ul style="list-style-type: none"> <li>• Incorporation of zinc deficiency data into WHO Micronutrient Database</li> </ul>
<ul style="list-style-type: none"> <li>• Comparison of laboratory methods for analysis of plasma zinc</li> </ul>	<ul style="list-style-type: none"> <li>• Working group for the promotion of biomarkers of micronutrient status in national nutrition/health surveys</li> </ul>
<ul style="list-style-type: none"> <li>• BRINDA2: Adjusting plasma/serum zinc for inflammation</li> </ul>	<ul style="list-style-type: none"> <li>• Zinc Fortification Task Force</li> </ul>
<ul style="list-style-type: none"> <li>• Systematic review of tolerable upper intake level in young children</li> </ul>	<ul style="list-style-type: none"> <li>• Communications, advocacy, fundraising</li> </ul>

# ZINC FORTIFICATION TASK FORCE

**Goal:** To assess the efficacy and effectiveness of zinc fortification interventions, and to identify opportunities to enhance impact.

## **Task force members:**

- ▶ GAIN, FFI, Nutrition International, IZiNCG (UCSF, BMGF, UC Davis, Johns Hopkins)

## **Summary of key activities:**

- ▶ Systematic review of LSFF with zinc
- ▶ Key informant interviews to identify barriers to and enablers of LSFF with zinc
- ▶ Advocacy resources: Call to Action, Country Briefs
- ▶ Analysis of FBS data to assess potential impact of LSFF with zinc



# KEY RESOURCES

2020

Article  
**Enablers and Experience from 10 Low- and Middle-Income Countries with Mandatory Large-Scale Food Fortification**

Ann Tarini <sup>1,\*</sup>, Mari S. Manger <sup>2,3</sup>, Kenneth H. Brown <sup>3,4</sup>, Mduduzi N. N. Mbuya <sup>3,5</sup>, Laura A. Rowe <sup>3,6</sup>, Frederick Grant <sup>3,7</sup>, Robert E. Black <sup>3,8</sup> and Christine M. McDonald <sup>2,3,9</sup>

<https://www.mdpi.com/journal/nutrients>

2021

**Effects of Foods Fortified with Zinc, Alone or Cofortified with Multiple Micronutrients, on Health and Functional Outcomes: A Systematic Review and Meta-Analysis**

Becky L Tsang,<sup>1,2</sup> Erin Holsted,<sup>1,3</sup> Christine M McDonald,<sup>1,4,5</sup> Kenneth H Brown,<sup>1,6</sup> Robert Black,<sup>1,7</sup> Mduduzi NN Mbuya,<sup>1,8</sup> Frederick Grant,<sup>1,9</sup> Laura A Rowe,<sup>1,2</sup> and Mari S Manger<sup>1,4</sup>

<sup>1</sup>IZiNCG Fortification Task Force; <sup>2</sup>Food Fortification Initiative, Atlanta, GA, USA; <sup>3</sup>Rollins School of Public Health, Emory University, Atlanta, GA, USA; <sup>4</sup>International Zinc Nutrition Consultative Group, Oakland, CA, USA; <sup>5</sup>Department of Pediatrics, University of California San Francisco School of Medicine, San Francisco, CA, USA; <sup>6</sup>Department of Nutrition and Institute for Global Nutrition, University of California, Davis, CA, USA; <sup>7</sup>Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA; <sup>8</sup>Global Alliance for Improved Nutrition, Washington, DC, USA; and <sup>9</sup>Helen Keller International, Phnom Penh, Cambodia

**Call to Action: Addressing zinc deficiency through 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. Yet, at least 17% of the world's population is at risk of inadequate zinc intake based on national food availability. Data from the small number of studies of plasma/serum zinc concentration (PZC) in representative population samples suggest that the risk of deficiency is likely to be even greater than indicated by food availability data. Low- and middle-income countries where diets are predominantly cereal-based and contain limited amounts of animal-source foods are particularly at risk for widespread zinc deficiency.

**Large-scale food fortification (LSFF) is one of the most effective interventions for improving micronutrient status**

**PROVEN:** LSFF is a fast, safe, inexpensive, and scalable intervention for preventing the public health and economic impact of micronutrient deficiencies—but has been largely underutilized. When food fortification programs are implemented well and attain high coverage and quality, there is strong evidence of a significant decrease in the prevalence and burden of micronutrient deficiencies at the population level.

**COST-EFFECTIVE:** Every \$1 invested in food

**INTERNATIONAL ZINC NUTRITION CONSULTATIVE GROUP**

**Fortification as a Strategy to Address Zinc Deficiency in Honduras**

**Zinc is Essential for Human Health**

Zinc is a critical micronutrient for immune function, child health and development, and reproductive health. Seventeen percent of the world's population is estimated to be at risk of inadequate zinc intake, which is due in part to inadequate zinc intake from diets that are low in zinc. New evidence from a systematic review of 59 studies that assessed biochemical and health outcomes after the provision of a zinc-fortified food or beverage found that fortification with zinc, alone or together with other micronutrients, is an efficacious and effective strategy for reducing the prevalence of zinc deficiency in low- and middle-income countries. In addition, fortification with zinc and other micronutrients may increase child weight, reduce episodes of diarrhea and fever, and improve cognitive function.

**Health**

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2022

**GUIDELINE: FORTIFICATION OF WHEAT FLOUR WITH VITAMINS AND MINERALS AS A PUBLIC HEALTH STRATEGY**

“Fortification of wheat flour with zinc may be used as a public health strategy to improve serum/plasma zinc status of populations”



Nourish Life



THANK YOU!

[www.izing.org](http://www.izing.org)

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