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"Strengthening national capacities in food fortification"

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## The importance of vitamins and minerals for human health: considerations for programming in light of the COVID 19 pandemic

### Background

The global COVID 19 pandemic, measures taken to reduce its spread, and the broader economic fallout have disrupted food environments around the world. As a result, food availability and access will be affected in both the short and long term. The price of most foods is expected to rise, especially in import dependent countries, while the price for produce which cannot reach (export) markets is expected to drop. Both situations will have a negative impact on the incomes (and therefore food security) of vulnerable populations. The 2020 Global Report on Food Crises predicts that the number of people facing food insecurity will double, from 135 million in 2019 to 256 million in 2020, as a result of the economic impact of COVID 19.<sup>1</sup> Global poverty is projected to increase for the first time since 1990, and reverse approximately a decade in the world's progress in reducing poverty.<sup>2</sup> The achievement of the Sustainable Development Goals (SDGs), particularly those on poverty and zero hunger, is under considerable threat.

### Nutrition and the Sustainable Development Goals

Nutrition is an input to all the SDGs because undernutrition remains the foremost challenge to development. With its central role in shaping global development priorities, the EU has committed to supporting partner countries to achieve the SDGs by addressing malnutrition through a number of policies and strategies<sup>3,4,5</sup>. However, in light of the COVID 19 pandemic, there is real concern that the nutritional status of vulnerable populations will greatly worsen as income poverty shifts diets towards more affordable staple foods, as fresh fruits and vegetables become less available due to disrupted food systems, and if national social protection programmes and international food relief efforts focus on providing macronutrients (calories) but not micronutrients (vitamins and minerals).

### Why micronutrients matter

Micronutrient deficiencies (MNDs) are the most widespread form of malnutrition, and one of the main causes of disability and death. A lack of just one vitamin or mineral can lead to a range of health problems, such as birth defects, mental retardation, blindness and death. MNDs reduce lifetime earnings by an average of 10 percent. They directly impact economies, costing countries an estimated 2 to 5 percent of gross domestic product. They perpetuate the cycle of poverty, negatively impact economic development,<sup>6,7</sup> and undermine all other development investments. At least half of all children aged 6 months to 5 years, and more than 2 billion adults and children, already suffer from MNDs. The effects of COVID 19 threaten to make this dire situation worse, and at a time when adequate intake of micronutrients is imperative. At every life stage, micronutrients are crucial to immune system function and, therefore, to increasing our resistance to infectious disease. Annex 1 presents ten vitamins and minerals needed to sustain a strong immune system, and their specific contributions to the immune response. The effects of COVID 19 on livelihoods and food systems will decrease access to the diets that provide these micronutrients, which will in turn increase vulnerability to the infection itself.

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<sup>1</sup> 2020 Global Report on Food Crises. Joint Analysis for Better Decisions.

<sup>2</sup> Estimates Of The Impact Of Covid-19 On Global Poverty. WIDER Working Paper: UNU-WIDER.

<sup>3</sup> EC (2014) Action Plan on Nutrition, SWD (2014) 234, 3 July, [https://ec.europa.eu/europeaid/sites/devco/files/swdaction-plan-on-nutrition-234-2014\\_en.pdf](https://ec.europa.eu/europeaid/sites/devco/files/swdaction-plan-on-nutrition-234-2014_en.pdf)

<sup>4</sup> EC (2013) Enhancing Maternal and Child Nutrition in External Assistance: An EU Policy Framework, SWD 72, 12 March; SWD (2013): 104, 27 March, [http://ec.europa.eu/europeaid/documents/enhancing\\_maternalchild\\_nutrition\\_in\\_external\\_assistance\\_en.pdf](http://ec.europa.eu/europeaid/documents/enhancing_maternalchild_nutrition_in_external_assistance_en.pdf)

<sup>5</sup> EU. THE NEW EUROPEAN CONSENSUS ON DEVELOPMENT 'OUR WORLD, OUR DIGNITY, OUR FUTURE'. June 2017.

[https://www.consilium.europa.eu/media/24004/european-consensus-on-development-2-june-2017-clean\\_final.pdf](https://www.consilium.europa.eu/media/24004/european-consensus-on-development-2-june-2017-clean_final.pdf) (accessed 19 March 2020)

<sup>6</sup> Horton, S., Alderman, H. and J.A. Rivera. Copenhagen Consensus 2008 Challenge Paper - Hunger and Malnutrition. March 6, 2008. Copenhagen Consensus Center

<sup>7</sup> Horton, S., 2006. The economics of food fortification. J Nutr 136 (4), 1068\_1071

### Food fortification initiatives are crucial

Food fortification improves the quality of diets by adding micronutrients to commonly consumed foods. It began in the 1920s in Europe and North America with the addition of micronutrients to salt, milk and margarine. In these regions, many conditions associated with MNDs have been eliminated – such as cretinism, rickets, goitre, beriberi and pellagra. Food fortification is recognised as a sound and cost-effective public health strategy. Renowned scientists and Nobel laureate economists endorse fortification as a safe, sustainable, cost-effective intervention for public health and economic development. Every USD1 invested in food fortification returns between USD10 and USD27<sup>8,9</sup>. The EU supports three ways to fortify foods:

- **Nutrient-enriched crops** are cultivated using conventional plant breeding techniques. As well as an improved micronutrient content, they are climate-smart, drought- and pest-resistant, and can reach populations in remote areas with limited access to market
- **Industrial fortification** adds vitamins and minerals during processing to foodstuffs such as salt, maize meal, wheat flour and oil. It can reach large segments of at-risk populations, and requires no major changes to consumption patterns.
- **Point-of-use fortification** is the addition of micronutrient powders or pastes to food just before it is consumed. It is especially useful for fortifying complementary foods for infants and school meals for children.

Improving the nutrition of vulnerable populations is a long-term strategy. However, food fortification can be implemented in the short and medium as well as long term, to help protect the next generation from poverty, disease and food insecurity, and to support the achievement of the SDGs.

### Short term interventions

National and humanitarian responses to COVID 19 will be focussed on health systems, supply chains and food relief. These are essential – but healthy diets are also important. Where food baskets are supplied to people in need, fortified foods (such as flour and oil) must be included. To protect the newest generation, interventions targeting the first 1000 days of life must ensure that women of reproductive age, and pregnant and breastfeeding women, consume sufficient quantities of iron and folic acid by providing fortified foods, micronutrient powders or supplements. Children under 2 must be provided with fortified infant cereals or micronutrient powders.

### Medium term interventions

To ensure populations have a sustained supply of micronutrient-rich foods, governments and the private sector must be supported to produce industrially fortified foods. Raising nutrition awareness among consumers will be crucial to ensuring consumption of these foods. Food vehicles should be chosen appropriate to the local context, but could include rice, maize or wheat flour, edible oils, salt, dairy products, snack bars, and complementary foods for infants. Additionally, smallholder farmers should be supported to plant fast-growing varieties of nutrient-enriched crops. Value chains must be established for farmers and artisanal producers of fortified foods, to strengthen local food supply chains as well as livelihoods.

### Long term interventions

The long term approach should lead to increased dietary diversity through access to, and affordability of, nutritious foods. Climate smart and drought resistant nutrient-enriched crops should be a part of this approach. Nutrient-enriched staples reach the poorest households through the foods that they normally grow and eat, and once they have been bred, adapted and grown, become perpetual in the food system.

### Conclusion

The current COVID19 pandemic may hinder all efforts to deliver on the SDGs, especially those on hunger and poverty. To mitigate this, proven, cost-effective programmes and interventions must be scaled up. Increasing access to fortified food in countries with a high burden of malnutrition would be a significant response, while at the same time improving the resilience of populations to infectious disease.

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<sup>8</sup> FFI, GAIN, MI, USAID, The World Bank, UNICEF. Investing in the future; A united call to action on vitamin and mineral deficiencies. Global Report 2009.

<sup>9</sup> Doubling down on food fortification to fortify the future. Gates Foundation, 2019



## Annex 1: Ten vitamins and minerals for healthy immune systems

	Immune functions	Main dietary sources
<b>Vitamin A</b>	<p>Our body's first line of defence against infection and disease is our skin, which forms a protective barrier between us and the viruses, bacteria and other harmful micro-organisms that exist in the outside world. Vitamin A encourages healthy skin cell production, speeding up healing and keeping this barrier intact.</p> <p>Gaps in our skin's protective covering – for example, our mouth and nose – contain mucous membranes which trap pathogens to prevent them entering our body. Mucous also contains antibodies and enzymes to help fight off infections. Vitamin A protects the integrity of mucous membranes, helping our immune system to function properly.</p>	<ul style="list-style-type: none"> <li>• Green leafy vegetables such as spinach, kale and broccoli</li> <li>• Orange vegetables such as carrots, orange-fleshed sweet potato and pumpkin</li> <li>• Egg yolk</li> <li>• Whole fat milk and dairy products</li> <li>• Vitamin A fortified skimmed milk and dairy products</li> <li>• Meat (particularly liver)</li> <li>• Fish and fish oils</li> <li>• <b>Vitamin A fortified oils</b></li> </ul>
<b>Vitamin C</b>	<p>Vitamin C has excellent antibacterial properties, and improves the performance of T cells (which attack pathogens such as viruses) and phagocytes (which ingest foreign particles and viruses). It significantly reduces the incidence of respiratory tract infections.</p> <p>Inflammation and oxidisation are immune responses to fighting infections and disease. However, these responses can have adverse effects on healthy tissues and cells if over-produced or produced for an extended period of time. Vitamin C is an anti-oxidant and anti-inflammatory, limiting the tissue damage that can be caused when fighting infection.</p>	<p>A variety of fruits and vegetables, including:</p> <ul style="list-style-type: none"> <li>• Oranges</li> <li>• Papaya</li> <li>• Strawberries</li> <li>• Pineapple</li> <li>• Kiwi</li> <li>• Tomatoes</li> <li>• Green peppers</li> <li>• Broccoli</li> <li>• Brussels sprouts</li> </ul>
<b>Vitamin D</b>	<p>Deficiency in vitamin D is associated with increased susceptibility to infection and certain cancers. In several clinical trials and studies, vitamin D has been shown to lower the likelihood of developing (in particular) acute respiratory tract infections.</p> <p>Like vitamin C, vitamin D reduces inflammation due to immune system response. It halts the progression of autoimmune disease, and reduces its severity.</p>	<p>Vitamin D is mostly synthesized by exposure to sunlight. However, dietary sources include:</p> <ul style="list-style-type: none"> <li>• Fatty fish (e.g. salmon, mackerel, and tuna)</li> <li>• Egg yolk</li> <li>• Beef liver</li> <li>• Mushrooms</li> <li>• <b>Fortified dairy products</b></li> <li>• <b>Fortified cereals</b></li> </ul>
<b>Zinc</b>	<p>Insufficient zinc levels limit the body's ability to mount an adequate reaction to infections. Zinc helps strengthen the immune response by regulating the release of T cells and white blood cells from the thymus gland. Zinc also reduces inflammatory cytokines that damage cells.</p> <p>Zinc supplementation has been shown to reduce the incidence rate of acute respiratory infections by 35%.</p>	<ul style="list-style-type: none"> <li>• Meat</li> <li>• Shellfish</li> <li>• Legumes</li> <li>• Nuts</li> <li>• Oats</li> <li>• Seeds</li> <li>• <b>Zinc fortified foods and crops</b></li> </ul>

<p><b>Selenium</b></p>	<p>Selenium strengthens the immune system against viral and bacterial infections. A selenium deficiency impairs the multiplication of lymphocytes, which are essential for immune response.</p> <p>Selenium also reduces oxidative stress and inflammation.</p>	<ul style="list-style-type: none"> <li>• Brazil nuts</li> <li>• Fish</li> <li>• Poultry</li> <li>• Beef</li> <li>• Eggs</li> <li>• Spinach</li> <li>• Oats</li> <li>• Brown rice</li> <li>• <a href="#">Selenium fortified foods</a></li> </ul>
<p><b>Copper</b></p>	<p>Copper helps to activate T cells, and supports white blood cells to attack bacteria. Once activated, white blood cells surround invading pathogens, and then boost their levels of copper ions to break down the intruder organisms.</p>	<ul style="list-style-type: none"> <li>• Liver</li> <li>• Sea food</li> <li>• Nuts</li> <li>• Seeds</li> <li>• Lentils</li> <li>• Beans</li> <li>• Leafy greens</li> </ul>
<p><b>Iron</b></p>	<p>Iron helps immune cells to mature and multiply. Additionally, the immune system uses iron to produce bacteriostatic cells. These cells control iron fluxes during infection, which stops pathogens from utilising iron for their own growth.</p>	<ul style="list-style-type: none"> <li>• Meat</li> <li>• Poultry</li> <li>• Fish</li> </ul> <p>When consumed with foods containing vitamin C (to aid absorption):</p> <ul style="list-style-type: none"> <li>• Grain cereals</li> <li>• Legumes</li> <li>• Vegetables</li> </ul> <p><a href="#">Iron-fortified milled cereals:</a></p> <ul style="list-style-type: none"> <li>• <a href="#">Flour</a></li> <li>• <a href="#">Maize</a></li> <li>• <a href="#">Rice</a></li> </ul>
<p><b>Manganese</b></p>	<p>Manganese contributes to antibody production and supports the activity of T cells and infection-fighting white blood cells.</p> <p>Manganese is also involved in the protection of cells which combat oxidative stress.</p>	<ul style="list-style-type: none"> <li>• Nuts</li> <li>• Beans and legumes</li> <li>• Seeds</li> <li>• Bran cereals</li> <li>• Brown rice</li> <li>• Whole wheat bread</li> <li>• Green leafy vegetables.</li> </ul>
<p><b>Vitamin E</b></p>	<p>Vitamin E contributes to development of T cells in the thymus and supports the immune system as it ages. It protects against oxidative stress, further contributing to immune function.</p>	<ul style="list-style-type: none"> <li>• Sunflower, safflower and soybean oils</li> <li>• Oily nuts and seeds</li> <li>• Fruit</li> <li>• Vegetables</li> </ul>
<p><b>B vitamins</b></p>	<p>B vitamins in general protect the health of the digestive system against harmful microorganisms. In particular, vitamin B<sub>6</sub> supports the production of antibodies and the maturation of lymphocytes.</p>	<ul style="list-style-type: none"> <li>• Meat</li> <li>• Poultry</li> <li>• Fish</li> <li>• Eggs</li> <li>• Legumes</li> <li>• Seeds</li> <li>• Green leafy vegetables</li> <li>• <a href="#">Fortified cereals</a></li> </ul>