



# INDUSTRIAL FORTIFICATION

## quick guide



### What is industrial fortification?

Industrial fortification is the addition of essential vitamins and minerals to commonly eaten staple foods, condiments and food products during processing.

Industrial fortification began in Switzerland in 1923 with the addition of iodine to salt; this led to a significant decrease in iodine deficiency disorders, such as goitre and cretinism.

Today, over 100 countries implement salt iodization; 84 countries require the fortification of one or more industrially-milled grains; and more than 30 countries mandate the fortification of edible oils, margarine and ghee.

It is easy to forget that the micronutrient deficiencies that are widespread today in low and middle-income countries were common in the poor urban and rural populations of Europe and the United States until the early 20<sup>th</sup> century. At that time, industrial fortification was part of the public health response to common diseases such as goitre, cretinism, anaemia, rickets, pellagra and xerophthalmia. Early successes paved the way for the widespread fortification of flour, salt, milk and manufactured foods.

In the early 20<sup>th</sup> century, over 85 percent of children living in the industrial areas of North America and Europe suffered from rickets. When vitamin D was added to milk in the 1930s, rickets was eradicated as a major health problem.

Vitamin A was first added to margarine in the United Kingdom in 1927, to combat a widespread deficiency which resulted in the high mortality of children.

In the USA, mandatory fortification of wheat flour with iron, thiamine, niacin and riboflavin reduced anaemia, beriberi, pellagra and riboflavin deficiency respectively.



### Types of industrial fortification

There are three main forms of industrial fortification. **Mass fortification** is fortifying foods that are widely consumed by the general population – such as flour, salt and oil. **Targeted fortification** is fortifying foods designed for specific population subgroups – such as complementary foods for young children. **Market-driven fortification** is when governments allow food manufacturers to fortify their own food products – such as snack bars and beverages.

Mass fortification is often mandatory, targeted fortification can be either mandatory or voluntary, and market-driven fortification is always voluntary but governed by regulatory limits.

#### Mass-fortification

Mass fortification is usually instigated, mandated and regulated by governments. It is generally the best option when the majority of the population has an unacceptable risk of being or becoming deficient in specific micronutrients. One example of this is the mandatory addition of folic acid to wheat flour to lower the risk of birth defects – a practice which has been introduced in Canada, the United States and many Latin American countries.

Pellagra was common in the corn eating population of the southeast United States. Caused by niacin (vitamin B<sub>3</sub>) deficiency, pellagra is characterised by 'the four Ds' – dermatitis, diarrhoea, dementia and death. Between 1928 and 1930, the height of its epidemic in the USA, pellagra killed 7,000 people a year. Voluntary fortification of bread with niacin began in 1938, and mandatory fortification in 1940. By 1950, pellagra was almost eradicated.

### Targeted fortification

Targeted fortification programmes increase the micronutrient intake of a particular group rather than the population as a whole. Examples include foods developed for school feeding programmes, and energy biscuits for children and pregnant women.

### Market-driven fortification

Market-driven fortification is when a food manufacturer adds micronutrients to a food product for a business or brand advantage. In the European Union, fortified processed foods such as breakfast cereals and yoghurts have been shown to be a substantial source of iron, calcium, and vitamins A and D.

A global report produced by the World Bank and other actors in 2009 showed that every dollar spent on salt iodization and flour fortification results in benefits of more than 10 dollars.



## The benefits of industrial fortification

Industrial fortification can provide a steady supply of micronutrients to entire populations, or subsets of populations. By using established supply chain networks, fortified foods can lead to rapid improvements in people's micronutrient status.

Industrial fortification is considered to be one of the most cost-effective methods for preventing micronutrient deficiencies. The addition of vitamins and minerals to processed foods is fairly straightforward, and industrial fortification requires minimal infrastructure as it relies on pre-existing food processing technology and distribution chains. Depending on the food and specific vitamins and minerals added, industrial fortification only costs between USD 0.05 and USD 0.25 per person per year.

*"Strengthening national capacities in food fortification"*

