POTENTIAL NUTRIENT INTAKE FROM FORTIFIED FOODS

Technical Brief | May 2021

Global Fortification DATA EXCHANGE

This brief presents global trends of the potential nutrient intake (and how they compare to Estimated Average Requirements and Tolerable Upper Intake Levels) that can be achieved through fortification of maize flour, oil, rice, salt, and wheat flour before and after considering countries' industrial processing and fortification procedures for those foods.

INTRODUCTION

Deficiencies of vitamins and minerals (micronutrients) affects more than 2 billion people, with women of reproductive age and young children at greatest risk.[1] Micronutrient deficiency (MND) constrains socio-economic development, contributing to global economic losses of 3.5 trillion United States dollars each year due to malnutrition.[2] Food fortification is used to reduce MND as it can reach a wide population and increase the nutritional value of individuals' diets.[3,4]

The Global Fortification Data Exchange (GFDx) conducted an analysis that estimated the average potential contribution of food fortification to daily nutrient intakes for 153 countries.

KEY MESSAGES

Unadjusted nutrient contribution (the nutrient contribution if 100% of food is industrially processed and fortified) figures show that for all nutrients except iodine, fortified foods met 75% or less of the Estimated Average Requirement, with adjusted contributions (taking into account the fraction industrially processed and fortified) being much lower.

Iodine, mainly from fortified salt, contributes the most to nutrient intakes.

The data suggest there is minimal risk to countries of exceeding Tolerable Upper Intake Levels and causing harm to populations due to excess nutrient intakes from fortification.

The GFDx produced a publication for this analysis. For any additional details, please see the paper.[5]

THE POTENTIAL NUTRIENT INTAKE

Nutrient intake is the daily amount of nutrients...diet. In this analysis, it is limited to nutrients provided through fortification. Estimated Average Requirement (EAR) is the amount of a nutrient required to meet the dietary needs of at least 50% of the population. As nutrient intake increases above the Tolerable Upper Intake Level (UL), the risk of adverse health effects increases. EAR and UL values for key nutrients of interest can be found in **Table 1**.

Potential nutrient intake from food fortification may be affected by the structure of the fortification industry and industries' compliance to fortification legislation and standards. In many countries where small-scale production of foods is practiced (e.g. at-home or village milling), the amount of food that could be fortified with key nutrients is reduced. In addition, nutrient intake through fortified foods may be lower than expected if food producers do not consistently adhere to fortification legislation and standards. Poor compliance may include utilizing less bioavailable compounds, fortifying foods using lower amounts of one or more nutrients than required, or not fortifying foods at all.

TABLE 1. EAR AND UL VALUES FOR KEY NUTRIENTS OF INTEREST

Nutrient	EAR (mg/day)	UL (mg/day)
Vitamin A	0.5	3.0
Thiamin	0.9	N/A
Riboflavin	0.9	N/A
Niacin	0.9	N/A
Vitamin B6	1.1	100
Folic Acid	0.4[1]	1.0
Vitamin B12	0.002	N/A
Vitamin D	0.01	0.1
Vitamin E	12	1000
Calcium	800	2500
Iron	8.1	45
Fluoride	3.0[2]	10
Iodine	0.095	1.1
Selenium	0.045	0.4
Zinc	6.8	40

1. Because fortifying with folic acid is recommended for the prevention of neural tube defects, the recommended intake of 400 µg of folic acid daily for women of reproductive age was used [6] instead of the lower EAR level.
2. There is no EAR for flouride; the adequate intake (AI) was used [7].

The calculations in this analysis assume that standards have been followed at the point of production. Actual practice may differ (e.g. under or overages) and losses can occur after production (due to storage or cooking), therefore the analysis may not reflect actual intake of micronutrients once the food is consumed.

METHODS

Data for this analysis were taken from the GFDx, a public database that acquires data from annual fortification surveys, literature reviews, and regional and national stakeholders [7]. All countries with intake or availability data and fortification standards were analyzed.

The potential nutrient contribution was calculated for two scenarios as described in the following section.

The median %EAR and %UL for each nutrient across all country/food combinations is presented.

NUTRIENT INTAKE ADJUSTMENTS

An **unadjusted** contribution represents the maximum potential that could be achieved in an ideal fortification setting and takes into account a country's most recent data on the amount of food available for consumption and nutrient levels specified in fortification standards.

An **adjusted** value represents a more realistic picture of potential contribution estimates, additionally taking into account the percent of food industrially processed and the percent of food actually being fortified according to standards.

BEFORE ADJUSTMENT ASSUMPTION

100% & *100%*

of food is industrially processed **of food is fortified**

AFTER ADJUSTMENT ASSUMPTION

Uses a country's most recent available data on industrial processing and fortification compliance to determine how much food fortification contributes to nutrient intake.

RESULTS

In the maximum scenario, the median %EAR met by countries was 338 for iodine and 75 or less for all other nutrients (**Figure 2**).

In the realistic scenario, the median %EAR decreased to 285 for iodine and 32 or less for the other nutrients.

Before adjusting for industrial processing and fortification compliance, the median %UL met by countries was 68 for selenium, 54 for iodine, and 20 or lower for the other nutrients (**Figure 3**).

After adjustment, %UL met decreased for all nutrients. The highest value was for iodine: the median %UL met was 25 among countries.

FIGURE 2. COMPARISON OF UNADJUSTED AND ADJUSTED %EAR AMONG KEY NUTRIENTS OF INTEREST

The median unadjusted and adjusted %EAR across all countries with available data across all five food vehicles: maize flour, oil, rice, salt, and wheat flour.

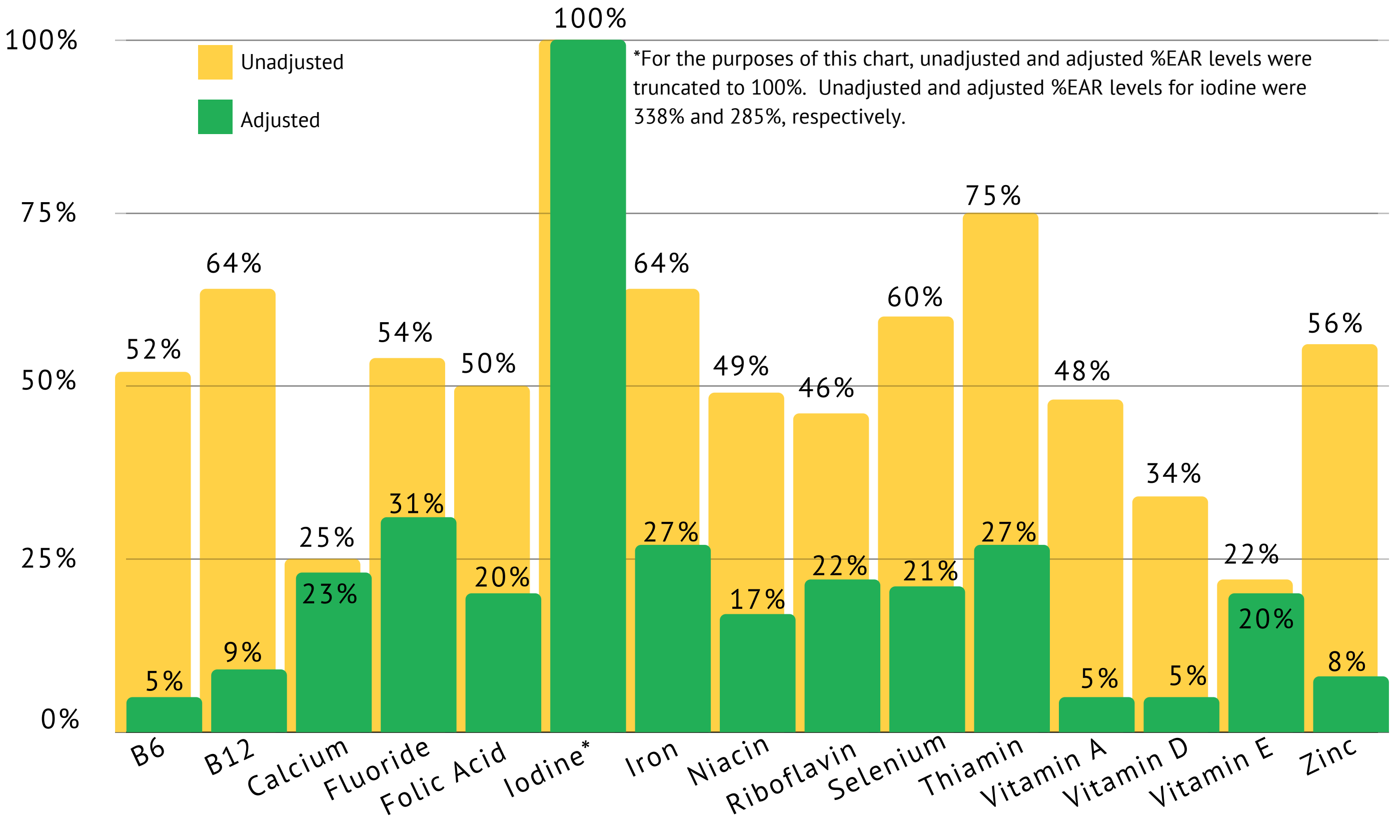
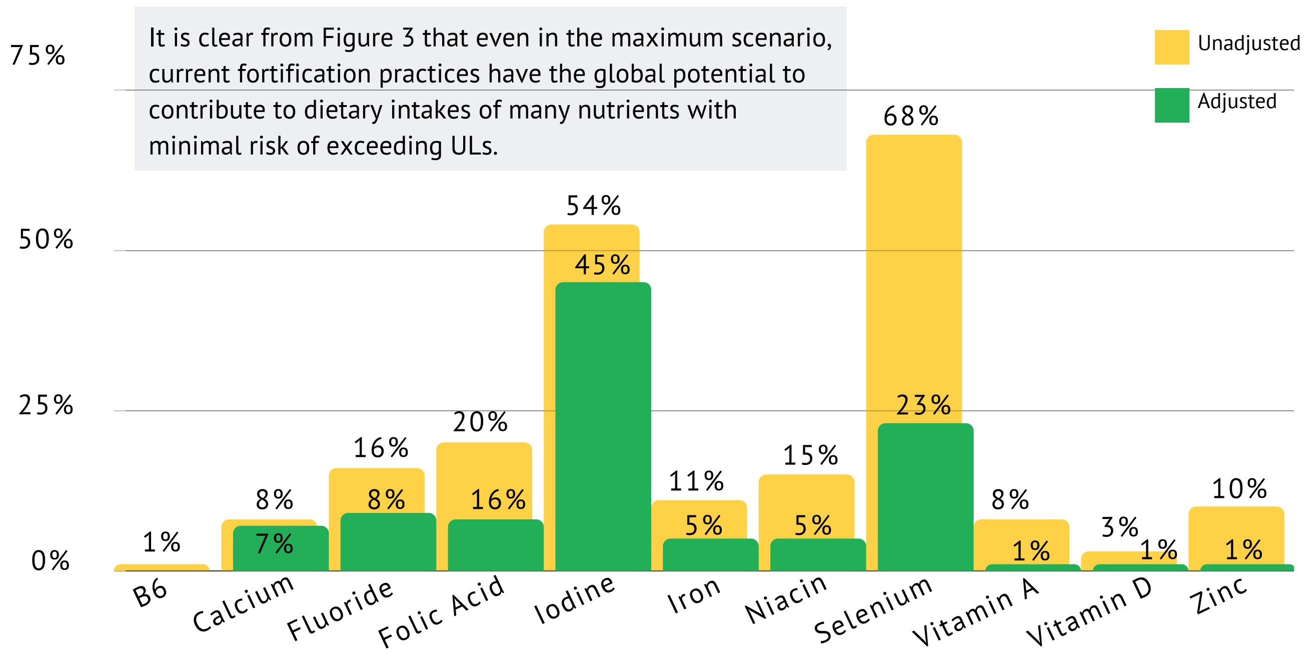


FIGURE 3. COMPARISON OF UNADJUSTED AND ADJUSTED %UL AMONG KEY NUTRIENTS OF INTEREST

The median unadjusted and adjusted %UL across all countries with available data across all five food vehicles: maize flour, oil, rice, salt, and wheat flour.



CONCLUSION

The fortification of maize flour, oil, rice, salt, and wheat flour (combined) can increase the intake of up to 15 nutrients to the diet. For all nutrients in the realistic scenario, except iodine, the median contribution of fortification was 75% or less of the EAR. In the realist scenario for iodine, the median contribution of fortification was 285% of the EAR and 45% of the UL. These data suggest that with fortification of the five foods according to their countries' standards and given current industrial processing and compliance figures, there is minimal risk of countries exceeding ULs for most nutrients and causing harm to populations.

When countries have a higher proportion of food that is both industrially processed and fortified to standards, the potential for nutrient contribution to the diet increases. This contribution can support country efforts to reduce and control micronutrient deficiencies with a food-based intervention.

Countries are encouraged to continuously monitor the contribution of the fortified foods present in their country to ensure that the nutrients delivered through fortification are safe and effective.

SUGGESTED CITATION

Global Fortification Data Exchange. Technical Brief: The Potential Nutrient Intake of Fortified Foods. 2021. Accessed dd/month/yyyy. [http://www.fortificationdata.org.]

CONTACT US

If you have any questions, want to share your experience using the GFDx, contribute data, or provide any other comments and feedback, please reach us at the email below or visit our website to learn more about fortification resources.

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