ADVOCACY NOTE

Improving Nutrition through Food Fortification Policy and Programming: Ensuring an Evidence-Based Design with Country-Specific Quantitative 24-Hour Dietary Recall Data

Micronutrient deficiencies affect more than one quarter of the world's population, adversely impacting their health and ability to contribute fully to the economic well-being of their community and country. The World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) have identified four main strategies for addressing micronutrient malnutrition: (i) nutrition education to increase the diversity and quality of diets; (ii) food fortification and biofortification; (iii) micronutrient supplementation; and (iv) disease control measures (WHO/FAO 2006).

Large-scale food fortification[1]—which involves adding small amounts of micronutrients to widely consumed foods—is a proven, cost-effective, and sustainable way of reaching large segments of at-risk populations with key micronutrients through existing food delivery systems, without requiring major changes in existing food consumption patterns. Two-thirds of the world's countries mandate large-scale food fortification (Global Fortification Data Exchange n.d.). In countries where national mandatory fortification programs have been implemented with high coverage and strong adherence to quality standards, programs have led to a significant decrease in micronutrient malnutrition among entire populations (Osendarp et al. 2018).

Country-specific quantitative 24-hour dietary recall data are crucial for the evidenced-based design of a successful national food fortification program. Quantitative dietary data are needed to understand the prevalence and extent of the gap in micronutrient intakes among different demographic groups, to identify which foods would make suitable vehicles for fortification, and to make informed decisions about the types and amounts of micronutrients to use as food fortificants.

A recent review of large-scale food fortification in eight low- and middle-income countries (LMICs) identified four key criteria that often determine the success of a food fortification program (Neufeld et al. 2017). Three of these—the appropriate choice of food fortification vehicle; accounting for the magnitude and distribution of inadequate dietary intakes in the design of the fortification program; and periodic review of the dietary pattern evidence base that underpins the design of the program—depend on the appropriate collection, analysis, and use of quantitative dietary data. The fourth criterion, political commitment for quality control of fortification levels, is required to ensure the food fortification program is implemented according to its intended design.

[1] Large-scale food fortification (also referred to as mandatory, mass, or universal fortification) is defined as the addition of one or more micronutrients to foods commonly consumed by the general population (e.g., salt, sugar, oil, semolina flour, maize flour and wheat flour) as mandated and regulated by the government sector.

Intake is a Center for Dietary Assessment that aims to strengthen policies and programs to improve nutritional status by increasing the availability, quality, comparability, and use of reliable dietary data and metrics in low- and middle-income countries (LMICs). We hope that the availability of valid, concise, effective diet-related metrics, along with *Intake* technical assistance for the planning, design, collection, analysis, and use of dietary data, can play an important role in helping actors in LMICs to develop evidence-based nutrition and agriculture policies and programs to ensure high-quality diets for all. To date, *Intake* has provided technical assistance to support the planning, design, implementation and/or analysis of government-led quantitative 24-hour dietary recall surveys in Jordan, Kenya, Niger, Nigeria, Viet Nam, and Zambia.

The dietary data required to design a food fortification program are ideally obtained by carrying out a population-based quantitative 24-hour dietary recall survey that collects information from the target population about all of the foods and beverages consumed during the previous day and night, as well as the amount of each item consumed. These data are then linked with food composition data, so that energy, macronutrient, and micronutrient intakes can be estimated for the population.

If the objective of a dietary survey is to inform food fortification policy, the survey should typically be nationally representative and designed to collect information for multiple demographic groups, because dietary patterns and nutrient requirements differ by age, sex, and physiological status (e.g., menstruating, pregnant, lactating women). Collecting 24-hour dietary recall data for a second, non-consecutive 24-hour recall period for a sufficiently large random sub-sample of respondents is standard best practice for a dietary survey. When this is done, the data collected can be analyzed to estimate the distribution of usual intake of foods, food groups, and nutrients for the population. These data can also be used to estimate the prevalence and extent of inadequate micronutrient intakes in the population.

The specific ways in which a national, population-based quantitative 24-hour dietary recall survey can be used to help plan, design, and optimize the potential effectiveness of a national fortification program are described below.

To establish the need for a food fortification program

Dietary data from a quantitative 24-hour dietary recall survey are needed to estimate the prevalence of inadequacy of key micronutrients in the diets of different demographic groups and to estimate the usual intake distribution of specific nutrient-dense or nutrient-poor foods and food groups, or dietary factors that can influence the absorption of micronutrients.[2] Low dietary diversity, limited consumption of nutrient-dense foods, and high consumption of nutrient-poor staple foods are clear indications of poor-quality diets. In conjunction with biochemical data on the micronutrient status of the target population, these data can provide evidence for the need to establish a food fortification program and policy.

To identify suitable food vehicles for fortification

To ensure that the target population will benefit from a food fortification program, appropriate food vehicles[3] for fortification—the foods to which micronutrients can be added—must be selected. The food or foods chosen must be widely and regularly consumed throughout the year by a large portion of the population at risk of a particular micronutrient deficiency. In addition, potential food vehicles should be "fortifiable."[4] A quantitative 24-hour dietary recall survey provides data on the usual intake of potential fortifiable food vehicles and whether they are consumed in sufficient quantities by vulnerable demographic groups to help determine if the food is a promising vehicle for fortification.

To select micronutrients to add and determine fortification levels

Fortification levels aim to decrease the risk of deficiency among the majority of the population, without presenting a risk for excessive micronutrient intakes (WHO/FAO 2006). To correct micronutrient deficiencies in a population, it is necessary to determine the micronutrients of concern and establish the desired fortification level of food vehicles with the selected micronutrients.

Quantitative dietary data are needed to ascertain the extent of the dietary deficiencies, i.e., the extent of gaps between current micronutrient intakes and recommended intakes. Because there is usually a wide range of intakes within any given population, data are needed on the distribution of intakes and micronutrient gaps for different demographic groups of interest.

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[2] Absorption-enhancing factors for iron include ascorbic acid, as well as meat, fish, and poultry; whereas inhibiting factors include plant components in vegetables, tea, and coffee (e.g., polyphenols and phytates), and calcium.

[3] A food vehicle is defined as food to which vitamins and minerals (including trace elements) can be added, to improve the nutritional quality of the food supply and provide a public health benefit with minimal risk to health.

[4] A fortifiable food vehicle is defined as a food vehicle that is industrially produced, i.e., not home-produced or obtained from small-scale or informal producers who produce less than a specified volume annually.

The increases in intakes that are needed to satisfy the daily intake requirements for the micronutrients of concern must then be determined. The appropriate fortification level, i.e., the amount of nutrients per amount of food vehicle, will depend on the amount of the food vehicle consumed among the population. As such, dietary data are needed to determine the usual intake distributions of the potential food vehicles by demographic group.

To identify and prioritize the target population groups

Dietary data from a quantitative 24-hour dietary recall survey can also be used to identify demographic groups at risk for micronutrient deficiencies, and these data can inform decisions on the food vehicles, micronutrients of concern, and fortification levels. Depending on the food vehicles selected for fortification, fortified foods have the potential to reach everyone, including the poor, pregnant women, young children, and populations that are challenging to reach with direct delivery of other nutrition interventions.

To predict the probable impact of potential fortification interventions

Dietary data collected from a quantitative 24-hour dietary recall survey can also be used in simulation and modeling exercises to estimate the extent to which the nutrient gaps in the diet could be filled through fortification efforts and the probable impact of different fortification interventions on micronutrient intakes.

To evaluate the impact of a food fortification program

Quantitative dietary data are needed not only to inform the design of a fortification program, but also during implementation of the program to ensure the program remains relevant and appropriately designed to respond to existing micronutrient intake deficiencies, given the dietary patterns of the target population. Quantitative 24-hour dietary recall surveys can be used to establish a representative baseline of current diets among different demographic groups. Moreover, at various points throughout the implementation of a national food fortification program, surveys can be repeated to determine whether or not a fortification program is achieving its nutritional goals or if modifications are needed.

Conclusion

Implementing and sustaining a successful food fortification program is a long-term effort, but the potential impact for addressing critical deficiencies in micronutrient intakes can be substantial. To optimize the potential for a successful fortification program and justify the investment, the design of the program must be evidence-based and informed by high-quality, nationally representative quantitative 24-hour dietary recall data for relevant demographic groups in the target population. Programs that are not based on evidence are not only at risk of being ineffective and cost-inefficient but could also do actual harm if the fortification levels are set too high, and micronutrient intakes reach unsafe levels for some demographic groups.

References

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