Methods for Establishing Fortification Levels

Food Fortification Initiative
Enhancing Grains for Healthier Lives

Opportunity

Determining the type and amount of nutrients to add to flour is a key step in creating a safe and effective fortification program to alleviate vitamin and mineral malnutrition.

Because of the long-term commitment of food fortification, the use of appropriate calculations and methods is essential to make these decisions.

WHO Recommendations for Wheat Flour Fortification

In 2009 the World Health Organization (WHO) published an Interim Consensus Statement for countries seeking to fortify wheat or maize flour [1]. The global recommendations were informed by discussions among nutrition, pharmaceutical and milling experts [2].

The statement provides recommendations for the type and amount of nutrients that can be added to flour during the fortification process, taking into consideration the following: flour extraction rate, fortificant compound and the estimated per capita flour availability. Ideally, fortification levels are based on current nutrient intakes of the target population [3], but these data are rarely available. In the absence of nutrient intake data, the WHO recommendations can be used to determine the type and quantity of iron, folic acid, zinc, vitamin B12 and vitamin A to add to flour (Figure 1).

When Usual Nutrient Intake Data are Not Available

If usual nutrient intake data are not available for target groups, and the nutrients are not listed in the WHO Interim Consensus Statement, there are a few options. It is best to collect the dietary data necessary to determine the distribution of usual nutrient intake in the target population. When collecting or analyzing intake data is not feasible, consider using nutrient content levels from a neighboring country with similar dietary characteristics, for example the African guidelines of fortification levels for staples [4] or the Caribbean standards for wheat flour [5]. Another possibility is to use restitution levels to restore the nutrients in flour to the levels found in the whole grain [6].

When Usual Nutrient Intake Data are Available

Each nutrient's Estimated Average Requirement (EAR)* and Tolerable Upper Intake Level (UL)* can be used to estimate the proportion of individuals in a population at greatest risk for deficient or excess intake, respectively. Those proportions can then be used to model the effects fortification will have on the nutrient intake distribution of the population when different levels of micronutrient are added to flour. This process allows for the design of a fortification program specific to the needs of the target population, maximizing the potential for public health impact and minimizing any adverse effects. The Intake Modeling, Assessment and Planning Program can be used as a guide through this process [7].

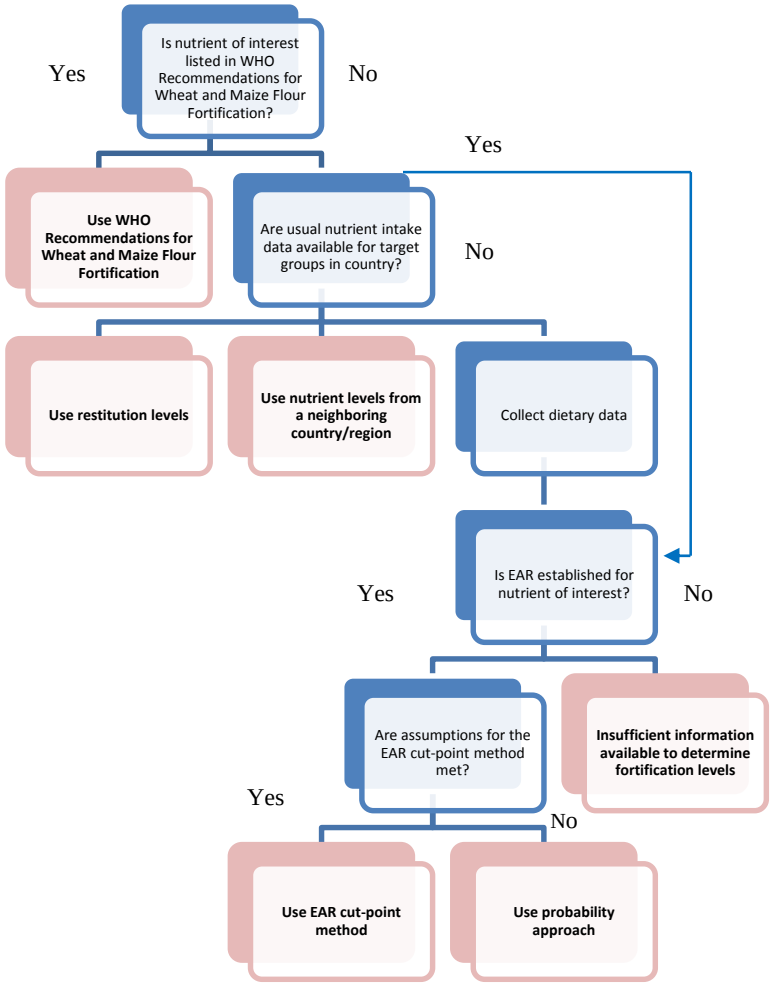
Two methods can be used when usual nutrient intake data are available [3]: the EAR cut-point method or the probability approach. The first is easier to apply but requires that several assumptions be met. For the EAR cut-point method, one common mistake is to use the group mean intake of a nutrient, in place of intake distribution data. This can result in misleading conclusions and is an incorrect application of the method. Additionally, the Recommended Daily Allowance (RDA), Recommended Nutrient Intake (RNI) or Adequate Intake (AI) should not be used in place of the EAR. Any of these substitutions may lead to incorrect results with the EAR cut-point method. The probability approach can be used when the assumptions of the EAR cut-point are not met which is only the case for a select group of micronutrients.

This peer-reviewed brief was written by the Food Fortification Initiative, 4 December 2012
For more information, e-mail info@ffinetwork.org or see: www.FFInetwork.org

Methods for Establishing Fortification Levels

Food Fortification Initiative
Enhancing Grains for Healthier Lives

(Figure 1)



References

[1] Food and Nutrition Bulletin. 2010, 31(1 Suppl), S86-93
[2] WHO, FAO, UNICEF, GAIN, MI & FFI. Recommendations on wheat and maize flour fortification, meeting report: Interim consensus statement. Geneva, World Health Organization, 2009 [http://www.who.int/nutrition/publications/micronutrients/wheat_maize_fort.pdf].
[3] WHO/FAO. Allen LH et al., eds. Guidelines on food fortification with micronutrients. Geneva, World Health Organization, 2006. [http://www.who.int/nutrition/publications/guide_food_fortification_micronutrients.pdf].
[4] East, Central and Southern Africa Health Community. ECSA guidelines of fortification levels for staples, 2010. [http://www.a2zproject.org/~a2zorg/pdf/ECSA-Fortification%20Levels-2010-08-21%20(1).pdf]
[5] Caribbean Community Standard: Wheat flour. Guyana, Caribbean Community Secretariat, 1995 (CCS 0024).
[6] Bauernfeind JC, DeRitter E. Foods considered for nutrient addition: Cereal grain products. In: Bauernfeind JC, LaChance PA, eds. Nutrient additions to food: Nutritional, technological, and regulatory aspects, Trumbull Food & Nutrition Press, Inc. 1991:143-203.
[7] Iowa State University. Intake modeling, assessment and planning program. http://www.side.stat.iastate.edu/

*Definitions [1]
EAR is the average daily nutrient intake level estimated to meet the needs of half the healthy individuals in a particular age and gender group. The EAR is used to derive the RDA and RNI.
UL is the highest average daily nutrient intake level that will not pose a risk of adverse health effects to for virtually anyone in the population.

How to cite this document: Food Fortification Initiative (FFI). Methods for establishing fortification levels. Atlanta, USA: FFI, 2012. Available from www.FFInetwork.org Accessed on [date].

This peer-reviewed brief was written by the Food Fortification Initiative, 4 December 2012
For more information, e-mail info@ffinetwork.org or see: www.FFInetwork.org