

## Lessons learned from the implementation of large-scale fortification programs

### EXECUTIVE SUMMARY

Food fortification is one of the cost-effective strategies that has been implemented to improve the prevalence of essential micronutrients among the most vulnerable population groups. In Ethiopia, Evidence depicts that the prevalences of iron, vitamin A, zinc, and iodine deficiencies are public health problems that affect children and women of reproductive age. Based on this, the government of Ethiopia is working to reduce the impacts of micronutrient deficiency by fortifying certain foods. The effort includes the initiation of mandatory iodine salt fortification in 2011, voluntary edible oil fortification with vitamin A and voluntary wheat flour fortification with iron, zinc, and vitamin B groups in 2018. However, there is a gap in lessons learned and challenges during the implementation of food fortification in Ethiopia and elsewhere. Therefore, the objective of this review is to synthesize evidence of key lessons learned from different countries that implemented food fortification programs and; to identify both the opportunities and challenges regarding the implementation of food fortification programs in Ethiopia.

Currently, in Ethiopia, there are several accomplishments with the government and private sector involvement in food fortification programs. For instance, endorsement of legislation for universal salt iodization, national standards for staple food fortification, availing policy and programs such as Food and Nutrition Policy and Strategy, National Nutrition Program, Nutrition Sensitive Agriculture Strategy, and many others are working in parallel. Furthermore, the country is importing fortified edible oils. On the other hand, some of the local manufacturers have already started fortifying edible oils and



Photo credit: Wheat flour, Phu Thinh Co, 2012  
Cooking oil: Wikimedia/2018/ Tiia Monto

wheat flour. This is supported by the Food and Nutrition Strategy (FNS), endorsed in May 2021, to develop national food fortification guidelines, design periodical monitoring and evaluation schemes, supply facilities, quality assurance, and quality control strategies. Moreover, adequate capacity building for industries, regulatory bodies, academia, and research organizations for evidence development such as program coverage and/or impact assessment is equally important for coherent interventions.

Building strong multi-sectoral partnerships with partners, the government, academia, and civil societies will enhance the scaling up of the food fortification program and minimize bottlenecks. However, some existing parallel programs need to be carefully evaluated, as in the case of universal salt iodization (USI). In such cases, a common agreement will be needed to avoid unnecessary duplication of efforts and obtain an efficient outcome.

## THE PROBLEM

Micronutrient deficiencies in low- and middle-income countries are more severe than in the developed world [1]. Globally iron, iodine, and vitamin A deficiencies are of public health importance, while vitamin D, B<sub>12</sub>, and riboflavin deficiencies are also emerging problems [2]. Micronutrient deficiencies can have several negative consequences, including impaired brain and cognitive development, reduced productivity, compromised immunity against disease, and poor pregnancy outcomes [1]. Food fortification has been used as one of the cost-effective strategies implemented to reduce the prevalence of micronutrient deficiencies [3, 4]. According to Keats *et al*, (2019), large-scale food fortification (LSFF) has improved micronutrient status in many population groups and shown a positive effect on nutritional outcomes. For instance, iron fortification reduces 34% of anaemia across all ages, salt fortification with iodine reduced the prevalence of grade I and II goitre by 74% among pre-school-age children and 41% of neural tube defects preceding LSFF with folate [5]. This LSFF program was employed for salt, staple, and commercial foods including condiments as a potential target food vehicle [4].

Based on different countries' experiences, the government of Ethiopia has launched the fortification of some food vehicles. For instance, mandatory salt fortification with iodine [6], voluntary edible oil fortification with vitamin A [7], and voluntary wheat flour fortification with iron, zinc, and certain vitamin B groups [8]. According to Ethiopia's 2016 national micronutrient survey report, the prevalence of anaemia among pre-schoolers, school-age children, and women of reproductive age was 34.4%,

25.6%, and 17.7 %, respectively. Furthermore, the prevalence of vitamin A deficiency was 14%, 10.9%, and 3.4% in a similar population, respectively. In addition, the prevalence of zinc and iodine deficiencies was higher among pre-schoolers and women of reproductive age relative to vitamin A deficiency, which, according to WHO [9], is a significant public health concern.

## WHY IS THIS REVIEW NEEDED?

For two decades, a large-scale food fortification program has been implemented in low- and middle-income countries [10]. Based on a recent request that came from the Food, Beverage, and Pharmaceutical Industry Development Institute (FBPIDI) to the National Information Platform for Nutrition-Ethiopian Public Health Institute (NIPN-EPHI), we reviewed existing evidence from countries that have been implementing food fortification programs to gather key lessons learned from those countries. Thus, this review aimed to discuss the bottlenecks and gaps regarding the implementation of the fortification programs in Ethiopia and outline actions for policy and practice to guide the national food fortification for appropriate planning and implementation of the programs.

## OBJECTIVES OF THE REVIEW

The objectives of this brief were:

- To review key lessons learned from countries that are implementing food fortification for a longer period
- To identify challenges in acquiring inputs, and barriers regarding the implementation of food fortification programs in Ethiopia

### **Box 1: Methodology**

A rapid literature review of publications in PubMed and Google scholar written in English from 2000 to 2020 was performed. Furthermore, gray literature, accessed through personal communications, including national policy, national standards, and coverage reports were also used. Keywords like “Fortified food\*,” “Enriched food\*,” and “Supplemented food\*” were used in Google and for Medical Subject Headings (MeSH)-Medline “Food, fortified//adverse effects.” Complementary keywords were “Government program\*,” “Government sponsored program\*,” “Nutritional policy,” “Government health promotion,” “Food fortification program\*,” “Policymaker\*,” “Health policy\*,” “Mandatory program\*,” and under MeSH were “Health promotion/,” “Nutrition policy/,” “Health policy/,” “Mandatory programs/,” “Policy making/,” and “Legislation, Food/.” Moreover, articles describing the remaining technical challenges, successes, evidence gaps, and prioritized recommendations for the next steps to improve fortification and its potential impact have been given special attention. One limitation of this rapid review is that the search strategy followed neither a systematic review nor a meta-analysis methodology.

## **FINDINGS**

### ***Evidence on large-scale food fortification achievements and challenges in low-and middle-income countries***

Evidence showed that some Asian countries (i.e., Bangladesh and India) and African countries (i.e., Cote d’Ivoire, Nigeria, Senegal, South Africa, Tanzania, and Uganda) had some successful food fortification implementation programs. However, the coverage and utilization of fortified foods are inconsistent among these countries. For example, LSFF coverage widely varies by food vehicle and country but is consistently lower in utilization among the most vulnerable population groups in these countries. The review identified various bottlenecks for coverage and utilization of fortified foods, including the co-existence of fortified and non-fortified products in the market; weak regulatory and monitoring frameworks; limited capacity to follow the standards due to added costs of fortification programs, unable to monitor the level of diversified and fortified food intake periodically; reaching out to a non-targeted population instead of the most in need; poor integration of laws and regulations into existing legal frameworks and/or reluctance to enforce the regulations. In addition, during production, producers may have limited resources and be unable to implement the targeted program; thus, they are not carefully maintaining the necessary safety and quality control procedures as their priority [2].

Despite all the bottlenecks and challenges with LSFF, there are lessons learned and could be adopted for the future food fortification program in Ethiopia. The review of evidence that was conducted in low and middle-income countries by Osendarp et al., 2018 [2] showed the following key lessons as successful fortification programs for future fortification efforts.

- The high impact of fortification will be influenced by the appropriate selection of food vehicles being fortified as well as the frequency and amount of food consumed by the population.
- Fortification programs must be implemented based on dietary patterns, available evidence on the amount of inadequate intake, the prevalence of micronutrient deficiency, and fortified food consumption. Besides this, the program is better tailored as part of the country's micronutrient deficiency management strategies to ensure its integration with other parallel nutrition programs in the country.
- The food industries and the regulatory bodies should have sufficient organizational capacity and technical skills to develop, implement and maintain the needed quality/safety control and quality

assurance (QC/QA) procedures with agreed indicators.

- Finally, for successful and effective food fortification (FF) programs, a periodical assessment of the impact of fortification is useful. Experience has shown that in continents like Latin America, research capacity, good governance, strong private, and public partnerships were mentioned as important features of successful and sustainable FF programs.

### ***Evidence gaps related to Impact assessment, coverage, compliance and Monitoring and Evaluation (M&E) in Ethiopia***

Although food fortification has already started in Ethiopia, there is a lack of monitoring and evaluation (M&E), or program impact evaluation, in fortified salt, wheat flour, and edible oils. In 2018, households with iodized salt coverage were 88.1%, with a mean iodine concentration of 43.9 parts per million (ppm). However, there is a disparity among regional states regarding the availability of adequate iodized salt coverage and utilization based on the data collected from households, wholesalers, super-markets, small shops, and open markets. Accordingly, the lowest coverage was reported in Afar (49.5%) and the highest was in Dire Dawa (100%). Household purchasing decisions in Ethiopia are influenced by the availability and cost of salt regardless of its fortification level [12]. The key successes, challenges, and gaps in the food value chains and food fortification programs in Ethiopia are summarized from the existing evidence in Table 1.

## **KEY RECOMMENDATIONS**

The following are key recommendations and considerations:

- Enforcing and strengthening large-scale food fortification at the national level

A fragmented practice of food fortification has been carried out in Ethiopia; however, micronutrient deficiency is an ongoing major public health

concern. Activities such as: strengthening mass fortification of iodine in dietary salt with potential household utilization mechanisms and nationwide coverage; mandating vitamin A fortification in edible oil manufacturing industries; and piloting zinc fortification of wheat and/or maize flour followed by mass fortification to improve zinc status of women of childbearing age and children.

- Provide technical and financial assistance to wheat flour and edible oil producers in Ethiopia in order for fortified wheat flour and edible oil to be available on the market for consumers.
- Developing a national standard for small-scale fortification practice.

A national standard should be developed to control the safety and quality of fortified foods on a regular basis. To ensure high compliance for the fortified foods produced in small-scale industries, it is recommended to maintain continuous monitoring, quality assurance, and control, as well as corrective measures.

- Tailored periodic monitoring and evaluation, dietary patterns and impact assessment, and documenting program coverage and gaps during the program implementation are recommended.

**Table 1.** Key successes, challenges, and gaps in the food value chains and food fortification programs in Ethiopia

No.	Key Successes	Main challenges and gaps
1	The national standard for food fortification (FF) has been developed [6, 7, 8].	Except for salt iodization, the other standards are voluntary and may not consider FF as a priority, so, the fortification requirements can be overlooked.
2	Countrywide micronutrient deficiency profiles are available [9].	Except for the salt fortification program, there is no data generated for other micronutrient intervention coverage.
3	There is legislation for universal salt iodization, National Food and Nutrition Policy and Strategy, National Nutrition Program, a five-year Fortification Action Plan, National Nutrition Sensitive Agriculture Strategy, and many more [11, 12, 13, 14, 15].	Documents such as legislation and/or national FF guidelines are highly recommended. There is also a need to revise responsible organizations according to their roles and responsibilities.
4	There are national initiatives to import fortified edible oils, and locally manufacture fortified wheat flour and fortified edible oils.	Periodical monitoring and evaluation, quality assurance and quality control, capacity building for industries, research and evidence generation, impact, and program coverage assessment are equally important for coherent and effective intervention.
5	There have been few public awareness campaigns, research findings, and scientific publications on social and behaviour change communication (SBCC) [16], as well as mass media broadcast activities.	The initiatives have to be scaled up to reach the broader public/ targeted consumers.  But in parallel, the quality of raw materials used for fortification, the selection of food vehicles to be fortified, and general compliance with the fortification requirements have to get prior attention in the course of implementation of the FF programs.

## ACTIONS FOR SUCCESSFUL LARGE SCALE FORTIFICATION PROGRAMS IN ETHIOPIA

- Constant capacity strengthening and collaboration to support regulatory, evidence generation, laboratory testing, and customs clearances.
- Establishing strong multi-sectoral partnerships with a high political commitment and transparent collaboration with partners; government, public, private, academia, and civil society to aid in program harmonization and scaling up across sectors.
- Design to increase availability, accessibility, and affordability of the premix and the supply facilities in the country.
- Mapping of medium and large-scale industries; supportive training; equipment; and the availability of high-quality raw materials imported with sufficient shelf life prior to fortification.
- Clear legislation and appropriate national standards for the amounts of nutrients to be added to the food vehicle are critical success factors.
- Ensuring that national regulatory agencies have the resources, capacity, and expertise to monitor and enforce food fortification standards. A minimum set of indicators on product quality and safety to be monitored needs to be identified.
- Food industries should have sufficient organizational capacity and technical skills to develop and implement the needed internal quality assurance/quality control (QA/QC) procedures.
- Fortification-related programs should have a marketing component that increases community awareness. Including fortification logos as part of the packaging standards is highly recommended. Social marketing campaigns which target producers (millers, bakers) and the media are also recommended.

- Tailored periodical monitoring and evaluation, dietary patterns and impact assessment, and documenting program coverage and gaps in the course of program implementation are recommended.
- Finally, shifting the voluntary vitamin A and D fortification standards in edible oil to mandatory and

adding other minerals and vitamins in wheat flour to pilot level fortification for further scale up is recommended based on achievements.

**NB:** *The actions were partially adapted and customized to the Ethiopian context by extracting from the following documents [13, 14, 15, 16, 17, 18]*

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