Food fortification in the Philippines: Policies, programmes, issues, and prospects

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Abstract

Fortification is an important component of the Philippine Plan for Action on Nutrition. Several programmes are described for the fortification of commonly consumed foods, such as rice, margarine, sugar, salt, oil, and wheat flour, with essential micronutrients, especially vitamin A, iron, and iodine, to satisfy dietary gaps for these nutrients. The overall programme is designed to be spearheaded and implemented by the food industry, while the government is to provide necessary support through policy, technology development and transfer, and incentives to encourage the participation of food manufacturers.

The objective of the government's Sangkap Pinoy *seal programme is to encourage food manufacturers to market high-quality fortified food products. The seal is awarded to manufacturers who are able to meet standards for fortifying products with vitamin A, iron, or iodine. The seal makes the general public aware of the availability of fortified foods with assurance of quality and, thus, encourages consumption of fortified products.*

The prerequisites for a successful food-fortification intervention include advocacy, technology development and testing, stability studies, market testing, and field trials. Most fortification efforts have fulfilled these requirements, with the exception of a field trial to determine the efficacy of a fortified food in improving the nutrient status of a target group. Simple, rapid, and low-cost assessment methods to determine fortification levels must be developed to assist food manufacturers in their quality assurance monitoring activities. Moreover, the skills and abilities of village nutrition workers must be harnessed for monitoring fortified foods at the village or household level.

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Introduction

The commitment of world leaders to the eradication of micronutrient malnutrition was consistently expressed in three international conferences: the World Summit for Children in 1990, the Montreal Conference on Ending Hidden Hunger in 1991, and the International Conference on Nutrition in 1992. The Philippine response to the global call to eradicate all forms of malnutrition by the year 2000 is the Philippine Plan of Action for Nutrition (PPAN) [1]. Its five impact programmes include food security, micronutrient supplementation and food fortification, credit assistance for livelihood, nutrition education, and food assistance. This paper will discuss fortification programmes in the Philippines.

Food fortification as a strategy to reduce micronutrient malnutrition

Definition

The Codex Alimentarius Commission of the United Nations defines food fortification as "the addition of one or more essential nutrients to a food, whether or not it is normally contained in the food, for the purpose of preventing or correcting a demonstrated deficiency of one or more nutrients in the population or specific population groups." The nutrients may be added as extracts or concentrates of materials of biological origin, or as products of chemical or biochemical synthesis.

Purposes

Food fortification aims to restore the nutrients lost during food processing by enriching a food with the depleted nutrient or increasing the level of the nutrient in the food. In both cases, fortification may increase the intake of specific nutrients identified as inadequate in a population [2].

Requirements

To ensure that food fortification reaches the nutritionally vulnerable groups in the population, certain requirements must be met [3]. The food vehicle must be a staple food consumed widely throughout the year and must pass through central processing points. The level of fortification must contribute significantly to the nutritional requirements but must not exceed the safe upper limit. The fortificant must not alter the organoleptic properties, physical structure, or shelf-life of the vehicle. Control and monitoring procedures must be built into the manufacturing procedures to ensure that fortification levels are adequate.

Strengths

Food fortification is socially acceptable. It does not require the active participation of the consumers or any change in buying, cooking, or eating habits. Fortification, in most cases, does not affect the organoleptic properties of food products. It can be introduced quickly, and the benefits are readily visible. Of various interventions, food fortification is the least costly and the most effective way to eliminate dietary micronutrient deficiencies [2–7].

Limitations

Food fortification is less likely to benefit people who consume locally produced, unprocessed food, because it relies on centrally processed and marketed food vehicles. Fortified foods are accessible to both target and non-target groups and may not be the most economical way to reach the target groups. If the cost of fortification is passed on to target consumers only, purchasing patterns among the intended beneficiaries may change adversely. Fortification incurs additional costs for food manufacturers. Programme success is ensured only when political will, legislation, and enforcement are present [1, 4, 6].

The Philippine food-fortification programme

As a PPAN impact programme, food fortification aims to provide safe fortification of staples or commonly consumed foods (such as rice, margarine, sugar, salt, oil, and flour) with essential micronutrients, especially vitamin A, iron, and iodine, to satisfy dietary gaps for nutrients and to make these available and accessible to the population [7]. The programme was designed to be spearheaded and implemented by the food industry, while the government was to provide the necessary support through policy, technology development and transfer, and incentives to encourage the participation of food manufacturers.

Since PPAN's formulation in 1993, various food-fortification efforts have been undertaken. These include iron fortification of rice, iodization of salt, and vitamin A fortification of margarine, wheat flour, sugar, and cooking oil. Single or multiple nutrient fortification of several processed foods has also been conducted.

Fortification of rice with iron

In 1993, the Food and Nutrition Research Institute (FNRI) started the fortification of rice with iron. The effort included technology development and market testing in Nueva Ecija, the country's leading rice-producing province. A clinical trial was also done, with the objective of increasing the intake of bioavailable iron in the Filipino diet and to reduce anaemia among the population by fortifying rice at 3 mg per 100 g. The results of the study showed that the improvement of iron status and reduction of the prevalence of anaemia was 2.3 times higher for children given iron-fortified rice for four or five days than for those given non-fortified rice [8].

Iron-fortified rice has been introduced to the public, particularly in Sorsogon and Surigao del Norte, through the Enriched Rice for Anaemia Prevention programme, a rice subsidy programme of the Department of Social Welfare and Development and the National Food Authority [9, 10].

Iodization of salt

The Philippines is pursuing universal salt iodization through Republic Act No. 8172, the Act for Salt Iodization Nationwide, which was passed by Congress in November 1995 [11]. The law requires all producers, importers, and manufacturers of food-grade salt to iodize the salt they produce, manufacture, trade, or distribute. It sets standards, regulations, and incentives as well as sanctions and fines to violators. In support of the implementation of the law, the following activities have been undertaken: distribution of iodization machines, training on the technology of salt iodization and quality assurance, dissemination of information on the law and its implementing rules and regulations, installation of titration laboratories in all regions, community-based monitoring of iodized salt, and multimedia campaign to promote the consumption of iodized salt [10, 12].

It has been four years now since the approval of the law, yet its enforcement remains weak, with no strict monitoring for quality assurance, including quality control and iodine content of salt. Uniodized salt, which costs 50% less than iodized salt, still proliferates in public markets and retail stores throughout the country. It is no wonder that a 1997 survey by the Department of Health showed that iodized salt was utilized by only 15% of those surveyed [13].

In 1998, the Nutrition Center of the Philippines conducted a study to determine the stability of iodine in iodized salt sold through the *takal* system (the market vendor sells small quantities of salt from a larger package of salt). The results showed that despite the low quality of the iodized salt produced and its exposure to extreme environmental conditions, iodine levels remained within the limits set for iodized salt at the retail level [14]. This led to the issuance of a Department of Health circular that allows the selling of iodized salt through the *takal* system [15]. It is hoped that, through this circular, more salt retailers will be encouraged to sell iodized salt so more consumers will have better access to iodized salt.

Fortification of margarine with vitamin A

The fortification of coconut oil-based, shelf-stable, non-refrigerated margarine was initiated by its manufacturer, Procter & Gamble Philippines, in 1992 [16]. The stability study showed more than 50% vitamin A retention in the margarine after eight months of storage. Moreover, at least 80% of the vitamin A was recovered after cooking, reflecting good thermal stability [17]. The subsequent controlled field trial among three- to six-year-old rural children showed a significant increase in the mean serum retinol level as well as a 60% reduction in the prevalence of low serum retinol [18].

The vitamin A–fortified margarine was the first food product to be awarded with the Department of Health's *Sangkap Pinoy* (literal translation: Filipino or indigenous ingredients) seal, a mark of recognition from the government of a properly fortified, high-quality food product.

Fortification of wheat flour with vitamin A

In 1995, a feasibility study on fortification of wheat flour with vitamin A was conducted by the Nutrition Center of the Philippines with the participation of two millers and in collaboration with international agencies. The study showed that about 80% of the vitamin A added was retained in the flour and baked *pandesal* (most popular bread among Filipinos) over a period of one month [19]. The colour and odour of the flour and the flavour of the bread showed no significant changes.

Two years after, the effect of vitamin A–fortified *pandesal* on the vitamin A status of Filipino school children was assessed. The double-masked, randomized clinical trial involved provision of a 60-g piece of fortified or non-fortified *pandesal* to 835 children for six months. The results showed improved vitamin A status that was most evident by end-of-study differences in modified relative dose response, showing that intake of vitamin A–fortified *pandesal* halved the percentage of children with inadequate liver vitamin A stores [20].

However, despite the successful stability studies and efficacy trials, not all flour millers have decided to pursue wheat flour fortification. Of the 12 flour millers, only 4 are fortifying about 20% of all hard flour produced.

Fortification of sugar with vitamin A

The fortification of sugar with vitamin A was undertaken by the Victorias Milling Corporation, with technical assistance from the FNRI in 1996. The stability test showed that adequate vitamin A was retained in the vitamin A–fortified pure refined sugar stored for six months at room temperature. More than 80% of the vitamin A was also retained when the fortified sugar was used in the preparation of hot coffee, citrus juice, and cake. The colour and flavour of fortified sugar did not differ from that of unfortified sugar [21].

Vitamin A–fortified sugar was launched in the market in February 1997. In just a few months, however, the price of sugar in the world market plummeted and sent the already indebted Victorias Milling Corporation into further financial crisis. This halted the fortification of sugar with vitamin A, even before the programme could progress into full market scale. With the subsequent closure of four ailing sugar mills, further fortification efforts for sugar will have to wait until after the current sugar industry crisis in the Philippines is over.

Fortification of cooking oil with vitamin A

In 1997, the San Pablo Manufacturing Corporation, the manufacturer of Minola cooking oil, developed, tested, and adopted technology for the fortification of cooking oil with vitamin A. The FNRI and the Philippine Council for Health Research and Development provided technical assistance and funding support, respectively.

The stability test on vitamin A–fortified cooking oil revealed that vitamin A was stable from five months to one year whether it was packed in yellow plastic bottles, tin cans, or clear glass bottles. Free fatty acids and peroxide values during storage were within the acceptable limits. There were no significant differences in colour, flavour, and general acceptability between food products fried in fortified cooking oil and those fried in unfortified cooking oil. Vitamin A was substantially retained in fried banana, sweet potato fries, rice, and fish. A 15-g serving of oil provides one-third of the recommended dietary allowance (RDA) for vitamin A of the adult reference man [22].

Vitamin A–fortified cooking oil, which carries the *Sangkap Pinoy* seal, is now commercially available

throughout the country. Upon the initiative of the Philippine Coconut Authority, an efficacy trial on the vitamin A–fortified cooking oil will be conducted.

Fortification of processed foods

As an accompanying programme to food fortification, the *Sangkap Pinoy* seal programme aims to encourage food manufacturers to market high-quality fortified food products. The seal is awarded to manufacturers who are able to meet the standards for fortifying products with vitamin A, iron, and iodine. The seal makes the general public aware of the availability of fortified foods with assurance of quality and thus encourages them to consume such products. It also provides a mechanism for the government to support the private sector in marketing fortified foods and serves as a venue for regular consultation and dialogue with the industry for public–private sector partnership for food fortification.

Presently, there are 21, 7, and 3 food products with the *Sangkap Pinoy* seal for vitamin A, iron, and iodine, respectively. These include sardines, instant noodles, cheese, juice drinks, chocolate drinks, weaning foods, biscuits, margarine, snack foods, condiments, hot dogs, and hotcake. A technical committee composed of experts from various governmental agencies regularly conducts quality assurance and control monitoring of these products.

Issues and challenges

Establishment of clear programme policy

The Philippine food-fortification programme remains a project under the PPAN [2] and the 1996–98 National Micronutrient Operations Plan [7], while the Bureau of Food and Drugs Guidelines on Micronutrient Fortification of Processed Foods serve as reference for the *Sangkap Pinoy* seal programme [23]. A comprehensive food-fortification programme, with specific policies, has yet to be developed. For instance, there are no clear programme policies regarding food items eligible for the *Sangkap Pinoy* seal, the conduct of food-consumption surveys for possible definition of required fortification levels in food products, the dissemination of research results, and the sharing of developed fortification technology, among others.

Targeting staple foods

One of the primary requirements to ensure effective food fortification is for the vehicle to be widely consumed by the population. Indeed, there have been efforts to fortify staple foods such as rice, sugar, flour and cooking oil. However, except for vitamin A–fortified cooking oil, iron-fortified rice, and vitamin A–fortified sugar and flour, these efforts have not gone to full market scale. At present, most of the fortified foods on the market with the *Sangkap Pinoy* seal are non-staples.

Legislation requiring the fortification of processed foods with essential micronutrients is now pending in the Philippines Congress [24, 25]. The bill specifically mandates the fortification of rice with iron, wheat flour with vitamin A and iron, refined sugar with vitamin A, and cooking oil with vitamin A. It is hoped that after the bill is passed, fortified staple foods will be readily accessible and available throughout the country.

Strict enforcement of food-fortification laws

The present status of the salt iodization law reflects the government's failure to implement the provisions of the law with its full authority. Although legislative commitment is strong, police commitment seems to be lacking. Legislative commitment is important but, in and by itself, cannot sustain any food-fortification programme. It is not enough that food-fortification laws are passed. The government must ensure that the provisions of the laws are strictly enforced.

Lessening the effect of foreign exchange

For most developing countries, foreign exchange determines the sustainability of a food-fortification intervention [2]. This is exemplified by our experience in sugar fortification, which failed because of foreign exchange-dependent factors. Foreign exchange also affects the cost of fortification, as in the case of wheat flour. In a developing country like the Philippines, where wheat does not grow and has to be imported, fortification brings a double constraint to flour millers, because foreign exchange is required for both the food vehicle and the fortificant.

There may be a need to search continuously for appropriate, locally produced food vehicles. Likewise, local sources of fortificants, testing kits, machines, and reagents may have to be identified. A special concern is to help small manufacturers to procure reasonably priced fortification machines and fortificants. These may all help to lessen the constraints imposed by the need to secure foreign exchange.

Conduct of efficacy and effectiveness studies

The prerequisites for a successful food-fortification intervention include advocacy, technology development and testing, stability studies, market testing, and field trials. Most fortification efforts have fulfilled these requirements except for the field trial, the purpose of which is to determine the efficacy of a fortified food in

improving the nutrient status of a target group. This is the ultimate mark of a fortified food product. It is a valid basis for advertising claims that may increase the number of consumers, increase sales, and provide social and economic benefits to the manufacturer. Use of the product may be expanded and intensified because of its proved effectiveness.

Of the recommended vehicles for fortification, only iron-fortified rice, vitamin A–fortified margarine, and vitamin A–fortified wheat flour (as *pandesal*) have been tested by controlled field trials. All other fortified foods in the market, including those with the *Sangkap Pinoy* seal, have not been tested for their efficacy.

Establishment of quality assurance and monitoring procedures

Quality assurance and monitoring procedures at the production and retail levels must be set up to ensure adequacy of fortification. Simple, rapid, low-cost assessment methods to determine fortification levels must be developed to assist food manufacturers in their quality assurance and monitoring activities. Moreover, the skills and abilities of village nutrition workers must be harnessed for monitoring fortified foods at the village or household level.

Improving nutrient content of food through genetic modification

Food fortification, by practice or tradition, has involved the addition of chemical preparations of nutrients. The challenge for agriculturists worldwide is to increase the nutrient content or add more nutrients to plant products through either plant-breeding or biotechnology. Genetic modification of plant products is an emerging strategy to increase the amount of nutrients inherently found in plants or to add nutrients that are completely absent. For instance, the iron and zinc content of rice may be increased, its phytate content decreased, and β-carotene added. The iron, zinc, and folate contents of wheat flour may be increased, its phytate content decreased, and β-carotene added.

Conclusions

Micronutrient malnutrition must be addressed in a comprehensive manner. The interventions that already exist must be implemented according to the judgement of planners and programmers of the country in relation to the type of micronutrient deficiency, its severity, and the population groups affected. Food-based interventions must be the primary and long-term approach in the promotion of good nutrition. Food fortification, being a food-based approach, is seen as the most effective and sustainable strategy to increase the nutrient contents of food. However, the programme may be phased out eventually when agriculturists are able to improve the nutrient contents of foods through plant-breeding. Regardless of the plant-breeding method, whether traditional or biotechnological, the world population will be healthier if more nutrients are inherently present in foodstuffs.

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