

Prepared For :
ILSI- Japan



FINAL REPORT

STUDY ON THE CHALLENGES OF COMMERCIALIZING MULTINUTRIENT FORTIFIED RICE IN THE PHILIPPINES

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1. BACKGROUND

Fortification is defined as the addition of micronutrients in food to prevent or correct deficiencies in the population or specific population groups wherein the added nutrients may or may not be originally present in the food product that will be used (Liyanage & Hettiarachchi, 2011; Codex Alimentarius, 1991). In the Philippines, a law on food fortification was signed to mandate and encourage fortification of food products. This act is known as Republic (RA) Act No. 8976 or the “Philippine Food Fortification Law of 2000”, which promotes the fortification of foods to compensate for the inadequacies in the Filipino diet based on the most recent Recommended Nutrient Intakes (RNI). Food fortification program under this law consists of mandatory and voluntary fortification. Under voluntary fortification, manufacturers are encouraged to fortify all processed foods or food products based on the rules and regulations set by the Department of Health (DOH) through the Food and Drug Administration (FDA). Mandatory fortification, on the other hand, requires the fortification of staple foods including rice (fortify with iron), wheat flour (fortify with vitamin A and iron), refined sugar and cooking oil (fortify with Vitamin A), and other staple foods which may be later required by the National Nutrition Council (NNC).

The NNC formulated the Philippine Plan of Action for Nutrition (PPAN) to serve as the blueprint for achieving nutritional adequacies for all the Filipinos, and the government’s commitment to eradicate hunger and malnutrition (Barba, 2000; Solon 2000). The PPAN includes food fortification and supplementation programs as preventive and long- term food-based interventions to address the persistent micronutrient problems in the country particularly on iron, iodine, and vitamin A deficiencies. Collaboration between government and the private sectors will ensure that the technologies on fortified food products will be commercialized and will become available to the target population groups. Since its establishment, several fortification efforts have already been conducted including single and multi- nutrient fortification. The Department of Science and Technology- Food and Nutrition Research Institute (DOST-FNRI), as a member of the technical working group for both RA 8976 and PPAN have been consistently conducting R&D efforts on fortified food products including rice fortification technologies and micronutrient powders using extrusion technology.

Through the years, DOST-FNRI continues to conduct study on rice fortification. It had also explored multiple fortification to address the micronutrient deficiencies reported on the National Nutrition Surveys (NNS) being conducted by the Institute. In 2019, a multi-nutrient rice premix with iron, zinc, iodine, vitamins A, B₁, and folic acid for women of reproductive age was developed using extrusion technology. The product was found to be acceptable in terms of physico-chemical, nutrient and sensory properties. It was further improved to add other micronutrients and target other population groups including the pregnant and lactating mothers. These efforts are being conducted to aid in addressing the micronutrient deficiencies of Filipinos and bring positive impact to the society and the economy. To date, DOST-FNRI has developed rice premixes using extrusion technology formulated for women of reproductive age (Saises, M.C., *et al.*, 2020), and adults (Saises, M.C., *et al.*, 2019). Similarly in other countries, multi-nutrient fortified rice premixes have been developed and were found to be cost effective in addressing micronutrient deficiencies.

The existing implementation of rice fortification in the Philippines in terms of capacity, supply chain, and advocacy campaigns has not gained traction. It is besieged by many challenges like lack of budgetary support, investors, suppliers, and awareness. With the advent of multiple rice fortification, it is important

to understand the challenges and address them since the same system may be used for the commercialization of multi micronutrient fortified rice.

2. OBJECTIVES OF THE STUDY

The study aims to understand the feasibility of implementation, commercialization, financial attribution of multi micronutrient fortified rice in the Philippines and develop an operational road map for scale-up. Specifically, the study aims to validate that the challenges identified in previous project for iron fortified rice (IFR), as implemented by the World Food Program (WFP) Philippines and the Nutrition Foundation of the Philippines Incorporated. Also, identify avenues in promoting micronutrient for uses in institutions and in open market; identify merits and needs of introducing multi-nutrient fortified rice, identify necessary steps to obtain regulatory approval of multi-nutrient fortified rice under voluntary fortification; determine 5-year financial feasibility for the commercialization of multi micronutrient fortified rice.

3. RESEARCH METHODOLOGY

The study involved conduct of literature review focusing on (1) existing fortified rice supply chain in the Philippines; (2) acceptability of multi micronutrient fortified rice and (3) micronutrient deficiencies among different population groups. The study also involved evaluation of the challenges presented in previous study funded by the World Food Program on the capacities, supply chain, and campaign initiatives in the Philippines. To implement the project, the following procedures were used:

3.1 Project set up

Meetings between DOST-FNRI, International Life Sciences (ILSI)-Japan and DSM-Japan were held virtually to discuss the context of the project, set the objectives, and establish expected outputs. A project plan was prepared by DOST-FNRI and was included as an attachment by ILSI-Japan for fund request to the Nutrition Japan Public Private Platform. A delegation of agreement was prepared and approved by both DOST-FNRI and ILSI-Japan where the roles of both parties were specified and the term of delegation was also agreed to run from December 29, 2022 to July 31, 2023.

The study team searched literatures and references on implementation of rice fortification in the Philippines. The reference search also contained the following topics:

- i. Challenges in promoting the current fortified rice in Philippines;
- ii. Merits of introducing multiple micronutrient fortified rice in Philippines;
- iii. Applicability of the multi-nutrient rice in the Philippines based on existing malnutrition problems and laws;
- iv. Acceptance of a multi-nutrient fortified rice;
- v. Initial evidences of use in the Philippines;
- vi. Analysis on the cost and demand of multiple micronutrient fortified rice;
- vii. Steps to obtain regulatory approval for multiple micronutrient fortified rice

Sources used included the terminal reports on previous DOST-FNRI studies, licensing agreements with technology adopters, and monitoring reports. External data focused on rice supply and

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demand and rice fortification, including reports from Department of Trade and Industry (DTI), Philippine Statistics Authority (PSA), Department of Health (DOH), Food and Drug Administration (FDA), National Nutrition Council (NNC), Department of Agriculture (DA), National Food Authority (NFA), and literature from different search engines like Google Scholar, PubMed, Refseek, Science.gov and Google Books.

3.2 Report preparation

All references and data were collected, screened and analyzed. Only those that were relevant to the context of the project were used in this report. The project team discussed the merits of the selected references. An initial report will be submitted and reviewed by ILSI-Japan. Their comments will be incorporated in the final report which will be submitted at the end of the project implementation.

4. SCOPE OF STUDY

The study is solely based on secondary data and no ethical clearance is needed. The financial study is based on pilot scale productions conducted at the DOST-FNRI facility and may not reflect actual selling prices of rice premix and fortified rice adoptes.

5. SIGNIFICANCE OF THE STUDY

The results of this study can serve as evidence on possible implementation of the feasibility of commercializing multi-nutrient fortified rice. Economically, the project offers new technological ventures for existing fortified rice kernels, opportunities for rice producers to diversify their sale of fortified rice, and better market opportunity of fortificants suppliers. In terms of nutritional benefits, it can also serve as basis on the use of multi-nutrient fortified rice for programs targeting vulnerable groups including pregnant and lactating women, crafting policies for enhanced dietary supplementation programs of the Government. The roadmap to be on operational pathway for its scale-up implementation.

6. RESULTS OF LITERATURE SEARCH

The final report contains 6 topics discussing the following:

- 6.1 Updates and challenges in using iron fortified rice in the Philippines
- 6.2 Merits of introducing multiple micronutrient fortified rice in the Philippines
- 6.3 Applicability and acceptance multiple micronutrient fortified rice
- 6.4 Financial feasibility of multiple micronutrient fortified rice based on existing iron fortified rice supply chain
- 6.5 Regulatory requirements for multiple micronutrient fortified rice in the Philippines
- 6.6 Ways forward on increasing fortified rice utilization and shifting to multivitamin fortified rice

6.1 UPDATES AND CHALLENGES USING IRON RICE FORTIFICATION IN THE PHILIPPINES

Republic Act 8976 or the Philippine Food Fortification Act of 2000 serves as a medium-term response to eliminate micronutrient deficiencies which mandates the fortification of staple foods, both imported

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and locally processed such as rice, sugar, wheat flour, and cooking oil with micronutrients specifically vitamin A, iron, and iodine. The Department of Health spearheads the implementation of RA 8976 and the National Nutrition Council (NNC) serves as the Secretariat, for the Sub-Technical Working Group on Mandatory Food Fortification (TWG-MFF). Together with its member agencies, which includes the Department of Education (DepED), Department of Social Welfare and Development (DSWD), Department of Agriculture (DA), Department of Local and Interior Government (DILG), Department of Science and Technology (DOST), Department of Trade and Industry (DTI), National Economic and Development Authority (NEDA), Department of Labor and Employment (DOLE), Non-Government Agencies and Representatives of the industry, ensures implementation of collective efforts in scaling up the use of iron fortified rice. Further, the Sub-Technical Working Group on Rice Fortification is tasked to support and work with the National Food Authority (NFA) on its compliance to rice fortification as stated in RA 8976, develop and implement advocacy and communication efforts to promote sale and consumption of iron fortified rice.

On May 4 and 13, 2022, the Sub-TWG MFF convened and discussed the following: study funded by the World Food Program (WFP) on their initiatives on Rice Fortification, results of Nutrition Foundation of the Philippines (NFP completed project “Study on Rice Fortification Capacities Supply Chain, and Campaign Initiatives in the Philippines), consolidated accomplishments of member agencies and the proposed plans on rice fortification.

Several efforts and accomplishment of member agencies in rice fortification were reported during the meeting and presented below:

- 6.1.1 Department of Health (DOH)
DOH reinforced the Memorandum on “Promotion and Utilization of Fortified Foods in the Hospital Dietary Service”, issued the Department Circular Number 2020-0292 which is the End Poverty and Hunger Program, and implemented promotional campaigns relative to food fortification.
- 6.1.2 National Nutrition Council (NNC)
NNC issued the Governing Board Resolution on the Scaling Up Rice Fortification with Iron for the Social Safety Net Programs in the Philippines requiring the use of iron fortified rice in feeding programs, they also commissioned a study on the assessment of the Philippine Food Fortification Program, and proposed inclusion of the formulation of the strategic plan on food fortification in the NNC-UNICEF rolling work plan.
- 6.1.3 National Food Authority (NFA)
NFA was authorized to fortify 50% of the 300 thousand metric tons of rice buffer stock for 2022 with a budget of PhP 530, 514,000 allocated for the revival of the iron fortification program. They also procured rice fortification equipment and iron rice premix (pilot areas for implementation in NFA-National Capital Region, NFA Regional II, III, and IV.
- 6.1.4 Department of Interior and Local Government (DILG)
DILG drafted the revised memorandum on the scaling up rice fortification for local social safety net programs and issued the final version instructing the use of iron fortified rice in local government canteens, hospitals, meetings and other social safety net programs.
- 6.1.5 Department of Education (DepED)
- 6.1.6 Food and Drug Administration (FDA) reviewed and updated standards for the iron rice premix

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- 6.1.7 DepED issued their operational guidelines on the implementation of the school-based feeding program, where the use of iron fortified rice was specified for the localized cycle menus. They also reported that they have procured of iron fortified rice for school-based feeding programs
- 6.1.8 Department of Science and Technology- Food and Nutrition Research Institute (DOST-FNRI) assisted and trained additional technology adoptors for iron fortified rice and iron rice premix and assisted in the conduct of webinar series on iron fortified rice
- 6.1.9 Department of Labor and Employment (DOLE) issued advisory on the promotion and use of iron fortified rice in company and rice subsidies for employees and/or company canteens
- 6.1.10 Office of the Cabinet Secretary issued the Inter Agency Task Force on Zero Hunger (IATF-ZH) resolution urging the NFA to include additional funds necessary to repair, recalibrate, refurbish rice fortification equipment
- 6.1.11 Rice fortification challenges
During the meeting, several challenges were brought up including the removal of NFA's police power and monitoring of the iron fortified rice from their mandate, leaving no monitoring agency for the fortified rice since FDA only monitors the iron rice premix. Another challenge identified was the decrease in the budget for the School Based Feeding Program (SBFP). There were also problems in the availability of rapid testing method for monitoring. The current method requires submission of the premix and fortified rice to analytical laboratories which is expensive and would take at least 7-10 working days for the results to be released. It was also noted that different varieties of rice is consumed, it was suggested that the most common variety be identified for different provinces/municipalities and use this in the localized fortification efforts.
- 6.1.12 Ways forward for the iron fortified rice innovations on the iron fortified rice
- NFA to re-establish protocols on rice fortification for proper blending/dispersion; develop standard procedures for testing/inspection, analysis, evaluation and/or certification of iron-fortified rice in compliance with the new FDA standards for rice fortification;
 - DILG to finalize and disseminate, and enforce memorandum for the Scaling up of rice fortification for local safety net programs;
 - DepEd to expanded the use of iron fortified rice to other regions; promote the use of iron fortified rice through parent-teacher associations; develop guidelines to ensure consumption of IFR among students' beneficiaries
 - DOST-FNRI to continue R&D efforts on low-cost blenders, formulations, and continue efforts in providing technical assistance to the rice industry, and R&D on multivitamin fortified rice;
 - FDA to monitor quality and compliance of iron rice premix manufacturers/distributors using updated standards, provide technical assistance to new technology adoptors on the application for license to operate and Certificate of Product Registration;
 - Office of the Cabinet Secretary to sustain strong leadership and support in facilitating intersectoral action for rice fortification
 - NNC to formulate strategic plan on food fortification and look for funding support from other partners, and to follow up on the TWG members in developing their annual agency work plans.
- 6.1.13 Nutrition Foundation of the Philippines (NFP, 2022) reported on the iron fortification capacities, the concern lies in the supply chain issues, price of fortificant, and consumer

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awareness. They recommended to increase the number of manufacturers and distributors of IFR across the regions or in strategically located facilities to lower transportation expenses. It was also suggested to explore alternative suppliers of fortificant, blending cost, and reduce or eliminate royalty fees for technology adoption. The following issues identified are explained below:

- Poor consumer acceptance and perception
There is a persistent perception of low-quality iron fortified rice because of unpleasant taste and odd appearance. This could be addressed by wider social marketing efforts.
- High price of iron rice premix and iron fortified rice
The current selling price of IFR varies from Php 60 to 90 depending on the area. The estimated P4.00- additional cost per kilo of fortified rice is due to production cost of premix, mixing cost, packaging, and royalty fee.

To lower the price, cost cutting must be done without compromising the quality and compliance to the FDA standards. According to consumer KAP, the maximum allowable incremental cost for IFR consumer can afford was around Php 2.00.

As recommended in the NFP report, the following could be implemented to reduce the fortification costs.

- Purchase cheaper fortificant
- Reduce blending cost
- Removal or reduction of FNRI royalty fee
- Limited production and distribution facilities
No premix producers are located in Visayas and Mindanao Islands leading to additional P 2-5.00/ Kg logistics expenses.
- Lack of stewardship
The legal mandate was poorly enforced in the government, and the private sector lacked the same incentives to engage in expanding the local production capacity. As a result, only the public sector is creating rice fortification technologies. Based on the comparative study Forsman et al., 2014 on rice fortification settings, strong leadership to coordinate efforts and maintain success is one of the most important lessons learned from fortification experiences globally. The following strategies were suggested by several stakeholders in order to maintain stewardship across administrations:
 - Provide research that shows the clear health need and impact of the fortification solution.
 - Frame the fortification impact with respect to productivity and national economic development.
 - Communicate the potential decrease in overall healthcare costs.
 - Highlight the increase in potential revenues (e.g., if the government sells fortified rice).



- Use local businesses over imports to promote domestic production and development.
- 6.1.14 The WFP recent published study “Understanding the rice value chain in the Philippines: defining the way forward for rice fortification” also highlighted similar challenges and their recommendations as to addressing them.
 - 6.1.14.1 Weak enforcement of RA 8976 and low prioritization
 - Based on the law, fortification of rice is only mandatory for NFA and according to NFA, they stopped producing fortified rice since 2011 due to several supply chain constraints;
 - Statutory enforcement framework of rice fortification must be strengthened by providing technical support to DOH and FDA and key players of the fortified rice supply chain;
 - Advocacy among government agencies should also be conducted to increase budgetary allocations for fortified rice.
 - 6.1.14.2 Underdeveloped supply chain infrastructure
 - There is low awareness among millers on production, techniques, cost, suppliers of raw materials and machinery for rice fortification
 - It is recommended to conduct increased advocacy workshops among millers, and technology transfer trainings
 - 6.1.14.3 Lack of coordination among agencies involved in rice fortification
 - Development of a sustainable rice fortification supply chain requires cross-ministerial collaboration and communication strategy. It must include defined roles and responsibilities for relevant government agencies and the private sector.
 - 6.1.14.4 Low incentive to invest in rice fortification
 - Investment in rice fortification is considered an additional burden hence, not a priority. Millers are compelled to sell their rice at lower prices due to the entry of cheap imported rice
 - 6.1.14.5 Low return on investment perceived in fortified rice production due to lack of consumer demand and awareness on various production cost
 - Lack of consumer demand and government support results to low willingness of rice millers to invest in rice fortification
 - 6.1.14.6 Low acceptance among consumers due to negative past experience
 - Fortified rice previously supplied by NFA used coating technology and was yellowish which resulted to poor acceptability among consumers. This experience left a negative perception even after more acceptable premixes are available.

It is important to understand the challenges of rice chain supply for the scaling up efforts of IFR. The same supply chain can be used for the multi micronutrient fortified rice supply chain. For both locally produced and imported fortified kernels, the same blending equipment may be used in preparing the multi micronutrient fortified rice, as well as the distribution channel and advocacy/campaign techniques. It is important to note that should fortified rice facilities in the Mindanao Island be operational, possible cost of logistics for the premix/kernels may be reduced, but, cost for the logistics of the fortificant from the port of origin to the production site should be added. In general, for a smooth transition from iron to multi micronutrient fortified rice, the existing challenges faced in scaling up the iron fortified rice should be addressed first.

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The use of multi micronutrient fortified rice is included in the long-terms plans for rice fortification, in the dietary supplementation programs of NNC. However, iron remain as the only micronutrient mandated for rice and the addition of other micronutrients will fall under the voluntary fortification unless the guidelines for rice fortification be revised.

6.2 MERITS OF INTRODUCING MULTI MICRONUTRIENT FORTIFIED RICE IN THE PHILIPPINES

The latest Food Consumption Survey (FCS) of the DOST-FNRI in 2018-2019 showed that rice and rice products remained the most consumed food group, followed by fish and fish products, and vegetables, regardless of household size. Most of the Filipino households are energy and nutrient inadequate, where only two (2) out of ten (21.8%) households met 100% of the energy recommendation; with an average intake of 6,524 kilocalories. Five (5) out of 10 (55.1%) households met the estimated average requirement (EAR) for protein. Among the micronutrients, 81.2% of the households met recommended levels for niacin. Iron and calcium requirements were met by the least percentage of households at only 5.8% and 12.4%, respectively (Figure 1).

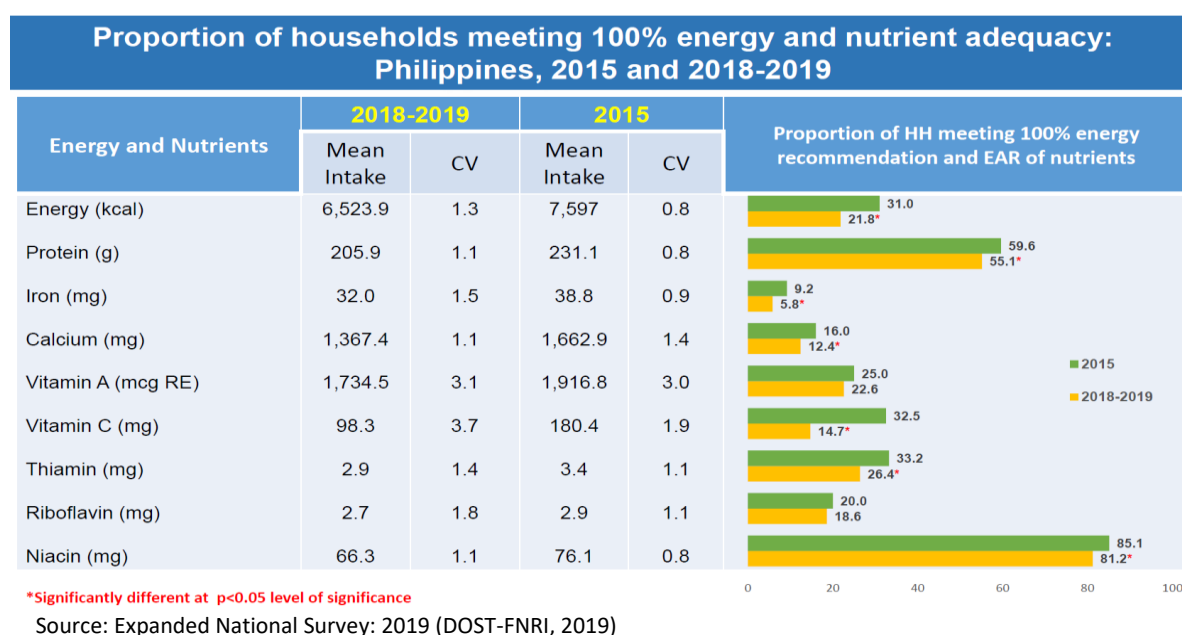


Figure 1. Food household consumption survey

Filipino diet is predominantly carbohydrates mainly from rice. Based on the Department of Agriculture (DA) supply and demand projections for 2022 as of September 15, 2022 the total annual supply of rice is 17.364 million MT, while the total consumption is 15.137 million MT. The Philippine Rice consumption expects to increase to 15.3 M MT (Agflow, 2022). As the main food staple of the nation, rice is a suitable food vehicle. It offers an opportunity to improve the nutrition gap through rice fortification.



Given the inadequate vitamin content of polished rice and the lack of dietary diversification, high rice consumption is a risk factor for low micronutrient intake (Picolli et al., 2012). With the current advocacy programs to promote iron fortified rice, this would be an appropriate time to initiate awareness for multi-nutrient rice and its benefits:

- Improved nutritional value: Rice is a staple food for many people around the world, and adding essential micronutrients to it can significantly improve its nutritional value. This can help address nutrient deficiencies, particularly among vulnerable populations (World Food Programme, 2018).
- Reduced risk of micronutrient deficiencies: Micronutrient deficiencies, such as iron deficiency anemia, can have serious health consequences. Multinutrient rice fortification can help reduce the risk of these deficiencies, improving overall health and wellbeing (Muttayya et al., 2012)
- Increased economic benefits: Multinutrient rice fortification can also have economic benefits, as it can increase the market value of rice and create new opportunities for farmers and producers.
- Improved cognitive development: Adequate intake of essential micronutrients is essential for proper cognitive development. Multinutrient rice fortification can help improve cognitive function, particularly in children, which can have long-term benefits for their education and future economic opportunities (Fiorentino et al, 2018, Best et al, 2011).
- Enhanced food security: Fortified rice can provide a sustainable and affordable source of essential nutrients, particularly in areas where access to diverse foods is limited (World Food Programme, 2018). This can help improve food security and reduce the risk of malnutrition.

Overall, multinutrient rice fortification has the potential to significantly improve public health and wellbeing, particularly in regions where rice is a staple food and micronutrient deficiencies are common. Multinutrient rice fortification is a food-based approach to improve the nutritional quality of rice by adding essential micronutrients such as iron, zinc, and vitamins.

The price of fortified rice is influenced by the cost of producing the kernels, which depends on the initial equipment investment, and recurrent manufacturing costs, including the ingredients, transportation, and blending expenses. The equipment and its operation account for the majority of the costs (USAID, 2008). Since the cost of fortification accounts for 15–30% of the total cost, adopting multi-nutrient fortification of rice should be taken into consideration. The cost of the fortificant has a small bearing on the overall production cost. Hence, to make it investment-worthy, the addition of several micronutrients that are insufficient in the diet should be considered. Aside from being more cost-effective, this would address issues of micronutrient deficiencies in different age groups, especially in the vulnerable population.

Furthermore, this supports the Philippine Development Plan (PDP) for 2023-2028 which underscores collective strategic actions to ensure food security and proper nutrition (Figure 2). The joint efforts of the government, private sector, and other stakeholders will be toward attaining a sufficient and stable supply of food commodities, expanding access to affordable, safe, and nutritious foods, and improving nutrition across all ages.



The strategic framework also includes increasing the development and adoption of technologies that increase the nutritional content and prolong shelf life shall be pursued. Importantly, it indicates that the government shall strengthen research and development efforts on food fortification (*i.e.*, large-scale fortification of staple foods), promote and utilize iron-fortified rice and other products and explore advanced and emerging technologies (NEDA, 2023). The development and promotion of multi-nutrient rice fortification are in accordance with the country's endeavor.



Source: National Economic and Development Authority. (2023). Philippine Development Plan 2023-2028.

Figure 2. Strategic Framework to Ensure Food Security and Proper Nutrition

The Philippine Plan of Action for Nutrition's (PPAN) Strategy Plan Research Agenda 2022-2028 outlines tactics and initiatives that aim to provide an enabling environment for the PPAN Research's implementation. The goals include the reduction in the prevalence of micronutrient deficiencies to acceptable levels among the vulnerable population. The multi-micronutrient fortified rice can be used to contribute to achieving the goals and targets of PPAN (Table 1).

Table 1. PPAN goals and targets

Indicator (%)	ENNS 2018 data	Updated PPAN target		Basis of targets
		for 2022	for 2028	
Prevalence of anemia among pregnant women	23%	11.6%	17.2%	3.2% rate reduction per year based on past trends and mild public health problem
Prevalence of vitamin A deficiency in children 6 months to 5 y/o	15.5%	<15.0%	9.9%	Reduce to <10% or to mild public health significance by 2028. A 0.622-point reduction per year.
Median urinary iodine concentration (UIC) in ug/L of pregnant women	122 ug/L	150-249 ug/L	150-249 ug/L	Increase the median UIC to 150-249 ug/L or have adequate iodine nutrition by 2023-2028.
Median UIC in ug/L of lactating women	99 ug/L	100-199 ug/L	100-199 ug/L	Increase the median UIC to 100-199 ug/L by 2023-2028.
Proportion of children 6-12 y/o with median UIC level below 50 ug/L	12.4%	<20.0%	4.9%	Less than 20% by 2028. Reduce to less than 5% by 2028 with a 0.833-point reduction per year.
Median UIC in ug/L of children 6-12 y/o	174 ug/L	100-199ug/L	≥174-199 ug/L	Retain the median UIC within 100-199 ug/L or adequate iodine nutrition by 2023-2028.
Percentage of households using adequately iodized salt	36%	>90	91	Achieve universal salt iodization with >90% of households using adequately iodized salt i.e., salt with iodine content of ≥15 ppm. A 6.111-point increase per year.

Source: Joint meeting of the Technical Working Group on Food Fortification and National Salt Iodization Program, 25 August 2022.

6.3 APPLICABILITY AND ACCEPTANCE OF MULTI MICRONUTRIENT FORTIFIED RICE

In the Philippines, malnutrition continues to be a major problem. Stunting and wasting in children under five have increased over time, where 13.4% of children six months to five years old suffer from iron deficiency and 15.5 % suffer from vitamin A deficiency (VAD). The Expanded National Nutrition Survey (ENNS) show that iodine deficiency (ID) exists in pregnant women (23%), elderly (22.6%), and lactating mothers (20%) (DOST-FNRI, 2019).



Diets deficient in necessary vitamins and minerals hinder not only the cognitive and physical development of the vulnerable population (WHO, 2006) but also social and economic growth. Those who are malnourished are unable to realize their full potential. Malnourished children perform worse in school, which reduces their employment prospects in the future. Adults who are undernourished are less able to work, support their communities' economy, and take care of their families. Children born to underweight mothers are more likely to experience physical and cognitive impairments later in life. This keeps the cycle of unemployment and poverty going. Thus, the nutritional status of the population is one of the factors in determining the quality and productivity of the people, which in turn will affect national productivity. In the long run, good nutritional status contributes to the social and economic development of the country.

To prevent micronutrient deficiency, the consumption of a healthy and balanced diet is recommended. However, it is difficult to achieve particularly when food items are inaccessible and unaffordable for disadvantaged populations. One of the most effective strategies to reduce micronutrient deficiencies is through the fortification of multiple nutrients to increase vitamin and mineral intake. Fortification of staple food such as rice which makes up around 35 % of the daily household food intake (DOST-FNRI, 2022) has the potential to increase nutrient intake.

The DOST-FNRI conducted multi micronutrient rice fortification studies on formulation, acceptability, distribution, and efficacy of multi micronutrient rice premixes. Currently, three formulations are available for adults, women of reproductive age, and pregnant and lactating mothers. The rice premixes contain combinations of micronutrients that were based on the Recommended Nutrient Intakes (RNI) of Filipinos, specific for each target group.

The multi micronutrient fortified rice kernels for adults were formulated based on the Recommended Nutrient Intakes (RNI) of adult males aged 19 to 59 years with the following target micronutrient levels below (PDRI, 2018).

Table 2. Target micronutrient levels of multi micronutrient rice kernels based on 1/3 RNI (PDRI, 2018)

Fortificant	RENI Male Adult, 19-29 y/o
Iron	4 mg
Zinc	2.17 mg
Vitamin B1	0.4 mg
Vitamin A	233 ug
Folic acid	133 ug

The multi micronutrient fortified rice were used in the intervention model study in which families were given the fortified rice for 120 days. The approach of intervention involved gardening, nutrition education, and supplementary feeding (GarNESupp) for internally displaced persons (IDPs) in Marawi City, Mindanao. To evaluate the effects of the supplementary feeding with fortified rice, the height and weights of the family members were measured before and after the intervention. In addition, iron, zinc, folic acid and vitamin A biomarkers were determined. The results of the intervention achieved a significant decrease in the prevalence of zinc deficiency among children 13 to 18 years and adults 19



years and above. Moreover, folate deficiency significantly decreased at the end of the study (Agdeppa et al., 2019).

The same samples of multivitamin fortified rice were tested for acceptability wherein 85 respondents were asked to evaluate the rice using a 7-point hedonic rating scale. The multivitamin fortified rice were evaluated based on appearance (itsura), odor (amoy), taste (lasa), and general acceptability (kabuuang kagustuhan), 7 being the highest score with a description of “gusting-gusto”. The scoresheets were distributed with the fortified rice and the consumers were asked to evaluate the rice and encircle the number corresponding to their preference for each sensory attribute (Figure 3).

SCORE SHEET

PANGALAN: _____ EDAD: _____ KASARIAN: _____ PETA: _____

Bilugan ang numero kung paano nagustuhan ang **Multi-nutrient Fortified Rice** base sa kanyang **itsura, amoy, lasa, at kabuuang kagustuhan**.

Itsura	Amoy	Lasa	Kabuuang Kagustuhan
7 – Gustong gusto	7 – Gustong gusto	7 – Gustong gusto	7 – Gustong gusto
6 – Katamtamang gusto	6 – Katamtamang gusto	6 – Katamtamang gusto	6 – Katamtamang gusto
5 – Bahagyang gusto	5 – Bahagyang gusto	5 – Bahagyang gusto	5 – Bahagyang gusto
4 – Hindi ayaw, hindi gusto	4 – Hindi ayaw, hindi gusto	4 – Hindi ayaw, hindi gusto	4 – Hindi ayaw, hindi gusto
3 – Bahagyang ayaw	3 – Bahagyang ayaw	3 – Bahagyang ayaw	3 – Bahagyang ayaw
2 – Katamtamang ayaw	2 – Katamtamang ayaw	2 – Katamtamang ayaw	2 – Katamtamang ayaw
1 – Ayaw na ayaw	1 – Ayaw na ayaw	1 – Ayaw na ayaw	1 – Ayaw na ayaw

Figure 3. Sensory evaluation scoresheet for the multivitamin fortified rice

According to the results of the sensory evaluation for the MNERK fortified rice, out of the 85 respondents, more than 50% gave the highest rating (gusting gusto) for all attributes. The results also show that the product is generally acceptable to the respondents. Furthermore, out of the 85 respondents, only 1 gave a low score of 2, corresponding to “katamtamang ayaw”. The summary of results is shown on table 3.

Table 3. Sensory evaluation test results for MNERK fortified rice using a 7-point hedonic scale

	Itsura	Amoy	Lasa	Kabuuang itsura
7- gustong gusto	58	52	54	49
6- katamtamang gusto	22	25	23	30
5- bahagyang gusto	3	7	6	5
4- hindi ayaw, hindi gusto	1	1	2	1
3- bahagyang ayaw				
2- katamtamang ayaw	1			
1- ayaw na ayaw				
	85	85	85	85



Results generated were as follow: 7 (like moderately)- 58%, 6 (like slightly)- 35%, 5 (neither like nor dislike)- 6%; and 4 (dislike slightly)- 1%. The results of the sensory evaluation have shown that multi-nutrient fortified rice is generally acceptable (Saies, M. C. et al., 2019).

Consumer acceptance of fortified rice can be improved by conducting consumer awareness campaigns to educate the public on the benefits of fortified rice which can be done through public health campaigns, social media and community outreach programs. Key stakeholders, such as government officials, rice millers, and manufacturers should be involved in the development and promotion of fortified rice. This can help increase the buy-in and support for fortified rice and increase the availability of fortified rice in the market. The cost of fortified rice should be affordable to consumers, which can be achieved through government subsidies, tax incentives, or other financial mechanisms that make it easier to produce and distribute fortified rice at an affordable price.

The use of multi micronutrient fortified rice in the studies highlighted its potential impact to improve the nutritional status of the population, targeting multiple nutrient deficiencies at lesser production costs. Fortification with different micronutrients has been demonstrated to improve nutritional status more significantly than treatment of a single micronutrient fortification. With this, it is apparent to promote voluntary multi micronutrient fortification of rice to address nutritional needs.

Several studies in other countries were also conducted on the efficacy of using multi-nutrient fortified rice. A study conducted by Thankachan et al., (2012) using multiple micronutrient fortified rice showed positive impact on physical performance, vitamin B-12, and hemoglobin concentration of school children, while the study conducted by Hussain et al., (2014) showed significant improvement on the iron and vitamin A status of children fed with iron and vitamin A fortified rice. A recent intervention study conducted by the team of Mahapatra et al., (2022) using multiple micronutrient fortified rice was evaluated among 973 children aged 6 to 12 years old over eight months in Gujarat, India between June 2018 and February 2019. The fortified rice provided approximately 10% of the Recommended Dietary Allowance (RDA) of iron; 25–33% of vitamin A, thiamine, niacin, and vitamin B6; and 100% of folic acid and vitamin B12. After the intervention, significant increase in the mean hemoglobin by 0.4 g/dL ($p < 0.001$) was observed with reduced anemia prevalence by 10% ($p < 0.00001$), and improved average cognitive scores by 11.3 points ($p < 0.001$). Furthermore, a study comparing cost-effectiveness of rice fortification with multi micronutrients to single fortification (*i.e. iron alone*) showed that the cost per person per year of using mutli micronutrients was lower than using one micronutrient (Hardinsyah et al., 2016)

These studies, among others, provide evidence that the consumption of multivitamin rice can be an effective way to address micronutrient deficiencies, particularly among vulnerable populations. However, it is important to note that the efficacy of fortified rice can vary depending on several factors, including the composition of the fortification, the level of consumption, and the population being targeted.

Multivitamin rice fortification offers several advantages over single nutrient fortification presented below

- Addresses multiple nutrient deficiencies: Multivitamin rice fortification addresses multiple nutrient deficiencies simultaneously, making it a more comprehensive approach to addressing malnutrition (Allen et al., 2009). Rice is a staple food in many countries, and fortifying it with



multiple nutrients can help provide a more balanced and diverse diet to populations at risk of malnutrition.

- Synergistic effect: The combination of multiple nutrients in one food product can have a synergistic effect on the bioavailability and absorption of these nutrients. This can lead to a more significant impact on the overall health and nutrition of the population.
- Cost-effective: Multinutrient fortification can be more cost-effective than single nutrient fortification since multiple nutrients can be added to the same product, reducing production costs. According to theoretical cost analysis, the final cost of a rice premix will be roughly the same regardless of the number or type of micronutrients added. (USAID, 2008). This indicates that the cost of making a rice premix is largely determined by factors other than the number or type of micronutrients added. These factors include the cost of rice, the cost of processing, and the cost of equipment. The cost of the micronutrients themselves is relatively small compared to these other costs. Adding multiple nutrients to the same food product can reduce the production costs associated with fortification. Since all the nutrients are added to the same product, the production process can be streamlined.
- Economies of scale: The cost of fortification can be reduced when multiple nutrients are added to the same food product. The fortification process can be streamlined, and the equipment and resources needed for the fortification process can be shared, leading to economies of scale.
- Reduced monitoring costs: Monitoring and quality control costs can be reduced with multinutrient fortification since all the nutrients are added to the same product. This reduces the need for multiple tests and monitoring programs to ensure that each nutrient is added at the correct level.

6.4 FINANCIAL FEASIBILITY OF MULTI MICRONUTRIENT FORTIFIED RICE BASED ON EXISTING IRON FORTIFIED RICE SUPPLY CHAIN

In the Philippines, hot extrusion is the current process used in producing both the iron and multinutrient extruded rice premixes. In which case, the same equipment is used in producing both premixes, and differing only with the added micronutrients for the latter (Figure 4).

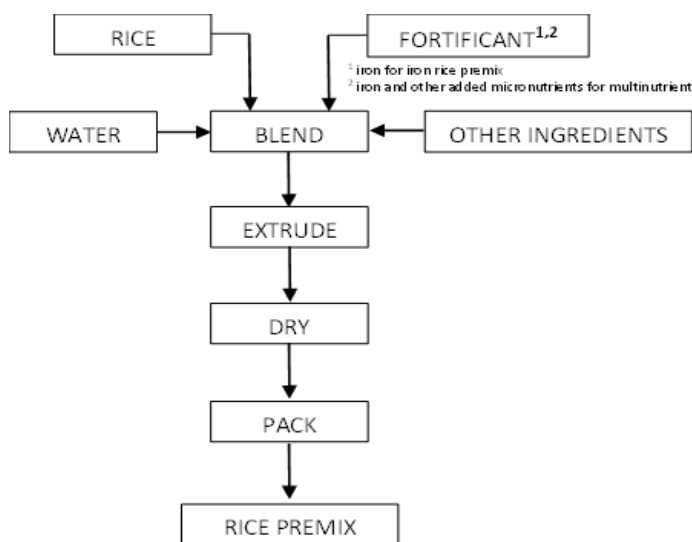


Figure 4. General method for producing rice premixes.

Since there are no differences in the equipment, facility, and human resource to produce both premixes, the price difference can be attributed to the added micronutrients (Table 4 and 5).

Table 4. Comparison of raw materials and packaging cost for the iron and multivitamin rice premixes.

Particulars	IRON RICE PREMIX				MULTIVITAMIN RICE PREMIX			
	Quantity		Unit Cost	Total Cost	Quantity		Unit Cost	Total Cost
	per day	per month			per day	per month		
A. Raw Material				985,347.99				1,308,000.68
A, Kg	165.0000	4,125.00	40.00	165,000.00	165.0000	4,125.00	40.00	165,000.00
B, Kg	0.4125	10.31	300.00	3,093.75	0.4125	10.31	300.00	3,093.75
C, Kg	1.6500	41.25	350.00	14,437.50	1.6500	41.25	350.00	14,437.50
D, Kg	33.0000	825.00	2.00	1,650.00	33.0000	825.00	2.00	1,650.00
E, Kg	20.0292	500.73	1,600.00	801,166.74	20.0292	500.73	1,600.00	801,166.74
F, Kg	0	0	0	0	2.0381	50.95	4,550.00	231,829.72
G, Kg	0	0	0	0	0.1079	2.70	4,480.00	12,087.77
H, Kg	0	0	0	0	0.6575	16.44	4,200.00	69,033.20
I, Kg	0	0	0	0	0.0231	0.58	16,800.00	9,702.00
	220.09				222.92			
B. Packaging Material								
Packaging Plastic (PE)	180.00	4,500	2.00	9,000.00	180.00	4,500	2.00	9,000.00
			TOTAL COST	994,347.99				1,317,000.68

Table 5. Schedule of project cost for the iron and multivitamin rice premixes

	IRON RICE PREMIX		MULTIVITAMIN RICE PREMIX	
	Amount	%	Amount	%
A. Fixed Assets				
Machineries and Equipment	3,500,000		3,500,000	
Office Furniture & Equipment	30,000		30,000	
Plant, Building & Warehouse	-		-	
Transport Equipment	150,000		150,000	
Total Fixed Assets	3,680,000	47%	3,680,000	41%
B. Working Capital				
Direct Material (RMPPM)	2,983,044		3,937,502	
Direct Labor	140,625		140,625	
Cash Manufacturing Overhead	119,726		119,726	
Cash Operating Expenses	155,850		155,850	
Total Working Capital	3,399,245	43%	4,353,703	49%
C. Pre-operating Cost				
Technology licensing fee	-		-	
Contingency Fund	393,291		446,317	
Organizational Cost	393,291		446,317	
Total Pre-Operating Cost	786,583	10%	892,634	10%
Grand Total	7,865,828	100%	8,926,337	100%



Based on the DOST-FNRI financial feasibility study for a five (5)- years projection, time and motion study for pilot-scale production, and current market prices of the ingredients, the computed breakeven price of multi micronutrient premix was PhP 374.41 for every 1Kg pack, with a proposed selling price of PhP 449.30 per 1 Kg pack with 20% markup (Table 6). These estimates include a simulation of a 25-day production per month with a single 8-hour shift with zero capital investment and assumed to have an existing facility in place and needs to invest in fixed assets such as production equipment. About 85% of the production cost is for raw materials and packaging, suggesting that competitive pricing and more considerable profit margin can be achieved if the ingredients and packaging materials cost is minimized, while maximizing plant operation and production capacity. (Padrones et *al.*, 2021).

Table 6. Project information for the iron and multivitamin rice premixes

Particulars	Details	
	IRON RICE PREMIX	MNERK (ADULTS)
PRODUCT NAME		
PLANT CAPACITY	4,500 packs (1kg) per month	4,500 packs (1kg) per month
PACKAGING SIZE	1,000 grams per pack	1,000 grams per pack
TECHNOLOGY SOURCE	Department of Science and Technology - Food and Nutrition Research Institute (DOST - FNRI)	Department of Science and Technology - Food and Nutrition Research Institute (DOST - FNRI)
TARGET MARKET	All Consumers	All Consumers
TOTAL PROJECT COST	7,865,827.94	8,941,336.90
Assets	3,680,000.00	3,680,000.00
Working Capital	3,399,245.15	4,367,203.21
Pre - Operating Expense	786,582.79	894,133.69
FINANCING SCHEME		
60% Loan	4,719,496.77	5,364,802.14
40% Equity	3,146,331.18	3,576,534.76
INTEREST RATE/ANNUUM	18%	18%
TERMS OF PAYMENT	5.00	5.00
PAYBACK PERIOD	2.51 Years	2.36 Years
RETURN ON INVESTMENT (ROI)	35.33%	38.67%
INTERNAL RATE OF RETURN (IRR)	24.44%	27.13%
NET PRESENT VALUE (NPV)	1,152,506.46	1,888,450.92
BENEFIT COST RATIO (B/C)	1.38	1.47
BREAK-EVEN SELLING PRICE	274.95	348.81
PROPOSED SELLING PRICE	329.94	418.57

The proposed selling price for the rice premixes may vary for every premix adoptors depending on their operation hours, plant capacity, salary rates and other expenses (Table 7). The order size will also affect the pricing of the rice premix, wherein a small-sized orders are usually priced higher than large orders. For instance, using the same basic assumptions, the proposed selling price for a 4,500 Kilos iron rice premix is P 329.94 per Kilo, however should the order be only 3,000 Kilos, the proposed selling price will increase to P 356.69 per Kilo. In the case of the multivitamin rice premix, the price will increase from P



418.57 to P 444.07 should the order be decreased from 4,500 to 3,000 Kilos multinutrient rice premix; while it will decrease to P 208.67 should the shift be increased from 1 to 2 with corresponding increase in produced amount of premix from 4,500 to 9,000 Kilos. The higher the plant capacity of the premix production plant, the higher the increase would be for small orders since the computation of the premix selling price is significantly affected by the maximum capacity of the equipment.

Table 7. Basic assumptions for the iron and multinutrient rice premixes produced at DOST-FNRI

BASIC ASSUMPTIONS	
Plant Operation	8 Hours per shift 1 Shifts per day 25 Days per month
Plant Capacity	4,500 packs (1kg) per month
Computation of Salaries	Basic Salary plus Fringe Benefits
Fringe Benefits	25% of Basic Salary
Operating Expense	15,000.00 Monthly
Processing Utilities	32,500.00 Monthly
Repairs & Maintenance	3% of the Original Cost
Working Capital	3 months operation
Computation of Depreciation Cost	Straight Line Method
Pre-operating Expenses	5% of the Project Cost
Raw Material Ending Inventory	5 Days of Production Requirement
Finished Goods Ending Inventory	5 Days of Production Volume
Income Tax	35% of Taxable Income
Other Government Fees	Up front or annually
Accounts Receivable	1 Month of Sales
Accounts Payable	2 Weeks of Purchases
Building / Facility	Existing

In producing the fortified rice, the same method may be used for both the iron and multinutrient fortified rice (Figure 5).

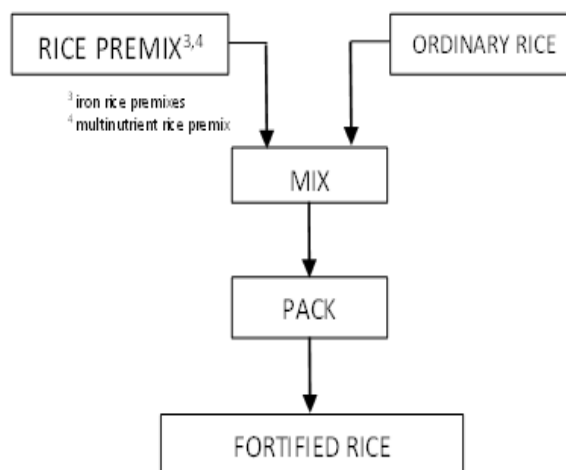


Figure 5. General method for producing fortified rice.



Comparing the cost of producing iron and multinutrient fortified rice with the same assumptions (Table 7), using the breakeven selling price for iron (P274.95) and multinutrient (P348.81) premixes and P 35.00 per Kilogram ordinary rice, the projected selling price of the fortified rice will be P 42.61 and P 42.87 for iron and multinutrient respectively. In general, the blending cost, is not significantly affected by the type of premix used, but is affected by the capacity of the machine, production volume per day, and the price of the ordinary rice being used.

Table 8. Basic production volume assumptions for the iron and multinutrient fortified rice premixes produced at DOST-FNRI

Details	Amount	
Packaging Size	50	kg per sack
	50	sacks per hour
Production Capacity	700	sacks per day
	17,500	sacks per month @ 50 kg per sack
Operating hours per shift	8	hours per shift
Operating shifts per day	2	shifts per day
Operating days per month	25	days per month

The cost of the machine (fixed assets) will also affect the pricing of the fortified rice; thus, it is important to invest in a blending machine that has a high capacity with low cost and long useful life. Another major contributor to the pricing of fortified rice is the transport of the premixes to the fortified rice production facility and to the point of sale (*Figure 6*). In the Philippines, only two operational premix facilities located in the Luzon area cater to the orders of fortified rice facilities. The current market for the fortified rice is limited to Institutional buyers such as the Department of Social Welfare and Development (DSWD) and Department of Education (DepED), and the National Food Authority (NFA) and their regional offices.

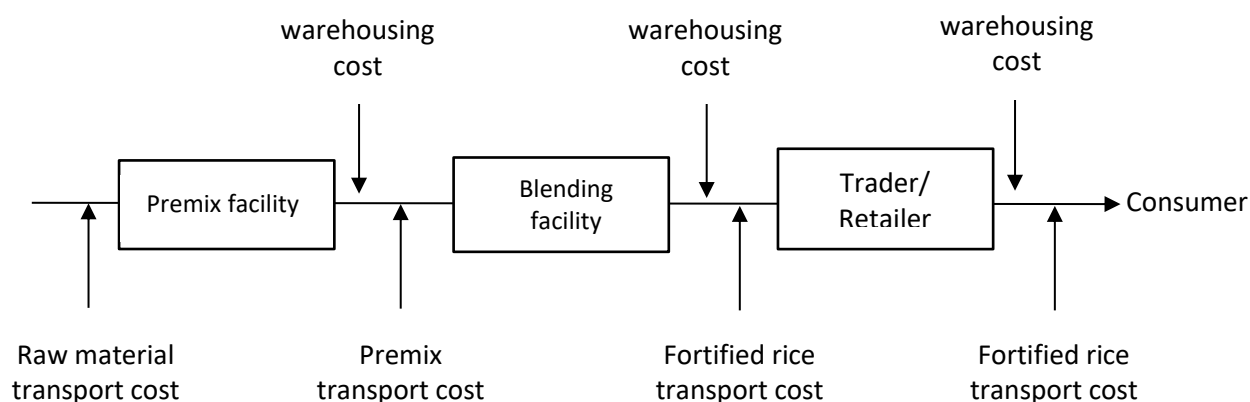


Figure 6. Transport and warehousing cost for the sale of fortified rice.

One of the raw materials used in the production of rice premixes is the fortificant, which is imported since this is not produced in the Philippines. The transport cost for the fortificant usually includes tax duties, and is already incorporated in the estimated costing of the premix (as raw material cost). The usual point of sale for imported fortificants is in the Luzon Island (Manila City) through a local distributor. In case premix producers will be operational in the Visayas and Mindanao areas, the transportation cost for the fortificant will increase, resulting to increase in the raw material cost of rice premixes. The usual rates for a 20 Kilogram box (minimum order for fortificant) are around P 2,000.00 from Luzon to Visayas or Mindanao will result to approximately P 10.00 increase per Kilogram premix. For transport of premixes from the facility in Luzon to a blending facility in Visayas or Mindanao, approximately 1000 Kilogram premix will amount to around P 20,000.00 to P 25,200.00 which will also be added to the price of the fortified rice on top of the proposed selling price which is around P5.00 per 50 Kilogram sack of fortified rice.

The usual buying price of fortified rice for Institutional buyers is P 18.00 per 250 grams or P 72.00 per Kilogram iron fortified rice. This includes the add on costs for the premix, blending, transport costs and other costs like registration fees for participation in bidding procedures. The Department of Education-BLSs- School Health Division (DepED), one of the Institutional buyers, reported an order of 1,699,220 kilograms iron fortified rice aggregated from January 1 to December 31, 2023; which relates to about 8,496.10 kilograms premix. On the other hand, one of the DOST-FNRI technology adoptors reported an annual sale of 12,000,000 kilograms iron fortified rice and 6,000 kilograms iron premix from January 1 to December 31, 2022 with actual price of P350.00 iron rice premix- which is comparable with the estimated selling price of iron rice premix (P 329.94; *Table 6*).

Although selling prices may be much lower for premix importers, it is important to note that these importers have minimum volume orders of 5 metric tons. This hinders premix buyers in procuring lower priced-imported premixes due to the large difference in their production requirement and the minimum order offered by premix importers. One possible solution is for premix importers to lower their minimum orders per buyer and pool several orders to complete the 5 metric-tons minimum order requirement.

6.7 DIFFICULTIES AND CHALLENGES ENCOUNTERED IN THE RICE FORTIFICATION PROGRAM

Despite the progress made in rice fortification in the Philippines, including updating the operation guidelines, increase in premix and fortified rice facilities, improved linkages between fortified rice suppliers and buyers, increasing awareness on use and benefits of fortified rice, there are still several gaps that needs to be addressed. Some of the weaknesses include:

- Limited coverage: The current rice fortification program in the Philippines is not yet fully implemented nationwide. While some regions have already adopted rice fortification, there are still areas where fortified rice is not available.
- Inadequate quality control: There have been reports of inconsistencies in the levels of fortification in rice products, indicating a lack of adequate quality control mechanisms.
- Limited consumer awareness: There is still limited awareness among the general public about the benefits of fortified rice and how to identify fortified rice products. This limits the demand for fortified rice, which in turn affects the sustainability of the program.
- Limited access to fortificants: Fortificants used in rice fortification are not readily available in the Philippines, which may increase the cost of fortification. In addition, for multivitamin



rice premixes, the fortificants used in the R&D stage are individual fortificants and when scaled-up may result to raw material cost to balloon, due to the minimum order requirement for each added micronutrient.

- Limited government funding: While the government has allocated funds for rice fortification programs, the amount is not sufficient to fully support the nationwide implementation of the program.
- The geographical structure of the Philippines makes it challenging to implement nationwide rice fortification, and increases transport cost on the premix and fortificant.
- Stringent Government requirements with regards to bidding documents and facility permits. The existing local producers of premixes are relatively new and has yet to apply for certifications like HACCP, which is being required by large Institution buyers like the National Food Authority.

Addressing these weaknesses will require a concerted effort from the government, private sector, and civil society. It may involve strengthening the regulatory frameworks, improving quality control mechanisms, increasing public awareness about the benefits of fortified rice, improving access to fortificants, and increasing funding for rice fortification programs. Several measures may be implemented to strengthen rice fortification program in the Philippines, including but not limited to (i) increasing public awareness by launching massive and simultaneous campaigns; (ii) improving enforcement through regular monitoring, inspections and penalties for non-compliance; (iii) expanding the program to include fortification of commercial rice and developing attractive packaging and messages; (iv) increase involvement of rice millers, traders, and retailers; (v) ensuring affordability by continuous studies raw material, process and product optimization.

6.8 REGULATORY REQUIREMENTS FOR THE MULTI MICRONUTRIENT FORTIFIED RICE IN THE PHILIPPINES

The guidelines to secure regulatory approval for both iron and multi micronutrient premixes includes the following steps based on AO No. 4 s. 1995 titled *“Guidelines on micronutrient fortification of processed food”*.

1. Evaluate the fortification process

- b. *Fortificant*- The nutrient added must be stable in the food vehicle under normal condition, distribution and use. It must also be present at safe level and will not result to excessive intake of the nutrient considering cumulative amounts from other sources in the diet. Fortification is appropriate when essential nutrient(s) is (are) added in proportion to the total caloric content of food.
- c. *Fortification level*- For essential nutrients that are deficient in the Filipino diet, the fortification level shall supply at least 1/3 of the Recommended Dietary Allowance (RDA) of the target consume. While For nutrients that are essential but have not been established to be deficient in the Filipino diet, the added nutrients shall supply at least 1/5 or 20% of the RDA of the target consumer. And for nutrients that are essential but have not been established to be deficient in the Filipino diet, the added nutrients shall supply at least 1/5 or 20% of the RDA of the target consumer.



For nutrients that are essential but have not been established to be deficient in the Filipino diet, the added nutrients shall supply at least 1/5 or 20% of the RDA of the target consumer.

2. Follow the labelling requirements

The following label declarations shall be required for fortified processed foods, in addition to other requirements under FDA's food labeling regulations.

- a. **Claims-** Only when the levels of fortification provided are met and when the nutrient content analysis within the shelf-life of the product, show at least 80% to 90% of the claimed fortification level depending on the nutrient analyzed and the precision of the analytical methods used, shall the claim "FORTIFIED" be considered valid. The terms "enriched", "added with", "supplemented with" and other similar terms shall be equivalent to the term "fortified".
 - Label information- The following information must be present in the label
 - Number of servings per container/package
 - Serving Size by weight or volume*
 - Calories per serving (kcal)
- b. Nutrients added and their corresponding amount expressed as % RDA per serving
- c. For multivitamin rice, the amount of nutrient fortificant shall be declared in terms of %RDA per the specified amount needed to make one serving of the ready-to-eat food.

All prepackaged, processed food products for distribution are required to secure a Certificate of Product Registration (CPR) before these are sold, distributed, or supplied among other marketing and promotional activities (R.A. 9711 and A.O. 2014-0029). Prior to application for a CPR, the manufacturer/importer/distributor/trader should have a License-to-Operate (LTO).

The following steps are needed for the CPR application:

1. Create a company-specific CFRR E-Portal User Account and Password with a valid License to Operate;
2. Send a request via e-mail for the user account to cfrr@fda.gov.ph and attach scanned copy of notarized authorization letter (from the company being represented). The email should include the following details:
 - a. email address
 - b. Last name
 - c. First name
 - d. Middle name
 - e. Company name
 - f. LTO No.
 - g. LTO validity



The CFRR E-Portal user account will be sent to the email provided in the request. The validity of the user account will be the same as the validity of the LTO. Renewal of account must be done at least 90 days prior to expiration via email using the same format.

3. Log in to the account to <https://eportal.fda.gov.ph>. The account holder should use the account of Market Authorization Holder (MAH) of the product being applied for registration
4. Click new case. Choose Food Product Registration EODB (Application Form) and select “Start Case” to begin an application
5. Select “Initial” application and click “Next” or select “renewal” for renewal application
6. Enter data for product categorization, brand and product name, applicant and company details, years applied, ingredients and other important details as specified in the portal
7. Upload documentary requirements (total size should not exceed 25 MB)
8. Click “continue” to forward the application to pre-assessment and wait for results

A system-generated email notification with attached CPR will be sent if the application is approved.

The complete process may be viewed in the YouTube account of FDA:

CPR application- <https://www.youtube.com/watch?v=SAw3sSxi1Gg>

LTO application- https://www.youtube.com/watch?v=taYWA_a6Q0c

Application for the Certificate of Product Registration (Annex A), and Sangkap Pinoy Seal (Annex B) for both the iron and multi micronutrient rice premixes are submitted to FDA. DOST-FNRI only provides technical assistance to its technology adoptors in terms of providing data on the shelf-life, acceptability, test results for their CPR application.

7. WAYS FORWARD ON INCREASING FORTIFIED RICE UTILIZATION AND SHIFTING TO MULTINUTRIENT FORTIFIED RICE

The basis for these steps comes from existing literature and best practices in nutrition and food fortification programs. Many countries, including the Philippines, have successfully implemented rice fortification programs, and the steps outlined in the 10-year roadmap are based on the experiences and lessons learned from these programs that includes regulatory frameworks, public awareness campaigns, partnerships, and monitoring and evaluation mechanisms, as well as sustainable financing mechanisms to ensure the long-term success of the program. The following activities may be considered:

- Conduct of a comprehensive nutritional assessment of the current national status of the population, including an analysis of the prevalence of micronutrient deficiencies and the dietary patterns of the population (currently in place through the conduct of national nutrition surveys).
- Develop a comprehensive strategy for rice fortification, including identifying the appropriate fortificants, fortification levels, monitoring and evaluation mechanisms.
- Develop partnerships between the public and private sectors to promote rice fortification, including engaging with rice producers and manufacturers, as well as retailers and distributors (current technology adoptors can be tapped to produce the multinutrient rice premixes).
- Establish regulatory frameworks and guidelines for rice fortification, including quality control standards and regulations for multinutrient rice premixes.
- Develop and implement public awareness campaigns to promote the benefits of rice fortification and increase consumer demand for fortified rice.

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- Provide training and technical assistance to rice producers and manufacturers on the production of fortified rice, including best practices for fortification, quality control, and testing.
- Conduct continuous research and development that can improve the efficiency and effectiveness of rice fortification.
- Develop and implement monitoring and evaluation mechanisms to assess the impact of rice fortification on the nutritional status of the population.
- Develop partnerships with international organizations to leverage resources and expertise to support the implementation of the rice fortification program.
- Establish a sustainable financing mechanism to support the long-term implementation of the rice fortification program, including identifying sources of funding and developing cost-effective procurement and distribution systems.

The benefits of scaling up rice fortification far outweighs the cost of production, monitoring, and sustaining the program. Strong partnerships between key stakeholders and synchronized efforts are important in sustaining the program, as well as commitments from the rice industry and consumer awareness and utilization. Knowledge in the challenges, implementation and structure of the fortified rice supply chain can help plan an efficient program for the upscaling of multivitamin fortified rice.



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ANNEX A

Application for Certificate of Product Registration



Department of Health
FOOD AND DRUG ADMINISTRATION



CENTER FOR FOOD REGULATION AND RESEARCH

FOOD REGISTRATION REQUIREMENTS TO SECURE CERTIFICATE OF PRODUCT REGISTRATION :

- 1. REQUIREMENTS :** The following are the requirements for a product registration
(Imported/Locally Manufactured Food Products including Raw Materials ,Bulk Ingredients, Low Risk, Medium Risk, High Risk Conventional Food Pre-packaged Food Products and Food Supplements :

1.)Valid License to Operate (Food Manufacturer/ Exporter/Trader/ Importer/ Distributor /Wholesaler)

2.) Scanned copy of clear and **complete loose labels or artworks** as applicable , of all packaging sizes, or equivalents as defined by FDA regulations and **Picture of the product** in all angles and in different packaging sizes, and from at least two different perspective allowing visual recognition of a product as the same with the one being registered.

For Food Supplement : please include the artworks and /or blister packs Alu-Alu Pack and secondary packaging ie paper box or cardboard box)

3.) For Trader/Wholesaler/ Distributor of Locally Manufactured Food Products (When a product is manufactured or distributed by an establishment other than the FDA Licensed Manufacturer)

- Scanned copy of any of the following :
 - Notarized Distribution
 - Contract agreement with FDA Licensed Food Manufacturer / Repacker

For Importers/Distributors :

- **Scanned copy** of any of the original documents:
 - Foreign Agency Agreement
 - Certificate of Distributorship,
 - Appointment Letter
 - Proforma Invoice
 - Memorandum of Agreement from the manufacturer

- **AND Scanned copy of Any** of the following:
 - Manufacturer's certificate of registration with GMP compliance

1

Civic Drive, Filinvest City, Alabang 1781 Muntinlupa, Philippines
Trunk Line +63 2 857 1900
Website: www.fda.gov.ph

Fax +63 2 807 0751
Email: info@fda.gov.ph



ISO 9001:2008
Management
System



- Valid Phytosanitary Certificate/ Health Certificate
 - Valid ISO 22000 Certification
 - Valid HACCP Certificate issued in the country of origin;
 - Certificate of free sale (CFS) attested by the recognized regulatory body or Chamber of commerce / Phil. Consulate in the country of origin.
- 4.) **As applicable, documents to substantiate claims**, such as :
- Technical or nutrition health studies or reports
 - Market research studies
 - Certificate of analysis , quantitative analysis and computations
 - Scientific reports or studies published in peer-reviewed scientific journals
 - Certificates or certification to support use of logo/seal on Sangkap Pinoy, Halal, Organic, Kosher and in compliance with current labelling requirements.
- 5.) **Certificate of Analysis** reflecting critical parameters to determine compliance to applicable standards and regulations
- For medium and high risk products with standards of identity (infant formula, milk supplement, food for infants and young children, foods for special medical purposes , foods for special dietary use, food supplements , bottled water, processed meat products etc.) , the corresponding Certificates of Analysis for assessment of compliance to such standard must be uploaded.
 - Fortified Food Product covered by R.A. 8176 (iodized salt) and R.A. 8976 (cooking oil, flours and refined sugar)
- 6.) *Additional requirements for FOOD SUPPLEMENT :*
- **Stability study of the finished product**
 - **Safety data** (e.g. LD50 or toxicity tests as applicable to products with herbs and botanical ingredients not included in the Official Pharmacopoeias and Generally Recognized as Safe (GRAS) list or other applicable test procedures or reports to assess potential toxicity) must be attached to address uncertainties on safety of the product.
- 7.) **Actual representative product sample of FOOD SUPPLEMENT (on initial application only)** in commercial presentation with labels. Representative sample must be properly labelled with the respective case numbers, packages accordingly to protect the contents and submitted to FDA Main office within 10 days upon assessed fee through either of the following means:
- Delivery via registered courier that must contain the following information :

2



To : Food and Drug Administration
Civic Drive , Filinvest City, Alabang
Muntinupa City
From : Company's Complete Name and Address
Subject : Food Product e registration application
Case No :

ISSUANCES ON REQUIREMENTS

- **Administrative Order 2014-0029** : Rules and Regulations on Licensing of Food Establishments and **Registration** of Processed Food Products , and For Other Related Purposes
<http://www.fda.gov.ph/attachments/article/194723/AO2014-0029%20-%20Rules%20and%20Regulation%20on%20the%20Licensing%20of%20Food%20Establishment.pdf>
- **FDA Circular 2016-007** : Notification of Sources for Raw Materials, Low Risk, Medium and High Risk Pre-packaged Processed Foods
<http://www.fda.gov.ph/issuances-2/food-laws-and-regulations-pertaining-to-all-regulated-food-products-and-supplements/food-fda-circular/343494-fda-circular-no-2016-007>
- **FDA Circular 2016-0014** : Procedure for the use of electronic registration (e-registration) system for pre-packaged processed food products)
www.fda.gov.ph/issuances-2/food-laws-and-regulations-pertaining-to-all-regulated-food-products-and-supplements/food-fda-circular/355437-fda-circular-no-2016-014
- **FDA Circular 2013-010** : Revised Guidelines on the Assessment of Microbiological Quality of Processed Foods <http://www.fda.gov.ph/issuances-2/food-laws-and-regulations-pertaining-to-all-regulated-food-products-and-supplements/food-fda-circular/17218-fda-circular-no-2013-010>

II. PROCEDURE :

ISSUANCES ON PROCEDURE

- **FDA Circular 2016-014 (Updated)** : Procedure for the E-Registration System for Pre-packaged Processed Food Products (including Raw Material, Low Risk, High Risk Food Products)
www.fda.gov.ph/issuances-2/food-laws-and-regulations-pertaining-to-all-regulated-food-products-and-supplements/food-fda-circular/355437-fda-circular-no-2016-014



ANNEX B
Application for Sangkap Pinoy Seal

QWP-008-020-01-Annex-07



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF HEALTH
FOOD AND DRUG ADMINISTRATION
Civic Drive, Filinvest Corporate City
Alabang, Muntinlupa City



**SANGKAP PINOY SEAL PROGRAM
APPLICATION FORM**

(This form should be accomplished by applicant in duplicate)

Date: _____

I. General Information

Name of Applicant-Firm: _____

Business Address: _____

Telephone No. : _____ Fax No. : _____

Plant Factory Address (If there are more than one plant site where the product is manufactured, identify the locations of the other processing plant. Use separate sheet if necessary):

Telephone No. : _____ Fax No. : _____

Product Category Applied For : _____

Brand Name in the Market : _____

Fortificant Used:	Chemical Form :
_____	_____
_____	_____

Packaging Types and Sizes

Page 1 of 3

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II. Checklist of Documentary Requirements (Please check if the following are submitted):

- ☐ License To Operate (certified true copy)
- ☐ Report of analysis from FDA Recognized Laboratory
- ☐ Product Information
 - ☐ List of Ingredients
 - ☐ Nutrient Profile (in terms of %RDA per serving or per 100 grams. If the product is not ready-to-eat in terms of the following):
 - ___ Energy Value (kilocalories)
 - ___ Protein
 - ___ Fat
 - ___ Carbohydrates
 - ___ Vitamin A
 - ___ Iron
 - ___ Iodine
 - ___ Dietary Fiber
 - ___ Other vitamins/ minerals present in significant levels
i.e $\geq 10\%$ RDA
 - ☐ Schematic diagram of the manufacturing process
 - ☐ Storage and distribution conditions
 - ☐ Instruction for handling by customers
 - ☐ End product specifications e. g. Physico-chemical, microbial properties or sensory attributes
 - ☐ Estimated shelf life (with appropriate information on how this was determined)
 - ☐ Reference materials attesting to the efficacy & bioavailability of the fortificant
 - ☐ Product labels (current and proposed)

