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Understanding the Rice Value Chain in the Philippines:

Defining the Way Forward for Rice Fortification

October 2022

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Executive Summary

The Philippines, with a population of 110.8 million in 2021, is one of the largest economies in Southeast Asia and grapples with high prevalence of hunger and malnutrition. Rice, as the primary staple in the country, is an appropriate food vehicle for fortification. However, the use of traditional technology, inefficiency in the local rice supply chain, and availability of cheaper imports exacerbated by the implementation of the Rice Tariffication Law (RTL) affected the self-sufficiency in rice production. Therefore, approximately 19 percent of the total milled rice consumption was imported in 2021.

To facilitate local production and improve the nutritional health of the population, the Government of the Philippines is putting immense efforts in the scale-up of fortified rice, as elaborated below:

1. Implementation of the Philippines Food Fortification Act (2000). According to the Act, rice fortification is only mandatory for the National Food Authority (NFA) - the leading body for the implementation of rice fortification in the Philippines. However, NFA has not been producing fortified rice since 2011 due to several supply chain constraints.
2. Distribution of iron fortified rice among 23,000 schoolchildren in 69 schools in Maguindanao in 2021 by the Department of Education (DepEd), in collaboration with WFP. Under the programme, rice is voluntarily fortified by a few private millers and supplied to the government entities.

Currently, the supply chain ecosystem for rice fortification is not developed. A few private millers which supply fortified rice only to the Government are involved in the chain. However, there is some traction in the commercial market. One of the suppliers, Nutridense, has been supplying fortified rice kernels (FRK) to other millers, and now plans to expand its production in the near future.

Based on discussions with government stakeholders, it was evident that they are interested in scaling up rice fortification processes in the country, and are aware of the health benefits of consuming fortified rice. A summary of key inputs received during these discussions are as follows:

1. Awareness campaigns are needed to create and improve consumer acceptance for fortified rice.
2. Strengthening the coordination among the government entities is crucial.
3. Standards should be developed and an effective monitoring framework should be created.
4. The Government should procure fortified rice from millers for distribution in their feeding programs. Millers must be assured that demand for fortified rice will be sustained through policy reform measures.
5. Barriers in the domestic rice industry with respect to inefficient technologies and high costs of production should be tackled to reduce the dependency on imports.

During the discussions with millers, two issues were highlighted: 1) the need to create sustainable demand; and 2) likely profits they might expect. A summary of

important inputs received during these discussions is as follows:

1. Most millers were not aware of the production techniques involved as well as the raw materials and machinery used. There is a lack of knowledge about various costs involved and the possible channels to procure inputs.
2. Consumer demand for fortified rice is expected to be negligible if its price is higher than regular rice. Consumers would be hesitant to buy fortified rice given their lack of knowledge about the benefits of fortification.
3. The Government should create sufficient initial demand for fortified rice to feed the malnourished groups of the population.

The table below provides a summary of the barriers in the scale-up of rice fortification and their corresponding recommendations:

The development of a sustainable supply chain for fortified rice requires a clear, cross-ministerial collaboration and communication strategy. The success will depend on continuing advocacy and awareness building, business model development, restructuring of the mandatory fortification legislation and implementing a regulatory framework, and demand creation. The Philippines is in a good position to move to the next level of evolution.

SN	Barriers	Recommendations
1	Weak enforcement of the Food Fortification Act of 2000	**Strengthen the statutory enforcement framework of rice fortification** Provide technical assistance to DOH and FDA to strengthen the enforcement of the Food Fortification Act
2	Relatively low priority for NFA to resume rice fortification despite mandatory legislation	**Advocacy with NFA and government entities** Conduct meetings with government entities to prioritise rice fortification in the budgetary allocation process.
3	Underdeveloped supply chain infrastructure increased the cost of fortification for NFA	**Technical assistance to NFA** Conduct a study to optimise the supply chain costs for NFA and provide assistance in the production of fortified rice.
4	Lack of coordination among government entities involved in rice fortification	**Efficient communication with government decision-makers** Ensure smooth and continuous operations of the Sub-Technical Working Group for rice fortification to ensure efficient communication.
5	Low incentive to invest in rice fortification due to heavy competition posed by rice imports	**Strengthen domestic rice production** Improve domestic rice industry competitiveness to enable millers to compete with rice imports by modernising the technology of domestic rice mills.
6	Limited awareness among millers about the production techniques, costs involved, and suppliers of raw materials and machinery required for rice fortification	**Advocacy with millers** Conduct periodic workshops and individual meetings with the leading rice millers to advocate on rice fortification.
7	Low return on investment perceived in fortified rice production due to a lack of consumer demand and awareness on various production costs	**Business model - return on investment** Develop and disseminate a technical report for millers highlighting health benefits, technical know-how of rice fortification processes, costs involved and investment returns
		Demand creation through government programmes To grow the market demand for fortified rice, invite tenders from millers to procure fortified rice for government feeding programmes and offer subsidies to millers to fund the fortification process
8	Low acceptance among consumers due to unpleasant past experience of consuming fortified rice	**Awareness creation campaigns** Campaign to generate awareness about the benefits of consuming fortified rice among the population and conduct surveys to understand their perceptions.

Introduction

Background

Many countries in Southeast Asia are weighed down by the burden of malnutrition — high stunting rates and widespread MNDs. One of the largest economies in Southeast Asia, the Philippines (with a population of 110.8 million in 2021), is a low middle-income country with a high prevalence of hunger and malnutrition. High rates of anaemia and stunting affect the population's most vulnerable groups. The prevalence of MNDs is an indication of insufficient micronutrient intake of the population (1).

The Expanded National Nutrition Survey (ENNS) 2018 indicated that nearly 30 percent of children (6-59 months) were stunted. In 2018, 14.3 percent children (6-59 months) and ~26 percent pregnant women were anaemic due to iron deficiency (2). Iron deficiency can affect the growth and development of the fetus during pregnancy and the infant after birth. MNDs such as iron and vitamin A deficiencies disproportionately affect women, adolescents, and children. These MNDs are contributors to poor growth, cognitive impairments, and increased risk of morbidity and mortality (1).

The food consumption pattern of the population is less than ideal, as carbohydrates dominate the calorie intake. The majority of food consumption consists of cereals, primarily rice; followed by meat and fish. Additionally, packaged and instant foods have become popular. Such food consumption patterns indicate a higher intake of calories, fats, sodium, sugar, and food additives, which are relatively bereft of nutrients (3).

Food diversification and ensuring a balanced diet intake are the best ways to tackle MNDs, however their adoption is difficult due to social, economic and food security reasons in the country. This results in the need for large-scale nutrition intervention programmes (1). The Philippine government is implementing multiple strategies such as micronutrient and dietary supplementation, fortification, and diet diversification among its different population groups.

To improve the nutritional health of the population, the Government of the Philippines introduced mandatory and voluntary food fortification in the country through Republic Act no. 8976 in 2000 (4). The law provides mandatory legislation on the fortification of salt, wheat flour, sugar, edible oil, and rice. The Government also introduced the distribution of iron fortified rice (IFR) through social protection programmes (4) (5).

The production and consumption of rice is significantly high in the Philippines. However, the production of rice (12.4 million tons in 2021) is lower than domestic demand (6). Therefore, the country has to depend on imports. Inefficiency in the local rice industry and availability of cheaper imports have impeded self-sufficiency in rice production.

In 2021, WFP conducted the 'Fill the Nutrient Gap' study in the Philippines to identify suitable food items for effective fortification interventions based on the context of the country. National standards and mandatory fortification of rice are already in place. The Philippines is currently at the stage where optimal scale-up of the existing

social protection programmes and commercial demand generation for fortified rice is needed. Only a handful of private millers are selling fortified rice in the market.

To explore the prospects of rice fortification, WFP conducted a feasibility study in 2020 on rice fortification in the Philippines that examined the challenges and opportunities in initiating rice fortification in the country (13). The Philippines is currently in the pre-engagement stage of introducing fortified rice, and there is a need for generating greater awareness on rice fortification as a strategy to address MNDs amongst the government and private sector stakeholders (14).

For more than a decade, the United Nations World Food Programme (WFP) has worked with governments, the private sector and technical partners across countries in Asia and the Pacific (Pakistan, India, Bangladesh, Nepal, Sri Lanka, Myanmar, Cambodia, Indonesia, Laos, Timor-Leste, Bhutan, and the Philippines) to make rice more nutritious through post-harvest fortification. Primarily, WFP provides technical assistance on policy and regulatory frameworks, advocacy, analysis and evidence generation, programming, and consumer awareness.

To introduce rice fortification in a sustainable manner that also enables scale-up, the Government of the Philippines, with support from WFP, needs to ensure that fortified rice is widely available and accessible through two main platforms, namely the social protection programmes and commercial retail channels. These platforms can reach a wider population that are nutritionally vulnerable and in urgent need of micronutrient interventions. The analysis of the rice value chain will help identify key opportunities and challenges in engaging with stakeholders to make fortified rice available at scale.

Objectives of the Study

The study 'Understanding the Rice Value Chain in the Philippines: Defining the Way Forward for Rice Fortification' aims to understand the potential of rice fortification in the country.

The overall objectives of this study are as follows:

1. Undertake a detailed landscape analysis to identify and map key players across the rice value chain in the Philippines; and
2. Identify and analyse the demand and supply challenges across the rice value chain in the Philippines and explore opportunities to introduce fortified rice through commercial channels and government social protection systems.

Specific objectives

- Identify, map and document key players across the rice value chain that include rice milling industry; blending and extrusion equipment manufacturers; fortified rice kernel (FRK) manufacturers and suppliers of vitamins and minerals/multi-micronutrient premixes; private food safety and quality testing laboratories; and retail organizations (including cooperatives, where these exist) in the Philippines.
- Map all rice value chain players that follow good manufacturing practices and adhere to national/ international food safety and quality standards for processed foods.
- Study and illustrate the rice value chain and identify value chain engagement points/opportunities for potential rice fortification programme support.
- Document the demand and supply challenges faced by key players across the rice value chain (infrastructural, capital availability, regulatory, supply chain, import/export regulations/policy, taxation, policy and political environment) and identify opportunities to introduce and scale-up fortified rice through commercial channels and government social protection programmes.
- Map the supply chain and trading (including cost mark-ups along the chain) of rice.
- Study and recommend potential options for strengthening the supply side for scaling up rice fortification through commercial channels at the regional level including the feasibility of a regional hub of suppliers to cater to the fortified rice demand of the region and beyond.
- Collect and document information on opportunities and barriers for a range of rice fortification options.
- Review and hold consultations with relevant government and private sector stakeholders to identify potential private sector players to introduce fortified rice through commercial channels and government social protection programmes.
- Based on the consultation and analysis of the private sector players, identify select private sector players in the Philippines for potential partnership with WFP.
- Identify the barriers and key factors that could enable and contribute to the scale-up of fortified rice through commercial markets and government social protection programmes.

WFP has engaged with ValueNotes Strategic Intelligence, India to conduct this study.

Research Methodology

This study follows a structured research process, as described below:

1. **Project Setup and Plan**
   - Project kick-off and discussions with WFP stakeholders to better understand context, objectives and expectations
   - Knowledge sharing by WFP based on prior research and experience in rice fortification initiatives in various countries
   - Preparation of project plan

2. **Secondary Research and Primary Research Design**
   - WFP conducted intensive desk research on several topics, including:
     - Nutrition deficiencies in the Philippines' population
     - Past experience in food fortification
     - The rice industry in the Philippines; size, exports, domestic consumption, etc.
     - The supply chain for rice in the Philippines
     - Key stakeholders in the supply chain, from a fortification perspective
     - Status of rice fortification initiatives and barriers to adoption and scale-up
   - Sources used include:
     - Available literature comprising research papers, development partners' reports, and project reports from previous pilots such as those from the World Bank and WFP etc.
     - Reports and statistics such as those from the government of the Philippines, USDA, FAO, etc.
     - A complete list of publications references is provided in the bibliography
   - The initial secondary research helped identify information gaps and key stakeholders that could provide valuable inputs.
   - For each type of respondent, whether industry stakeholders or government/regulatory bodies, a discussion guide was developed.
   - During this process, the ValueNotes team had several discussions with WFP stakeholders to fine tune the list of likely respondents and relevant discussion points.

3. **Primary Research**
   - The list of entities and respondents were identified by an iterative process.
     - The reports and available literature used in secondary research helped identify important stakeholders in the Government as well as the rice industry in the Philippines.
     - The websites of multiple millers were utilized to find important details such as their milling capacity, their production levels, etc. Accordingly, the millers were classified based on their production capacities.
     - After the development of a list of relevant stakeholders, WFP proceeded to identify the names of the relevant people in these organizations through additional desk research.
     - Then, WFP had detailed discussions with the stakeholders. To ensure diversity and representation of view, stakeholders from the Government as well as the private sector were contacted.
     - Additionally, a few experts were referred by respondents of the initial interviews were consulted.
     - More clarity was sought with stakeholders.
     - The discussions helped:
       - » Flesh out gaps in understanding of the industry, ecosystem, and customized level of consolidation;
       - » Attain on-the-ground inputs from stakeholders on barriers to large-scale rice fortification; and
       - » Understand the constraints of different stakeholders, and possible future actions that might help reduce or remove some of the barriers.

   A list of respondents is provided in the below table.

4. **Analysis and Report Writing**
   - All inputs mentioned above were collated, analysed and distilled to create this report.
   - The analysis and report were discussed with the WFP team (including WFP Philippines Country Office), and their feedback was incorporated in subsequent versions.

Type of entity	Name of entities	Designation
Large rice millers and exporters	Arman Golden Harvesting	Owner
	D.A. Masangcay Rice Mill	Owner
	Dar Commercial Rice Mill	Owner
	Evangelista Rice Mill	Owner
	LML Rice Mill	Owner
	Malapote Rice Mill	Owner
	Partido Rice Mill	Owner
	RML Rice Mill	Owner
	RMR Rice Dealer	Owner
	Vergara-Tagorda Rice Mill (Former fortified rice manufacturer)	Owner
Rice importers	Goldmine Rice Marketing	Sales Head
	Gold & Perfect Corporation	Manager
Fortified rice/Fortified Rice Kernels suppliers	Nutridense Food Manufacturing Corporation	Owner
	Agribioscience Inc.	Owner
	DSM Asia-Pacific	Business Development: Rice Fortification (APAC)
Government entities	Food and Nutrition Research Institute (FNRI)	Senior Science Research Specialist
	Food and Drug Administration (FDA)	Center for Food Regulation and Research
	National Food Authority (NFA)	Assistant Administrator
	National Nutrition Council (NNC)	Executive Director
International agency	International Finance Corporation	Upstream Officer

Report Structure

The report is divided into eight chapters as described below:

Chapter	Title	Details
1	Nutrition Profile of the Philippines	The chapter focuses on the diet composition, the current prevalence of undernutrition and the MNDs in the Philippines' population. *Helps understand the scale of the problem on undernutrition, and the need and urgency for improving nutrition inputs in the Philippines.*
2	Food Fortification in the Philippines	This chapter gives background on the existing food fortification programmes in the Philippines. It also assesses past experiences in fortification, difficulties faced while scaling up, and success stories of food fortification (if any). *Provides an understanding of institutional experience, and lessons learnt from earlier initiatives with other food items.*
3	Overview of the Rice Ecosystem in the Philippines	The third chapter elaborates on the rice industry details (historical trend of production, consumption, export/import, production clusters, millers' capacities, rice varieties in demand, etc.). *This data helps us better understand the size and scale of the rice ecosystem in the Philippines, and its implications for rice fortification scale-up.*
4	Rice Supply Chain	This section details the existing rice supply chain in the country. *Provides an initial understanding of the key stakeholders who need to be involved in rice fortification initiatives.*
5	Key Stakeholders in Rice Fortification	This chapter details the critical stakeholders in the current fortified rice supply chain in the country. *Helps to understand which government entities, regulatory bodies, and non-government and private players, are important to scale up rice fortification in the Philippines.*
6	Barriers in Scaling up Rice Fortification	This chapter focuses on the barriers faced by various stakeholders, when scaling up rice fortification efforts. *It helps to give a clear picture of the bottlenecks in scaling up rice fortification in the Philippines. This is crucial for suggesting remedial measures or effective solutions.*
7	Recommendations for Scaling up Rice Fortification	This chapter synthesises the findings from earlier chapters and suggests specific recommendations to address or mitigate the barriers to scale-up. It also identifies the key stakeholders that need to be brought on board to address different issues. *It provides a detailed roadmap for the successful implementation of scaling up rice fortification in a measured and comprehensive manner.*
8	Appendices	Supplementary information and relevant statistics This section provides essential information to support the analyses throughout the report, including: - National Food Authority - Key Seasons for Rice Plantation and Harvest - Varieties of Rice Produced - Rice Importing Countries - Rice Tariffication Law - Key Rice Brands Operating in the Philippines - Role of Different Entities in the Rice Supply Chain - Cost Mark-up of Rice across the Rice Value Chain - Monitoring by Food and Drug Administration - DSWD and DepEd Feeding Programmes

1. Nutrition Profile of the Philippines

The Philippines is a low middle-income country with high prevalence of hunger and malnutrition, particularly amongst the lower income groups of the population. More than half of the households (54 percent) in the Philippines experience food insecurity (7). The effects of MNDs have further burdened the nutritional health of the population.

The majority of the population suffers from poor diets, despite improving food availability. This is due to inadequate access to food and high poverty levels, especially among the rural population. High food prices, especially of staples like rice, further aggravate the situation.

The food consumption pattern of the population is less than ideal, as carbohydrates dominate the calorie intake. The consumption of vegetables is insufficient. The majority of food consumption goes to cereals, primarily rice, followed by meat and fish. The per capita consumption of vegetables only averages 22 kg/year, compared to the FAO recommendation of 146 – 182 kg/year. Some Filipinos consider vegetables as the 'poor man's diet'. They prefer meat and meat-based products. Additionally, packaged and instant foods have become popular. Such food consumption patterns indicate higher intake of calories, fats, sodium, and food additives, which are relatively low on nutrients (3).

Therefore, the Philippines is burdened with MNDs, malnutrition, and very high prevalence of stunting among children under five years of age. Diversifying food production is essential to supporting nutritional improvement toward more balanced diets. To understand how fortification of food items (particularly rice) can aid in meeting the dietary guidelines for better nutrition, it is crucial to examine the MNDs situation in the country and their effects.

1.1 Micronutrient Deficiencies

According to the Expanded National Nutrition Survey (2018) and the National Nutrition Biochemical Survey (2019) conducted by the Food and Nutrition Research Institute (FNRI), the population of the Philippines faces high levels of stunting. Across population groups, anemia persists as a moderate to high public health concern.

The widespread prevalence of MNDs resulted in the following effects amongst the most vulnerable groups in the Philippines:

- Iron deficiency has led to a moderate to high prevalence of anemia across population groups
- 29.6 percent of the children aged 0–59 months were stunted in 2019
- Approximately 9.4 percent of the Filipino population was estimated to be undernourished in 2019 according to FAO (18)

Iron, zinc and vitamin A are the crucial MNDs among pregnant women, lactating women, and children.

To combat the prevalence of MNDs, multiple initiatives were undertaken over the years. The implementation of Medium-term Philippine Plan of Action for Nutrition (MTPPAN) in 2005–2010 focused on production and consumption of nutrient-rich and fortified food, exclusive breastfeeding, and use of nutrient-dense complementary foods.

The current 2017-2022 Philippine Plan of Action for Nutrition (PPAN) aims to reduce the prevalence of MNDs among infants, adolescents, pregnant women, and lactating women. Among the basket of initiatives to address anemia and stunting, the Government adopted food fortification programme and micronutrient supplementations. As part of its fortification initiative, the Government approved national standards and mandatory legislation on the fortification of salt, wheat flour, oil, refined sugar, and rice.

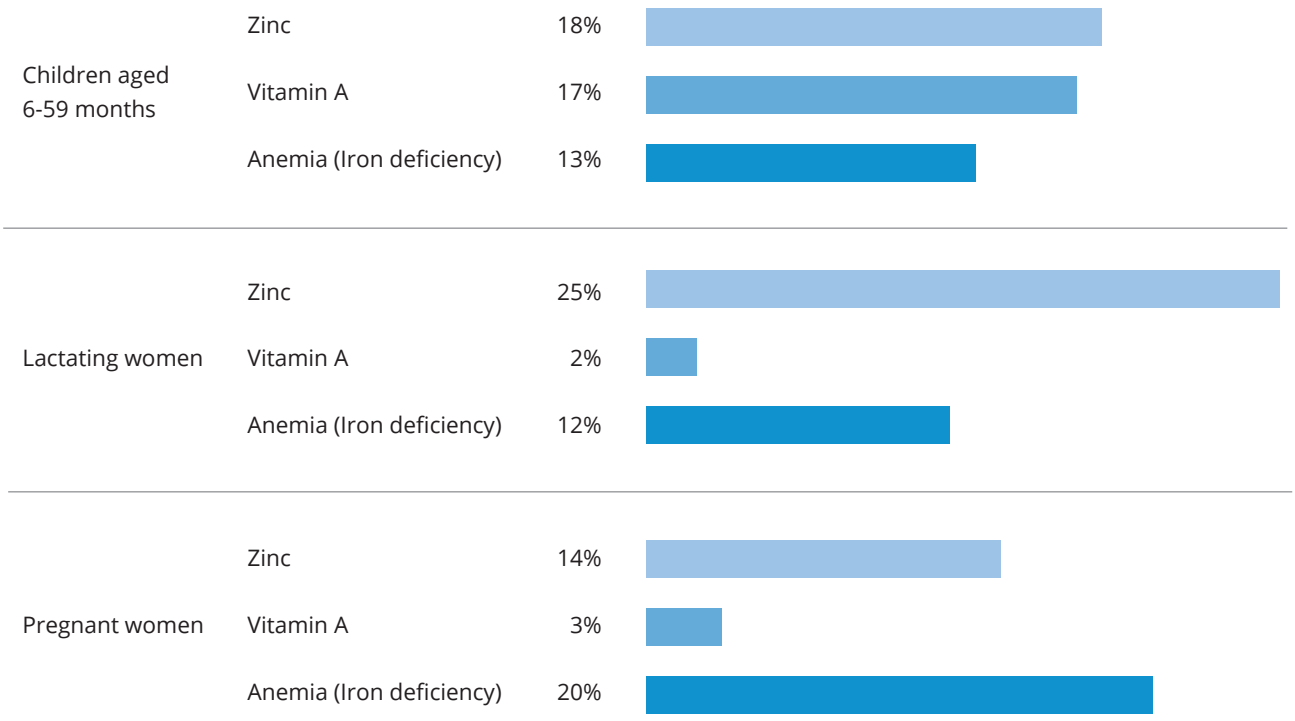
The development partner, Nutrition International (NI), supports the Government's PPAN through its 'Nutrition Technical Assistance for Nutrition' project. This allows the integration of distribution of iron-fortified rice (IFR) into the social protection programmes. In 2017, NI offered assistance in coordinating the operations of the National Food Authority (NFA), the Department of Education (DepEd), and the Department of Social Welfare and Development (DSWD) (5).

In 2019, the Government of the Philippines conducted a pilot distribution of fortified rice in a regional school feeding programme in Maguindanao, including Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). The programme targeted 23,000 schoolchildren in 69 schools in these regions (14).

It is imperative to further scale up these fortification programmes and strengthen the regulatory environment to ensure the improvement of the overall nutrition status.

The next chapter further elaborates on the current food fortification initiatives in the Philippines.

Figure 1: MNDs (%) among the vulnerable population groups in the Philippines



Source: ENNS 2018

2. Food Fortification in the Philippines

The Government of the Philippines passed the Food Fortification Act (Republic Act No. 8976) in 2000, mandating the fortification of salt, wheat flour, edible oil, refined sugar, and rice.

Legislation

The Food and Drug Administration (FDA), under the Department of Health (DOH), sets the food safety standards for fortification of food items. The table below provides details about food items included under mandatory food fortification in the Philippines (19).

Other food items which are voluntarily fortified in the Philippines include cereal-based products (such as snacks, instant noodles, etc.) with iron and B complex vitamins, juices, flavored drinks and food gels with vitamin C, and filled milk and margarine with vitamin A (19).

Salt fortification

According to the National Nutrition Survey (2019), only 38 percent of the salt produced in the country was fortified due to inefficient monitoring of salt fortification. To ensure compliance with the fortification legislation by salt manufacturers, the Food and Drug Administration (FDA) has instructed supermarket associations to sell sealed salt packets with fortification logos.

Wheat flour fortification

The domestic demand for wheat flour is entirely met by imports into the Philippines. Currently, there are 12 importers in the country. They are required to fortify flour with vitamin A and iron during the milling process.

DOH is working with Food Fortification Initiative (FFI), United Nations International Children's Emergency Fund (UNICEF) and Nutrition International to improve the existing wheat flour fortification standards in the country. The addition of folic acid to the wheat flour premix is also being considered.

Edible oil fortification

Edible oil is required to be fortified with vitamin A. FDA monitors whether the domestic production of edible oil is fortified, as per the required standards for processed foods.

Refined sugar fortification

While the Government is keen to address nutrient deficiencies there is inadequate attention to sugar fortification. The major barriers to sugar fortification are the lack of willingness to invest by the sugar industry stakeholders, negligible premix production, and inefficient monitoring and implementation of fortification.

Table 1: Fortification of food items in the Philippines

Food Item	Mandatory Legislation	Year	Micronutrients added
Salt	✓	1995	Iodine
Wheat flour	✓	2000	Vitamin A and iron
Refined sugar	✓	2000	Vitamin A
Edible oil	✓	2000	Vitamin A
Rice	✓	2000	Iron

Source: Department of Agriculture, FFI

Rice fortification

Rice fortification is mandatory for NFA, whereas it is voluntary for millers. However, NFA stopped fortified rice production after 2011 due to supply chain constraints and a lack of consumer demand given the unpleasant taste of fortified rice (elaborated in Barrier 8). However, NFA is required to produce fortified rice for social safety net programmes.

Currently, rice is fortified by a few private millers for distribution via the Government's social protection programmes. NFA is not producing fortified rice.

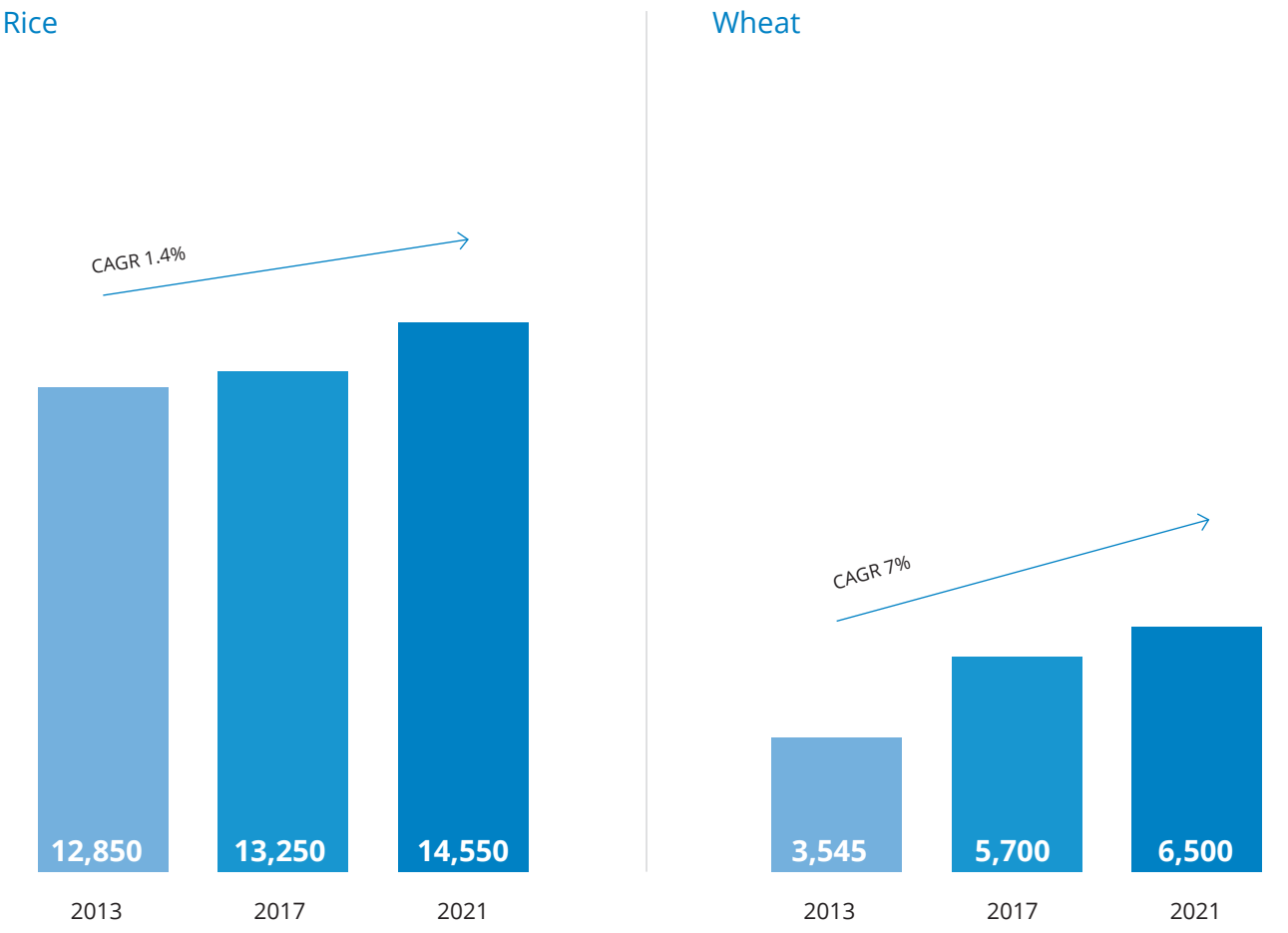
It is essential to increase coverage of fortified rice to enhance the nutrient intake of the population, given its status as the most consumed staple in the country.

2.1 Consumption of Key Cereals

Rice is the most consumed staple by the population of the Philippines. The average rice consumption accounts for about 20 percent of the average household budget for high and middle-income groups of the population and 30 percent for low-income groups. Wheat, on the other hand, is consumed in the form of bread, noodles, cookies, crackers, and pasta (6).

Between 2013 and 2021, rice consumption has grown at a slower rate (1.4 percent) compared to wheat (7 percent). However, rice remains the primary staple cereal, and an appropriate food vehicle for fortification to improve nutrition status across all strata of the population.

Figure 2: Domestic consumption of key cereals in the Philippines ('000 MT)



Note: CAGR stands for Compound Annual Growth Rate over a given period. Source: USDA

Source: USDA

2.2 Rice Fortification Status

The Philippines is one of the six countries in the world which has mandatory legislation for rice fortification. As per the 'Philippines Food Fortification Act of 2000' (Republic Act No. 8976), NFA is required to fortify both domestically produced and imported rice[1].

About 15 to 25 percent of NFA's supply was fortified until 2011. However, they stopped the production of fortified rice after that due to supply chain constraints and a lack of consumer demand given the unpleasant taste of fortified rice produced using coating technology.

It is important to note that mandatory legislation for rice fortification is not applicable to millers. Currently, only a few millers are voluntarily producing fortified rice. They supply IFR to DepEd and DSWD for their social protection programmes in the country.

The timeline for rice fortification in the Philippines is elaborated in the figure below.

Figure 3: Timeline for rice fortification in the Philippines

2000	2004	2011	2015-2016	2019	2021
Philippines Food Fortification Act mandated NFA to fortifiy domestically produced and imported rice	Rice fortification process started in the Philippines by NFA	NFA stopped producing fortified rice due to: • hindrances in the supply chain • negligible demand from consumers due to its altered taste and yellowish colour	Nutridense, a private miller, started the production of fortified rice and supplied it to DepEd and DSWD for their social protection programmes	HDN Technologies and FNRI developed a low cost blending machine for millers The Government conducted a pilot distribution of fortified rice in 69 schools in Maguindanao, including BARMM.	DOH issued updated guidelines for FRK produced by extrusion NNC supplies IFR under the 'Tutok Kainan' Programme to pregnant women and children (aged between 6-23 months). The programme has 38,434 beneficiaries.

Source: ValueNotes analysis

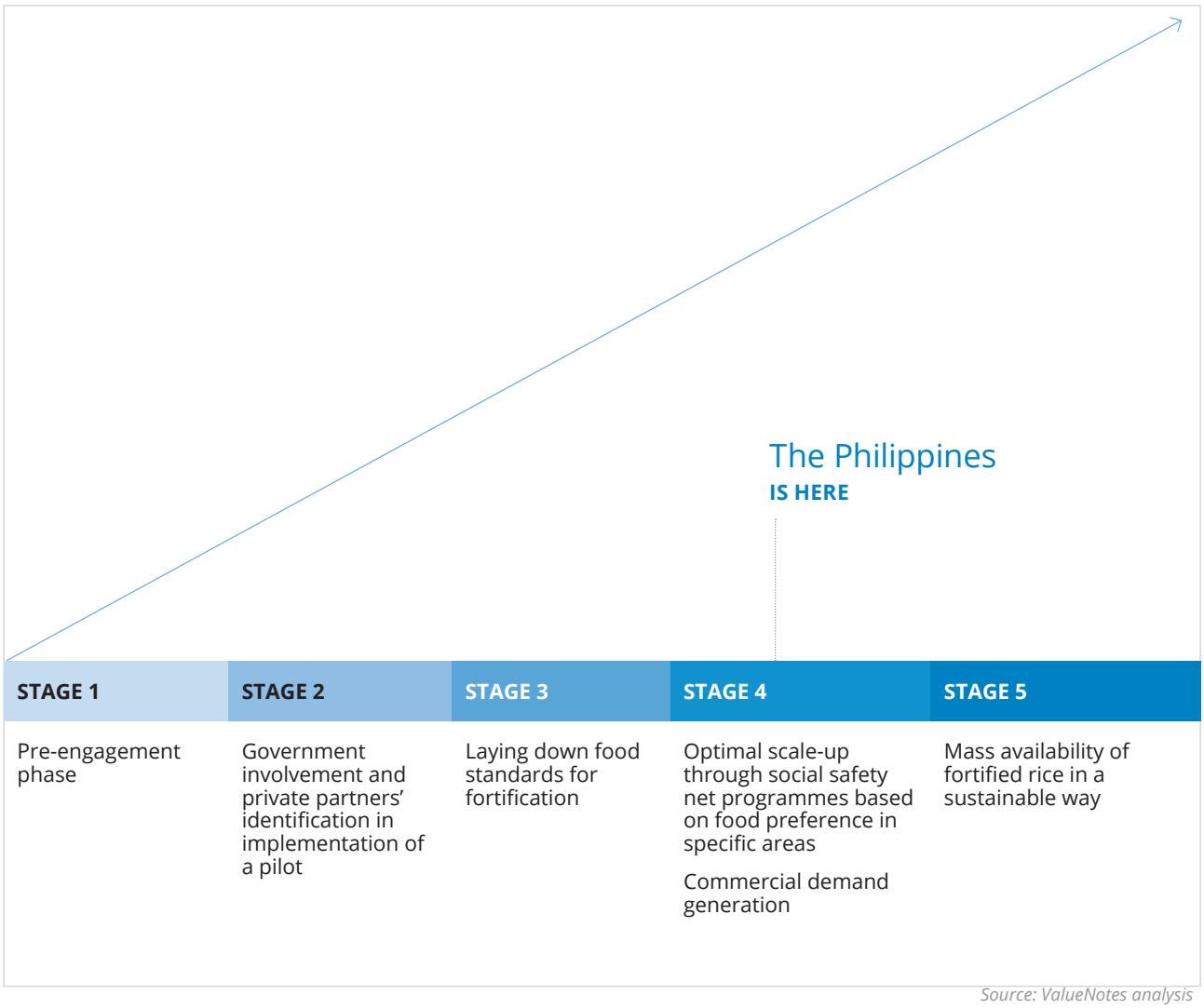
Figure 4 below depicts the progress of rice fortification scale-up in the Philippines. Currently, there is a need to optimally scale up the distribution of fortified rice through existing social protection programmes in the country (8). Further, it is essential to create commercial demand for fortified rice in the market.

While the Government has made substantial progress, much more effort is required to scale up the rice fortification programme. This will require sustained collaboration with the private sector and development partners.

To enable mass fortification of rice in the Philippines, it is crucial to understand the rice industry, processing capacity, roles of various stakeholders, the existing supply chain, and barriers. The next chapter describes the size and scale of rice production, consumption and exports in the Philippines.

[1] *National Food Authority*

Figure 4: Stages of rice fortification scale-up in the Philippines



Source: ValueNotes analysis

3. Overview of the Rice Ecosystem in the Philippines

This section elaborates on rice production and consumption data, industry structure (rice mills), and the market segmentation of rice as per distribution channels.

3.1 Rice Producing Clusters

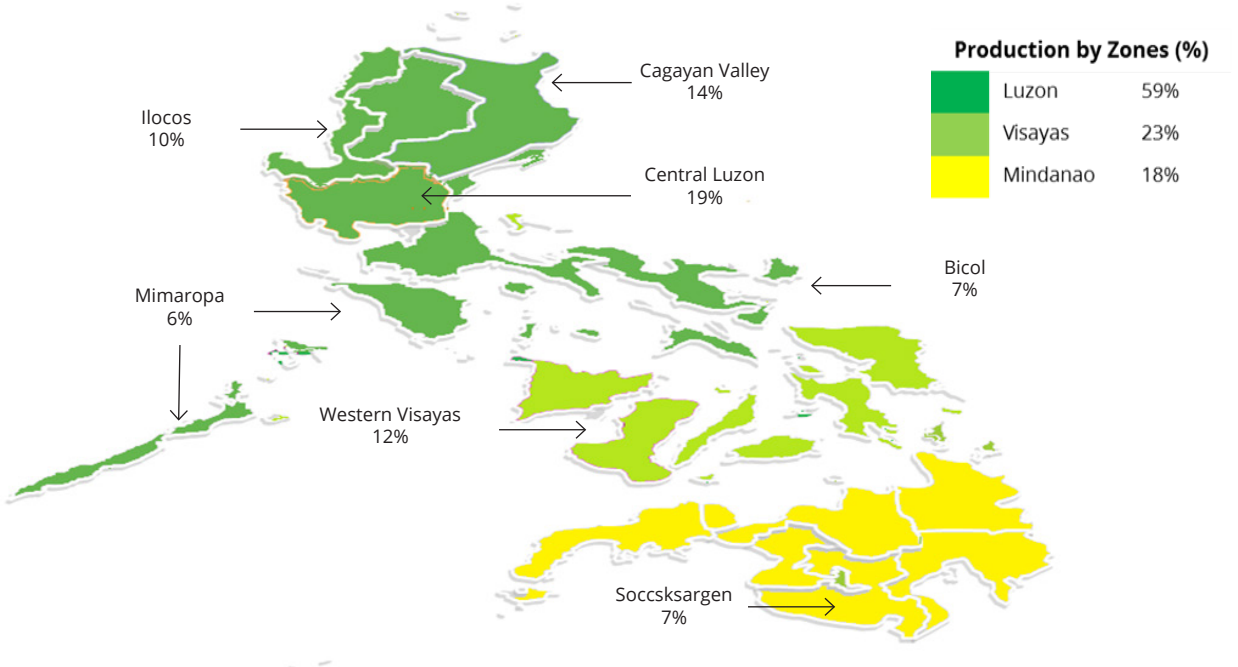
The islands of Luzon, Visayas, and Mindanao are the three major rice producing clusters in the Philippines. The major rice producing regions within these islands are depicted in Figure 5.

57 percent of the rice mills are located in major rice producing provinces such as Ilocos, Cagayan Valley, Central Luzon, Western Visayas, and Bicol[2] . The classification of mills is stated in the subsequent section.

3.2 Classification of Rice Mills

Rice mills can be classified as large-, medium-, and small-scale based on their tonnage capacity per hour (Figure 6). There are more than 8,000 rice mills in the country, which are mostly operated by private sector.

Figure 5: Rice producing clusters in the Philippines and total percentage of rice production (2020)



Source: Philippines Statistics Authority

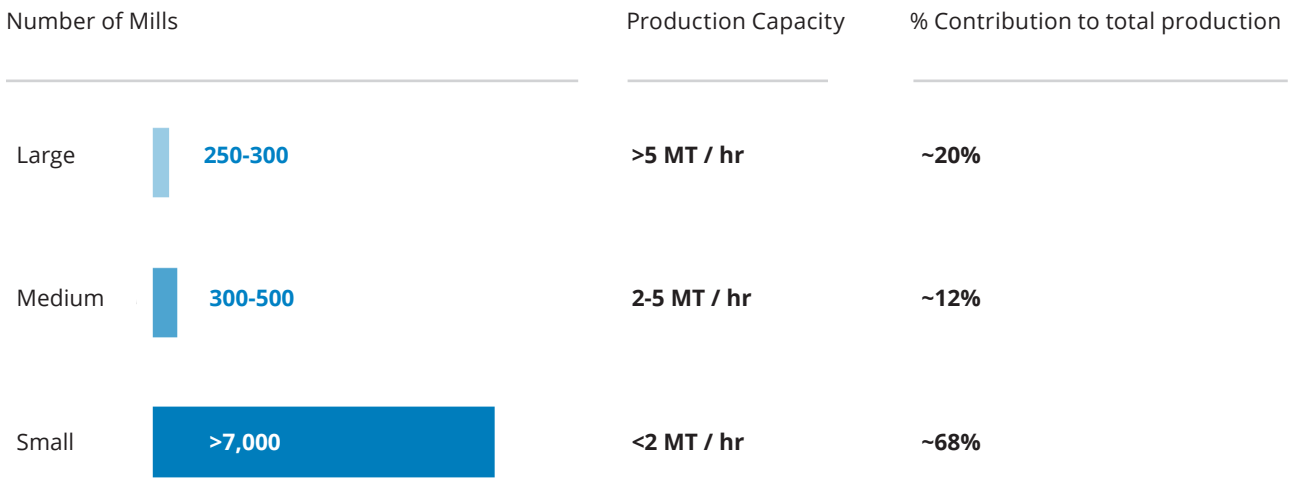
[2] *Key Seasons for Rice Plantation and Harvest*

Small mills are typically found in rural communities and used for custom milling by farmers and village retail stores. Medium mills usually operate at a milling capacity of 2 to 5 metric tons per hour.

Large mills typically have a production capacity of more than 10 metric tons per hour. These mills have a potential to be the pioneers in rice fortification in the Philippines, given the availability of financial resources to invest. Currently, five large millers[3] are involved in fortified rice production in the Philippines.

While large millers have the capacity to invest in rice fortification; however, there is a low level of willingness to invest due to a lack of clarity on the available market for fortified rice (elaborated in section 6.3). At present, they expect a guaranteed demand from the Government to consider venturing into rice fortification.

Figure 6: Classification of rice mills by production capacity



Source: NFA, ValueNotes analysis

NFA has a nationwide presence in the Philippines, with almost 75 mills across all provinces. However, not all the mills are operational currently. Their rice mills contribute approximately 15 percent to the country's total rice consumption (31). The rice sold by NFA is affordable for the low-income groups, as the prices are subsidized by the Government. Prices of rice sold by NFA are around 27 to 38 percent lower than those of private millers[4], as shown in the table below:

Table 2: Price of rice sold by NFA and private millers (Peso/kg)

Variety	NFA (Peso/kg)	Millers (Peso/kg)
Well-milled rice	25-27	37-44

Source: NFA, DA

3.3 Varieties of Rice Produced

In the Philippines, milled rice typically falls into the following four categories (9):

- Regular-milled rice (RMR) – Rice kernel that has been milled; lengthwise streaks of bran layers found in 20 to 40 percent of the kernels
- Well-milled rice (WMR) – Rice kernel in which hull, germ, and outer bran layers have been removed; lengthwise streaks of bran layers found in less than 20 percent of the kernels
- Special rice – Glutinous, aromatic, and nutritious rice
- Premium rice – Well-milled rice of higher-grade requirements (maximum 5 percent broken kernels)

The demand for RMR and WMR is higher compared to special and premium rice.

White rice accounts for 90 percent of the total rice consumption, as the population of the Philippines prefer white, fragrant, long and unbroken grains of rice. The sub-varieties – Dinorado, Sinandomeng, and Wagwag, are also popular, and could be considered for the production of fortified rice[5].

[3] *Fortified Rice Manufacturers*
[4] *Selling Price of Rice*
[5] *Varieties of Rice Produced*

3.4 Domestic Rice Production, Imports, and Exports

Rice Production

From 2017 to 2021, the total paddy production in the Philippines increased to 19.7 million MT, with an average yield of 4.1 MT/hectare on 4,719 hectares area under production (6).

About 63 percent of the total paddy produced in 2021 was milled (6).

Imports and Exports

The Philippines is one of the top rice importers in the world. The share of imports to total consumption is more than 10 percent since 2017. In 2021, 2.7 million MT rice was imported (6). The country does not export rice.

The figure below depicts the percentage of milled rice imports during 2017 to 2021. Around 19 percent of rice was imported in 2021 (6) (10).

Imports from Vietnam constituted 86 percent of the total imports[6]. Other source countries were Myanmar, Thailand, China, and India (10).

One of the key policies that resulted in increased rice imports is the Republic Act No. 11203 also known as the Rice Tariffication Law (RTL)[7] , which came into effect in 2019 (11). The law allows traders to import unlimited quantities of rice, rendering many local producers uncompetitive.

The impact is such that an estimated 30 to 40 percent of mills ceased operations since the implementation of RTL, according to the Philippine Confederation of Grains Association (PhilConGrains). Millers that are still in business have to survive on relatively small margins (12).

The declining prospect of the rice industry impacts the willingness to invest in growth. While millers tend to seek more protection from imports, this may not be possible given multilateral trade agreements in ASEAN.

However, rice fortification can present multiple opportunities for the domestic industry, given the rising domestic consumption of rice. The appropriate distribution channel for selling fortified rice to consumers can be inferred by understanding rice market segments in detail in the subsequent section.

Figure 7: % contribution of milled rice out of total paddy production ('000 MT) (2017-2021)

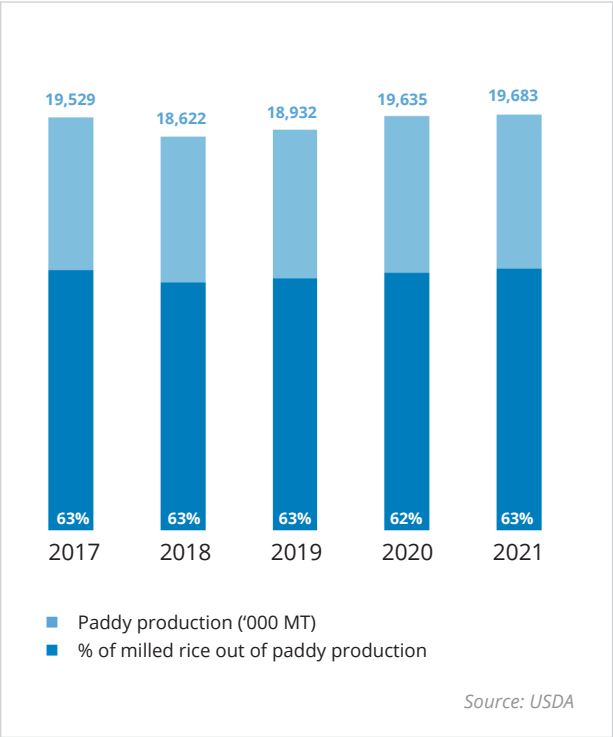
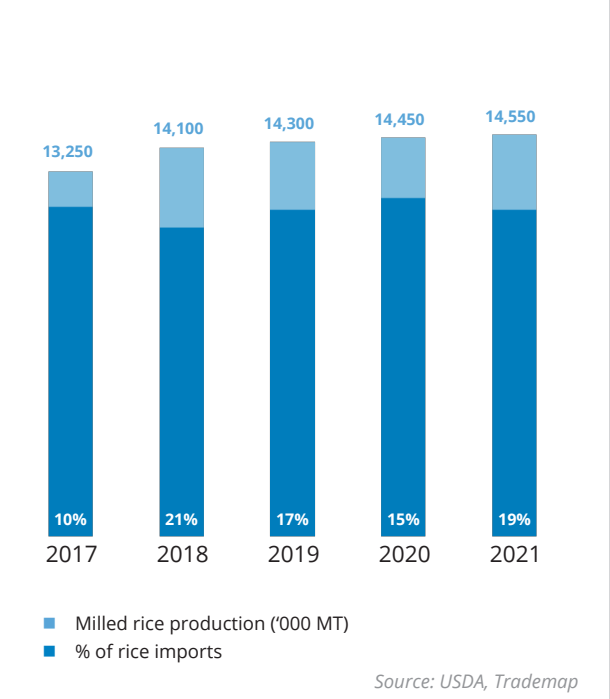


Figure 8: % of milled rice inputs ('000 MT) (2017-2021)



[6] *Rice Importing Countries*
[7] *Rice Fortification Law*

3.5 Market Segmentation

In the Philippines, consumers mainly purchase rice through two channels, which include:

1. Traditional channel – Wet markets, sari-sari stores (traditional grocery stores), etc.
2. Modern retail channel – Offline (supermarkets, hypermarkets, etc.) and online platforms (lazada.com, shopee.ph, bigas2go.com, etc.)

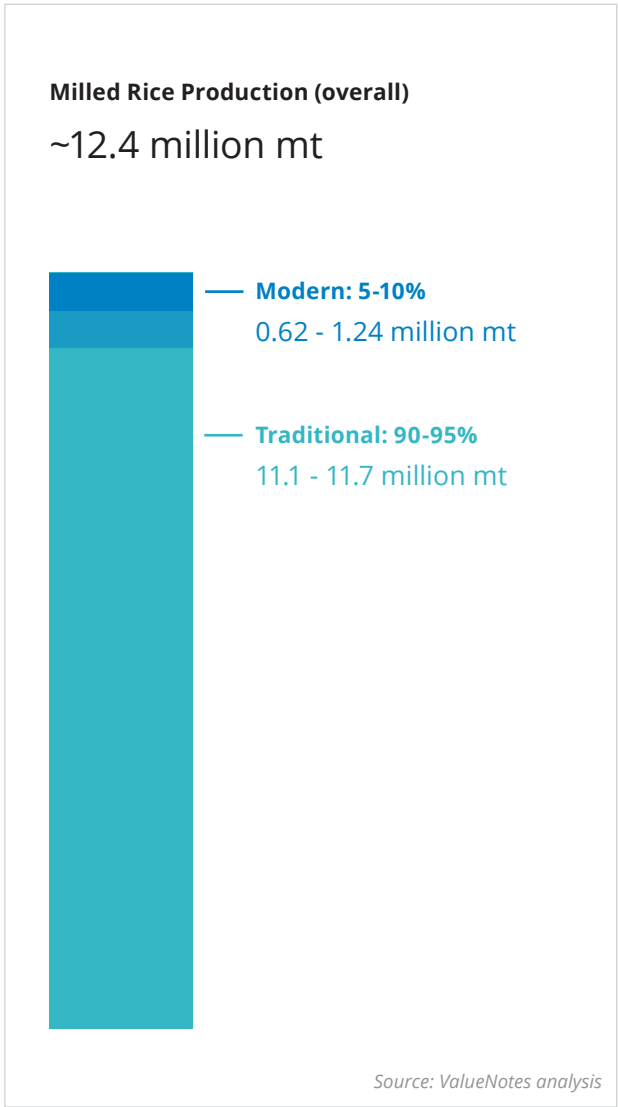
The figure below demonstrates the split between the rice produced and sold through traditional and modern retail outlets.

Large millers largely cater to the demand of modern markets, while medium and small millers cater to the demand through traditional markets[8].

The next section explores the supply chain of rice in the country, including key stakeholders and potential of developing the fortified rice supply chain. Large millers largely cater to the demand of modern markets, while medium and small millers cater to the demand through traditional markets.

The next section explores the supply chain of rice in the country, including key stakeholders and potential of developing the fortified rice supply chain.

Figure 9: % of rice sold in traditional VS modern retailer in the Philippines (million MT)



Source: ValueNotes analysis

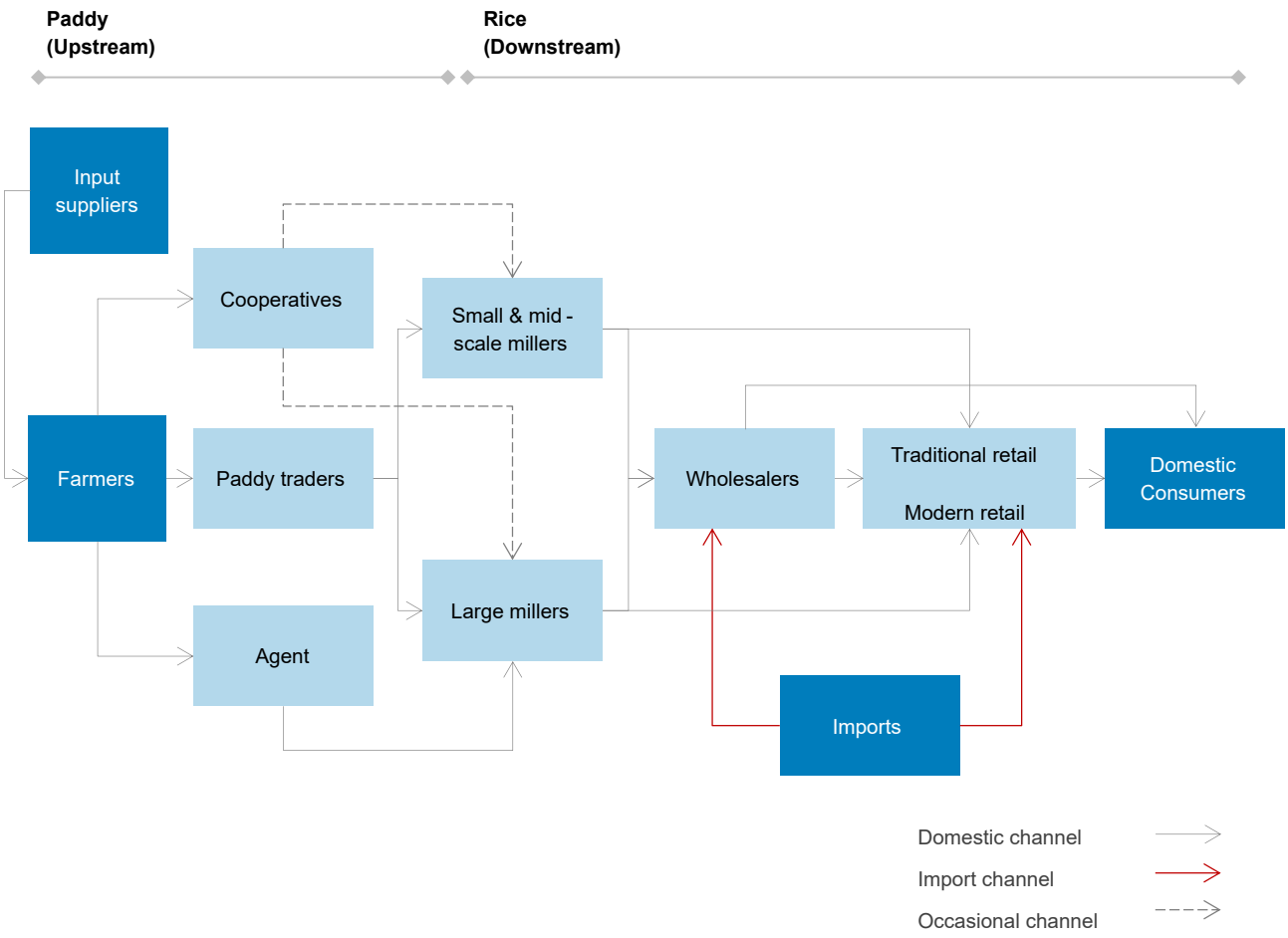
[8] *Key Rice Brands operating in the Philippines*

4. Rice Supply Chain

In the Philippines, there are separate supply chains for the distribution of rice by private millers and by the government network (13).

The rice value chain for the private sector in the Philippines is explained below in Figure 10.

Figure 10: Private millers' rice value chain in the Philippines[9] [10]



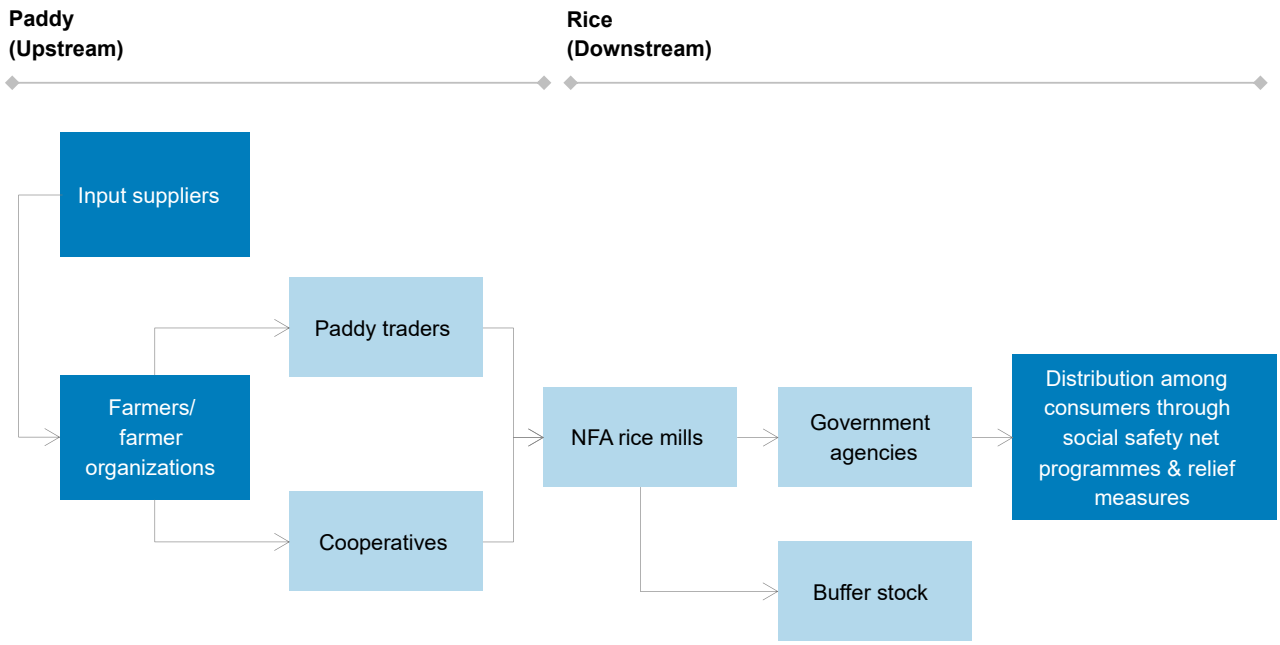
Source: Philippine Rice Research Institute, ValueNotes analysis

[9] *Role of Different Entities in the Rice Supply Chain*
[10] *Cost Mark-up of rice across the Rice Value Chain*

The rice distributed by the Government is used for various social protection programmes, such as dietary supplementation programmes in schools, day care centers, etc. and relief measures such as during disasters, epidemics, etc.

The rice value chain for the Government sector in the Philippines is explained in Figure 11.

Figure 11: Government rice value chain in the Philippines



Source: NFA, Official Gazette, ValueNote Analysis

Note: Government agencies include the Department of Social Welfare and Development (DSWD), Philippine National Red Cross (PNRC), National Disaster, Risk Reduction and Management Council (NDRRMC), Local Government Units (LGUs), Legislators, PAGCOR, DBM, BJMP, Military Camps Commissary, E.O. 51 employees (Includes departments, bureaus, offices, agencies and instrumentalities of the national Government, including government-owned and controlled corporations, the armed forces of the Philippines and the Philippine National Police who either provide rice to their employees as a form of incentive or non-monetary benefit or use rice in connection with their functions), other government institutions/agencies/cooperatives

To develop a sustainable ecosystem for rice fortification, a robust domestic supply chain for fortified rice should be developed. This would require the involvement of key stakeholders, whose roles are discussed in detail in the following section.

5. Key Stakeholders in Fortified Rice Supply Chain

There are multiple stakeholders involved in rice fortification in the Philippines, which include:

1. Fortified rice manufacturers
2. Government entities/ministries
3. Other stakeholders (machinery and raw material suppliers, rice associations, etc.)

5.1 Fortified rice manufacturers

Currently, there are five fortified rice suppliers in the Philippines which supply their produce to DepEd for their school feeding programme. The suppliers are mentioned in the table below.

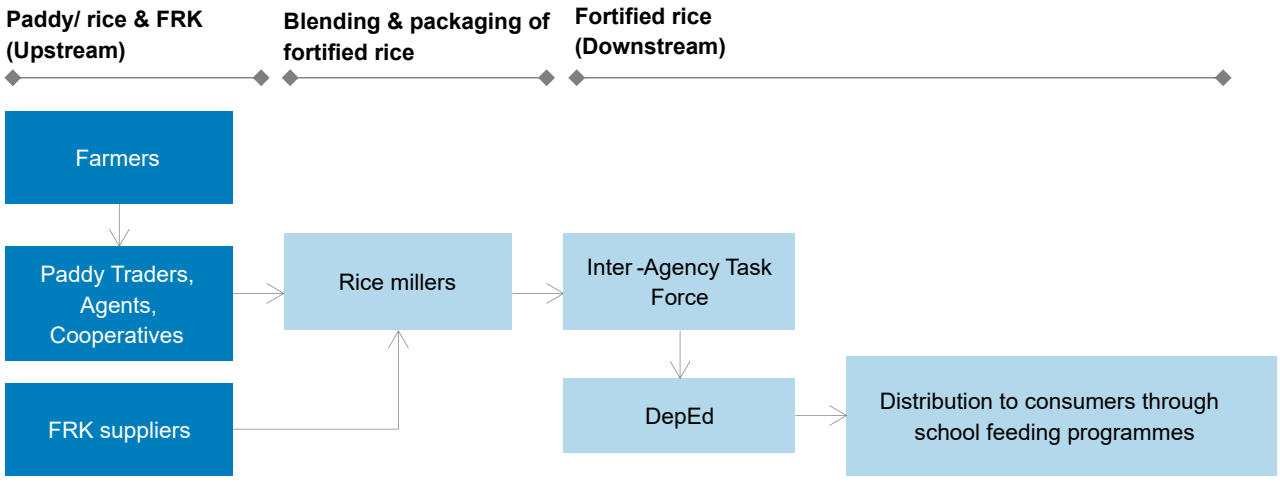
Currently, these suppliers do not cater to the commercial market. One of the suppliers, Nutridense mainly supplies FRK to the other millers, and plans to expand its production. The fortified rice supply chain of these entities is depicted below.

Table 3: Fortified rice suppliers in the Philippines

Entity	Region
Nutridense Food Manufacturing Corporation	Pangasinan
Nutrition and Beyond Corporation	Nueva Ecija
Camsur Multi-purpose Cooperative	Camarines Sur
Food Baskets Corporation	Antipolo
Antofel Trading	Davao de Oro

Source: National Nutrition Council

Figure 12: Supply Chain of Fortified Rice



Source: ValueNotes analysis

5.2 Government Entities

The scale-up of rice fortification will require efficient coordination amongst multiple government entities, across production, standardization, regulation, sale and distribution of fortified rice.

The role of such entities is mentioned in the table below:

Table 4: Government entities involved in scaling up rice fortification in the Philippines

Authority	Roles
National Food Authority (NFA)	• Procures paddy from farmers and uses their own mills or private mills • Sells rice to rice traders. Traders cannot sell the procured rice above a particular price set by NFA. • Responsible for the production and supply of fortified rice. However, not involved in fortified rice production currently, owing to multiple constraints as discussed in section 6.2
Department of Health (DOH)	• Issues guidelines and regulations for food fortification programmes • Monitors the implementation of mandatory legislation on fortification • Advocates for the consumption of fortified food items through their promotion bureau • The DOH is in constant communication with DSWD and DepEd to introduce iron-fortified rice in the commercial market. • Approved a memorandum in 2019 which requires DSWD to supply fortified rice to hospitals, treatment/ rehabilitation centers, and jails as part of their institutional feeding programmes. • As part of this memorandum, DOH encourages organized community farmers to fortify rice, in partnership with NNC and incentivizes them by assuring government procurement. However, farmers need to invest in the machinery and procurement of FRK.
Food and Drug Administration (FDA)	• Regulates the manufacturing and testing of processed food products • Sets food safety standards for fortified food items and updates them as per the guidelines issued by DOH • Monitors the quality of fortified rice in the market and checks the compliance of fortification by producers • Issues product registration certificates to the millers (currently Nutridense and JD Aguilar) for supplying FRK in the market • The Field Regulatory Operations Office has a number of regional offices spread across the country. Once rice is sold commercially, inspectors from these offices will be responsible in collecting samples of iron-fortified rice from the market and submitting them for quality assurance in testing laboratories[11]
Centre for Food Regulation and Research (CFRR)	• CFRR, under FDA, provides recommendations based on the results of the inspection of food safety by FDA • Their recommendations are presented to regional sales offices, the central laboratory and the legal office of FDA

[11] *Monitoring by Food and Drug Administration*

Food and Nutrition Research Institute (FNRI)	• Falls under the purview of Department of Science and Technology (DOST) • In 2019, FNRI in partnership with HDN Technologies, designed and developed a low-cost blending machine for the rice millers. The machine costs PHP 250,000, whereas imported machinery prices range from PHP 350,000 to PHP 700,000. DOST's machinery is affordable and easy to install in mills. • FNRI provides technical assistance by facilitating communication between HDN Technologies and millers for the purchase of blending machinery required for fortification • NRI provides certification for blending machinery to the millers after calibration process conducted by them • Also conduct National Nutrition Surveys
Food Analytical Service Laboratory	• Falls under the supervision of FNRI (under DOST) • Conducts testing, analysis, and evaluation of food items for quality assurance and safety for consumption

Department of Social Welfare and Development (DSWD)	• Responsible for implementing institutional feeding programmes
	  • Procures fortified rice and regular rice from private millers and NFA respectively for the school feeding programmes
	  • Implements supplementary feeding programme for preschool children in child development centres
	• Provides Family Food packs to affected areas during emergencies (natural disasters, calamities, etc.)

Department of Education (DepEd)	• Implements school feeding programme for children (from kindergarten to grade VI), including the distribution of fortified rice
Department of Agriculture (DA)	• Responsible for food security in the Philippines • Ensures rice supply and market price stability
Inter-Agency Task Force (IATF)- Zero Hunger	• IATF is a new task force developed after the COVID-19 pandemic • They procure fortified rice from private millers such as Nutridense and provide it to DSWD, DOH, and DepEd for their relief measures
National Nutrition Council (NNC)	• Develops policies for nutrition programmes in the Philippines • Comprises ten national level government agencies – DA, DOST, DOH, National Economic and Development Authority (NEDA), DepEd, DSWD, Department of Interior and Local Government (DILG), Department of Budget and Management (DBM), Department of Labor and Employment (DOLE), Department of Trade and Industry (DTI) – and three civil society organizations • Acts as an advisory body for rice fortification • Conducts periodic reviews on additional micronutrient requirements for fortification based on the needs of the population and the results of the National Nutrition Survey every five years
Local Government Units (LGU)	• Provide business permits to millers for conducting their business operations in the respective regions

5.3 Other Stakeholders

Rice fortification through the process of extrusion requires FRK, blending- and extrusion machinery (if FRK is produced by the miller themselves)[12]. Additionally, the role of rice associations as well as technical partners is critical in disseminating information to millers. Their roles are discussed in the table below.

Table 5: Other stakeholders in rice fortification in the Philippines

Key Player	Role
FRK suppliers	- Local distributors import iron premix from other countries (Korea, Japan, etc.) and provide it to the millers. - Domestic suppliers include Nutridense and JD Aguilar. - International suppliers include DSM, BASF, etc.
Blending machine suppliers	- Blending machines are imported by distributors and supplied to the millers. - Domestically available blending machinery costs PHP250,000. It is supplied by HDN Technologies, an equipment fabricator. FNRI connects interested millers with this entity and provides certification for the blending machinery.
Extrusion machine suppliers	- Currently, extrusion machinery is sourced from other countries (such as China) by distributors
Rice Associations	- Various rice associations exist in the Philippines. However, not all of them are active. In some cases, the association members rarely meet. - Some of the prominent rice associations include PhilConGrains, Western Pangasinan Miller's Association, Intercity Rice Mill Owners and Traders Association, and Partido Rice Millers Association.
Development / Technical Partners	- WFP and other potential development partners (such as PATH) and technical partners (such as DSM) are essential in advising the Government to scale up the rice fortification programme.

The next section provides analysis of the barriers to large-scale fortification, and how these affect different types of stakeholders.

[12] *Technologies for Rice Fortification*

6. Discussion and Analyses

6.1 Stakeholder Discussion - Summary of Findings

The Philippines is one of the major rice producing and consuming countries in the world. During 2021, the total rice production was 12.4 million MT (6). However, the rice industry faces competitive pressure from imports from countries such as Vietnam, Myanmar, Thailand, China, India, etc. Vietnamese imports alone accounted for 86 percent of the total imports in 2020. The share of milled rice imports has also been rising. It constituted 18 percent of consumption in 2021 (6).

Increasing consumption levels and its status as the most-widely consumed staple in the Philippines make rice a potentially critical fortification vehicle. The benefits of rice fortification can reach the majority of the population. While the Government indicated its interest in using fortification initiatives to address nutrient gaps in the population, this has yet to translate into significant action for promoting rice fortification.

Currently, rice is fortified by a few private millers for distribution in government social protection programmes. According to the 'National Feeding Programme' in the Philippines, DSWD, in coordination with LGUs, is required to provide at least one fortified meal to children aged between 3 to 5 years in daycare centers for a period of not less than 120 days in a year. Similarly, DepEd also has to provide fortified meals to undernourished public school children from kindergarten to grade six. Under this programme, DepEd, in collaboration with WFP, was able to provide fortified rice to 23,000 schoolchildren in 69 schools in Maguindanao in 2021 (14).

The NNC also supplies IFR under the Tutok Kainan Dietary Supplementation Programme (one of the initiatives of the PPAN 2017 - 2022) to nutritionally at-risk pregnant women and children (aged between 6-23 months) (20). A total of 38,434 beneficiaries have benefitted from this initiative till 2021 (21). Currently, the programme is being expanded to different regions across the country.

As outlined in Chapter 1, detailed discussions were held with key decision makers in the government and relevant stakeholders in the rice value chain. Takeaways from these discussions are summarised below:

Discussion with government entities

It was evident that government stakeholders are interested in scaling up rice fortification processes in the country. The focus of discussion was centred on the current social protection programmes; the presence of standards and the challenges regarding mandatory legislation of rice fortification; and the need for demand generation to incentivize millers to consider investment in rice fortification, etc. Their key suggestions included the restructuring of the mandatory legislation for rice fortification and the development of a sustainable supply chain for raw materials and machinery.

The highlights of the discussions with the government entities are provided below:

Table 6: Summary of discussion with government stakeholders

Discussion themes	Entity	Details
Past experience of fortified rice	DOH, NFA, NNC	• Low acceptance of fortified rice in the past due to the use of coating technology. Consumers did not like the unpleasant texture, yellowish colour, and rust-like aftertaste of fortified rice.
High operational costs	NFA, FNRI, DOH, NNC	• Despite mandatory legislation, NFA is unable to supply fortified rice due to high operational costs.
Administration challenges	DOH	• The local government and the chief of secretaries are changing every three years, hindering the continuous scale-up of rice fortification. When there was a shift in local government unit (LGU), it affected the momentum on fortification.
Role of Government entities	FNRI, NFA	• There is a significant need for strengthening the coordination among the government entities involved in rice fortification.
Millers' hesitance in investment in rice fortification	FNRI, NFA, NNC	• The high cost for iron premix production machinery (PHP 4 million) and blending machinery (PHP 400,000) is a hindrance for millers. However, the capacity of the machinery was not mentioned. • There is a need for substantial investment in fortification equipment for millers.
Affordability of fortified rice	DOH, FNRI, NFA, NNC	• A price premium of PHP 2 per kg for fortified rice (approximately 5 percent more expensive than normal rice) makes it less affordable to consumers. • Millers are hesitant to invest in rice fortification as higher product prices could dissuade consumers from purchase
Distribution of fortified rice through social protection programmes	DOH, NNC, NFA	• The Government should procure fortified rice from millers for distribution in their feeding programmes • Millers must be assured that demand for fortified rice will be sustained through policy reform measures
Awareness creation	FNRI, NFA, NNC	• There is a need to conduct awareness campaigns to boost consumer acceptance for fortified rice. • DOH and nutrition bodies should advocate for the benefits of fortified rice among the population.
Assistance needed for raw materials and machinery	DOH	• DOH tries to facilitate the local availability of FRK and fortification premix to minimise production cost. • Active participation of technology adopters (millers ready to invest such as Nutridense and JD Aguilar) that are willing to produce FRK is necessary.
	FNRI	• There is a requirement to develop blending facilities to meet the demand for fortified rice. • Financial and technical assistance for blending machinery and other needs must be provided to millers.
Tax exemptions and loans to millers	NNC	• A tax reduction or rebate for millers investing in rice fortification can be offered • Loans on favourable terms to technology adopters for fortifying rice can be provided.
WFP support required	DOH	• During emergencies, DSWD provides Family Food packs to affected areas. WFP can help them to deliver fortified rice through this initiative. • WFP can provide technical support to FNRI for food fortification programmes
	NNC	• Support is required from WFP in installing blending machines at miller's premises, and providing technical support to operate them. • Currently, the NFA is in the process of procuring blending machines. They may require support from WFP for machine calibration and for personnel training.
Others	FNRI	• Millers need support in the product registration process for fortified rice with FDA
	NFA	• In process of purchasing the required fortification equipment to resume the production of fortified rice. • Planning to fortify 50 percent of NFA's rice stock by 2023 and supply this through the feeding programmes of DSWD

Discussion with millers

The stakeholders in the rice value chain, particularly millers, were aware of rice fortification and its health benefits. The discussion with all the millers centred on understanding two key variables – 1) the expected demand for fortified rice; and 2) the profits. They showed hesitation to invest as they were not adequately aware of these key business variables, the required production techniques, the costs and returns on investment, and the raw materials and machinery used.

A summary of important inputs received during these discussions is as follows:

Table 7: Summary of discussion with millers

Discussion points	Details
Barriers in the rice industry	- It is important to tackle the barriers in the domestic rice industry with respect to inefficient technologies and high costs of production. - The millers face tough competition due to the availability of cheaper rice imports since the implementation of the Rice Tariffication Law. This has impacted their primary milling business.
Lack of knowledge about production techniques	- Most millers were not aware of the required production techniques and the raw materials and machinery used.
Lack of knowledge about costs	- It is crucial to understand the various costs involved and the possible channels to procure inputs, to better understand the expected profits in rice fortification
Past experience of fortified rice	- Low acceptance of fortified rice in the past due to usage of coating technology. Consumers did not like the unpleasant texture, yellowish color, and rust-like aftertaste of fortified rice.
Distribution of fortified rice through social protection programmes	- The Government must procure fortified rice from millers for distribution in their feeding programmes
Awareness creation	- There is a need for educational awareness campaigns by the Government to inform consumers about fortified rice and its health benefits. This might create additional demand to incentivize millers to consider investing in rice fortification.
Subsidies	- The Government could offer subsidies for procuring FRK and installing blending machinery - Additionally, the Government could provide subsidies to farmers for inputs such as fertilizers, pesticides and seeds. This will reduce the cost of procuring unhusked rice from farmers

Discussion with other stakeholders

The highlights of the discussions with rice importers, FRK suppliers, and funding partners are provided below:

Table 8: Summary of discussion with other stakeholders

Entity	Discussion themes	Details
DSM	Consumer preferences	- Creating consumer acceptance for fortified rice can be challenging as Filipinos rarely change their preferred rice brands and varieties
IFC	Funding opportunities	- IFC (a funding partner) has a minimum threshold of USD 30-40 million for investing in a rice milling company. Consequently, they cannot invest in private mills with low revenues and insufficient production capacities. - IFC is ready to explore investing in Nutridense if they meet their financial requirements and are willing to share their financial details. - NFA can receive funding through partnering with the Government and the World Bank. However, joint investments with the Government usually take longer than private investments by IFC.
Rice importers	Barriers in the rice industry	- The domestic rice industry is unable to compete with imports. Additionally, imported rice is of better quality, leading to more acceptance.
	Past experience of fortified rice	- It is difficult to create consumer demand for fortified rice based on past experiences of rust-like taste of fortified rice (using coating technology)
	Government's support required	- Currently, there is a lack of awareness and demand for fortified rice. Fortified rice is needed for malnourished and poorer groups; hence the fortification initiative must be driven by the Government
	International supply of fortified rice	- Currently there are no suppliers that are selling fortified rice from the rice exporting countries
	Investment in rice fortification	- The investment in rice fortification is about PHP 15 to 45 million (USD 300,000 – USD 900,000).
	Inquiries for fortified rice	- According to a directive by the Department of Labor and Employment in January 2022, rice sold in canteens of companies must be iron-fortified. This led to some inquiries for fortified rice. However, consistent government policy is needed before considering investment in rice fortification.
Domestic fortified rice and/or FRK suppliers	Monitoring framework	- There is a need to develop standards and an effective monitoring framework for rice fortification.
	Registration process for fortified rice	- It is important to develop an easy and feasible registration process for producers of fortified rice

The successful implementation of rice fortification requires a coordinated effort among the key stakeholders in the supply chain and a clear understanding of the challenges faced by them.

The subsequent section triangulates inputs from all the above sections, as well as inputs from the primary research (including interviews with stakeholders) to elaborate on these major barriers and recommendations that would help in scaling up rice fortification in the Philippines.

6.2 Barriers to Scaling up Rice Fortification

Barrier 1

Weak enforcement of the Food Fortification Act of 2000

The less-than-ideal enforcement of the Food Fortification Act is the most significant structural impediment to rice fortification in the Philippines. Without an efficient regulatory system in place, it is extremely difficult to ensure effective implementation of rice fortification by NFA and other rice producers.

Hence, FDA needs to better monitor and enforce the food safety standards for producing and distributing fortified rice and FRK. For instance, FDA restricted the use of *malunggay* (moringa) as a rice fortificant. Yet a few millers (such as Agribioscience and Don Nats) are selling organic rice comprising *malunggay* as a fortified product.

Such loopholes suggest that an effective monitoring and regulatory environment for rice fortification is not present in the Philippines. It is imperative to address these challenges and ensure the implementation of a stringent monitoring and enforcement framework for rice fortification.

Barrier 2

Relatively low priority for NFA to resume rice fortification despite mandatory legislation

The Philippine Food Fortification Act of 2000 mandates NFA to fortify the rice supplied to consumers. However, they stopped their rice fortification operations since 2011 due to structural barriers (elaborated in barrier 4). Despite the mandatory legislation, currently NFA is not distributing fortified rice. Meanwhile, other government agencies such as FNRI and DOH, and regulatory authorities such as FDA do not prioritise rice fortification.

This is an indication of the inadequate attention to rice fortification. The designated authority, NFA, is not able to carry out its statutory responsibility of fortifying rice supply. Currently, only a handful of millers are voluntarily fortifying rice for distribution in government programmes. Most millers are not aware of the existence of the legislation.

Barrier 3

Underdeveloped supply chain infrastructure increased the cost of fortification for NFA

NFA has approximately 75 rice mills throughout the country. However, not all of them are functional. Ideally, the production, storage, and distribution of fortified rice should take place in the same province to reduce transportation costs. Apart from the high cost of imported fortification premix, transportation to mills scattered across the country added substantial costs to their operations.

The expensive iron premix and high transportation costs resulted in an inefficient supply chain infrastructure. Additionally, acceptance among consumers was very low due to its colour and taste (elaborated in barrier 8). As a result, NFA stopped its rice fortification operations in 2011.

Even after a decade, the supply chain constraints still exist. It is therefore important to undertake further research to optimize the costs incurred by NFA.

Barrier 4

Lack of coordination among government entities involved in rice fortification

The coordination among government entities involved in rice fortification can be substantially improved. An example of this is the ambiguity around the appropriate authority (DSWD, NNC, or NFA) that bears the financial responsibility for the procurement of fortification premix/FRK, the mixing and blending process, and other additional services involved. The lack of clarity on roles complicates the implementation of rice fortification policies in the country.

The development of a sustainable supply chain for fortified rice requires a clear, cross-ministerial collaboration and communication strategy. It must include well-defined roles and responsibilities for the relevant government agencies as well as private sector players. A more effective organizational structure would help make an impact on large-scale rice fortification, and in turn, in improving the nutritional health of the population.

Barrier 5

Low incentive to invest in rice fortification due to heavy competition posed by rice imports

As discussed in Section 3.4, millers are unable to compete effectively against the low prices of imported rice since the implementation of the Rice Tariffication Law in 2019. To retain their market share, millers are compelled to supply rice on wafer-thin margins; and many mills have ceased production.

Thus, the domestic rice industry is preoccupied with attempts to meet the competition posed by cheaper rice imports. Investment in rice fortification is considered as an additional burden, and hence not a priority at the moment.

Barrier 6

Limited awareness among millers about the production techniques, costs involved, and suppliers of raw materials and machinery required for rice fortification

Except for a few large millers, most of the millers are unaware of the required technical processes in rice fortification. They are also not aware of the required raw materials such as premixes/FRK, the associated costs, and the machinery (blending/extrusion) needed for rice fortification. Additionally, millers cited a lack of knowledge about the following details:

- Difference in the taste, smell, texture of fortified rice compared to regular rice
- Shelf life of fortified rice
- Methods of packaging and storage of fortified rice compared to regular rice
- Lack of technical knowledge about operating and maintaining the blending machinery required for rice fortification

Given the limited awareness about the production process, there is a lack of knowledge about the costs of various inputs and the appropriate channels to purchase them. Addressing such knowledge gaps is an essential step in establishing a sustainable and efficient supply chain for fortified rice in the Philippines. This will require coordinated efforts from international agencies such as WFP, donors, government entities and stakeholders in the rice industry.

Barrier 7

Low return on investment perceived in fortified rice production due to a lack of consumer demand and awareness on various production costs

Given the limited knowledge of production processes as discussed earlier, millers are unable to assess the amount of investment needed, and the likely returns. Most prominent millers believed that the required investment in machinery as well as increased costs would be substantial, although they were unable to quantify this. Furthermore, the additional costs incurred in training the personnel, maintaining the machinery, obtaining permits further limit millers' incentive to invest in rice fortification.

Millers are also not optimistic about the volume of sales as local consumers prefer buying imported rice, which is cheaper than domestically available rice. Millers are also not aware of the cost differential between regular rice and fortified rice. It is essential to conduct consumer surveys to understand consumer preferences and their willingness to pay a premium for fortified rice.

Thus, the lack of consumer demand and the absence of government support result in a low level of willingness among rice millers to make investments in rice fortification. It is important to raise awareness on likely costs and investments among rice millers, as this will provide a framework for them to evaluate the option.

Barrier 8

Low acceptance among consumers due to unpleasant past experience of consuming fortified rice

The fortified rice supplied by NFA during 2007 to 2011 using coating technology was yellowish in colour, and the texture was not popular with consumers. This experience shaped the perception and limited the acceptance of fortified rice by the Philippines population.

Consumers were not aware of the underlying reason causing the colour change in fortified rice due to the addition of iron premix. This led to a perception among consumers that the fortified rice is of poor quality and unsafe for consumption. The population of the Philippines prefer consuming white, unbroken and shiny rice. Therefore, there is negligible consumer demand for fortified rice.

Creating large-scale consumer awareness towards the positive health impact of consuming fortified rice is essential to generating demand in the market, especially among those who can afford to pay a premium.

The above-mentioned impediments need to be addressed by a series of interventions and coordination among different entities across the value chain, and sustained over a period of time.

6.3 Commercialization by private sector

In conversations with private sector stakeholders, it was clear that the vast majority of the millers and other players were not willing to invest in rice fortification without having any clarity on the available market.

The stakeholders require basic understanding of the return on their investment. Currently, these players do not consider that the commercial sale of fortified rice would generate any profits. Hence, financial support or guaranteed offtake of fortified rice through government-led procurement programs is required to provide initial economies of scale to manufacturers.

The prospects of consumer-driven market demand are also not encouraging due to the price differential between fortified and non-fortified rice, as well as negative perceptions about the taste and/or colour of fortified rice. Particularly, in the Philippines, consumers had a bad experience of consuming yellow-colored IFR.

In addition, the problems faced by the rice industry due to the Rice Tariffication Law have substantially reduced the capacity of the private sector to incur fresh investment.

Essentially, the research indicates that commercialization (by private sector) at this stage does not seem viable. In the Philippines, there are a few rice mills that have ventured into rice fortification. However, they are only supplying fortified rice for government procurement programmes.

In the next chapter, recommendations to accelerate the scale-up of rice fortification in the Philippines are highlighted.

7. Recommendations for Scaling Up Rice Fortification

In the Philippines, rice is fortified by only a few private millers supplying to the government schemes. Currently, the rice fortification programme is at stage 4 (as discussed in section 2.2), where there is a need to optimally scale up the distribution of fortified rice through existing social protection programmes in the country. Appropriate advocacy could bring a change, given the Government's positive actions regarding fortification of food items, and desire to reduce incidence of MNDs.

A successful scale-up will require coordinated efforts from all stakeholders along several parameters. These include continuing advocacy and awareness building, business model development, restructuring the mandatory fortification legislation, implementing a regulatory framework, and demand creation.

The ultimate goal is to develop sustainable supply chain mechanisms and ensure that fortification costs are kept to a minimum. Higher prices will dissuade consumers, thus, impacting offtake of fortified rice. To do so, a comprehensive approach is required with the coordination of key decision-makers within the Government and the industry leaders in the rice value chain.

The recommendations below provide a detailed roadmap to a successful scale-up, including commercialization as well as subsidized distribution of fortified rice under social protection programmes.

1. **Strengthen the statutory enforcement framework of rice fortification**
   Provide technical assistance to DOH and FDA to strengthen the enforcement of the Food Fortification Act
2. **Advocacy with NFA and government entities**
   Conduct meetings with government entities to prioritize rice in the budgetary allocation process
3. **Technical assistance to NFA**
   Conduct a study to optimize the supply chain costs for NFA and provide assistance in production of fortified rice
4. **Efficient communication with government decision-makers**
   Ensure smooth and continuous operations of the Sub-Technical Working Group for rice fortification to ensure efficient communication
5. **Strengthen domestic rice production capacity**
   Improve domestic rice industry competitiveness to enable millers to compete with rice imports by modernizing the technology of domestic rice mills
6. **Advocacy with millers**
   Conduct periodic workshops and individual meetings with the leading rice millers to advocate on rice fortification
7. **Business model - return on investment**
   Develop and disseminate a technical report for millers highlighting health benefits, technical know-how of rice fortification processes, costs involved and investment returns
8. **Demand creation through government programmes**
   Invite tenders from millers to procure fortified rice for government feeding programmes and offer subsidies to millers to fund the fortification process
9. **Awareness creation campaigns**
   Campaign to generate awareness about the benefits of consuming fortified rice among the population

Recommendation 1: Strengthen the statutory enforcement framework of rice fortification

Provide technical assistance to DOH and FDA to strengthen the enforcement of the Food Fortification Act

Indicative timeline: short term (advised to begin within a year)

WFP, in partnership with DOH, can provide technical assistance to support the regulatory authority, FDA, in the development of a stringent statutory enforcement framework for rice fortification. This helps in effectively monitoring the quality of fortified rice and FRK production in the country.

Additionally, FDA should better disseminate information on these regulations and processes to the millers through the local government units and rice associations. This helps in avoiding any confusion (as the case in malunggay rice) among millers about the appropriate fortificants added to rice.

Recommendation 2: Advocacy with NFA and government entities

Conduct meetings with government entities to prioritise rice in the budgetary allocation process

WFP should advocate with DOH, NNC, and FDA to discuss the impediments in effective implementation and monitoring of rice fortification under the Food Fortification Act. It is imperative that government entities understand the bottlenecks in the fortification programme and strengthen the legislative and operating environment.

Based on discussions with respective stakeholders in the Government, an action-oriented plan should be rolled out to effectively implement the Food Fortification Act.

WFP should propose to NNC for budget allocation for rice fortification scale-up. It is imperative to access funds from the Government and development partners to successfully scale up the rice fortification programme.

Given the seemingly waning interest in rice fortification after initial efforts, improving the advocacy strategy with a focus on the positive impact on health is essential. This will help spark interest and engagement of key government stakeholders on fortification efforts.

Recommendation 3: Technical assistance to NFA

Conduct a study to optimize the supply chain costs for NFA and provide assistance in the production of fortified rice

Indicative timeline: short term (advised to begin within a year)

NNC should assist NFA in the development of an efficient supply chain infrastructure to lower transportation costs. WFP, in collaboration with respective government entities, can undertake a study to analyze the current supply chain costs and provide recommendations to optimize those costs.

NNC and WFP should advocate with NFA to prioritize investment in rice fortification with the budget allocated. They should also support NFA in purchasing FRK and upgrading the existing machinery, if needed. NFA is the key entity responsible to implement rice fortification in the Philippines. Strengthening their operations would significantly facilitate the scale-up of rice fortification efforts.

Recommendation 4: Efficient communication with government decision-makers

Ensure smooth and continuous operations of the Sub-Technical Working Group for rice fortification

Indicative timeline: short term (advised to begin within a year)

To ensure efficient communication with government decision makers, WFP should coordinate with NNC to ensure smooth coordination of the Sub-Technical Working Group[13] for rice fortification (both industrial and bio-fortified rice). The Group should streamline the coordination processes of relevant ministries. An organizational structure with clearly defined roles would ensure efficiency and clarity in the implementation of rice fortification programmes.

Furthermore, the precise roles of these entities on the production, registration and licensing process, of rice fortification should be communicated to the millers through the Department of agriculture and local government units in different provinces.

[13] *Sub-Technical Working Group for rice fortification*

Recommendation 5: Strengthen domestic rice production capacity

Improve domestic rice industry's competitiveness

Indicative timeline: medium term (ideally to be started after enforcement framework is strengthened)

To facilitate the production of fortified rice, it is crucial to tackle the existing challenges in the rice industry. Therefore,

1. WFP, through the Sub-Technical Working Group on Rice Fortification, should engage with the DTI to consider the impact of RTL on millers
2. DA should understand the technical challenges faced by millers to help scale up their production capacity

It is also imperative to upgrade the relatively inefficient methods of rice production used by millers. Technological advancement will significantly scale up production capacities and ultimately sharpen their competitive edge.

Additionally, modernizing domestic rice mills will foster industry consolidation and help achieve economies of scale, improving the competitiveness of the domestic rice industry. This requires proper funding infrastructure with the support from DA and banks. Loan schemes for millers can be explored to build the capacities of domestic rice mills. The cost and quality of domestic rice should be brought on par with imports; only then millers can focus on rice fortification operations.

Recommendation 6: Advocacy with millers

Conduct periodic workshops and individual meetings with the leading rice millers to advocate on rice fortification

Indicative timeline: medium term (ongoing process – once the technical document is prepared)

Most millers are unaware of the health benefits of fortified rice. The fact that millers are selling 'malunggay' rice as fortified rice showed that there is a misconception towards rice fortification. It is imperative that the Government's Sub-Technical Working Group on fortification takes complete ownership of advocacy with millers. This would signify their commitment in this initiative.

The Sub-Technical Working Group on fortification, in partnership with WFP and rice associations, should raise the awareness of millers through periodic workshops and/or individual meetings. FNRI can set up a technical personnel team to explain the technical processes involved in rice fortification These ensure millers are well-informed about the benefits of fortified rice in reducing the prevalence of MNDs, anemia, and stunting in the population.

The workshops/meetings can include discussions on:

1. Raw materials (FRK) and machinery (blending machinery) used in rice fortification
2. Availability of a low-cost blending machinery provided by HDN technologies, in collaboration with FNRI
3. Characteristics of fortified rice and its packaging and storage methods

Recommendation 7: Business model - return on investment

Develop and disseminate a technical report for millers highlighting health benefits, technical know-how of rice fortification processes, costs involved and investment returns

Indicative timeline: short term (ideally to be done within a year)

Given the lack of knowledge on the economic benefits of producing fortified rice amongst millers, it is essential to showcase a viable business model to them. WFP can partner with DOH, DA, the Inter-Agency Task Force on Zero Hunger, DSM (for funding and technical support) and Nutridense, to prepare a technical report covering various costs and returns expected in the production of fortified rice.

Indicative contents of the document include:

i. Health benefits of rice fortification
ii. Different processes of rice fortification and the most feasible technology
iii. Raw materials and machinery required
iv. Process innovation in FRK and machinery through case studies in other countries
v. Costs involved
   - Cost of importing FRK
   - Cost of blending machinery
   - Cost of FRK for local production (includes the cost of extrusion machinery)
   - Any other associated costs
vi. Investment and access to funding sources needed and expected returns under different scenarios

- Whether FRK is imported or produced locally
- Whether blending machinery is imported or produced locally
- Whether extrusion machinery is imported or produced locally
- Whether subsidies are provided by the Government for importing FRK or machinery

vii. Information about the possible channels of imports of FRK and blending machinery

viii. Financial viability in producing fortified rice – expected return on investment

ix. Case studies of successful rice fortification projects across other countries through existing WFP reports

Through the technical report, current FRK suppliers such as Nutridense can highlight that the overall benefits outweigh the marginal increase of costs in procuring FRK for production and an initial investment in blending machinery.

The technical report should ideally be disseminated alongside a training that should be included under the Food Fortification Programme. NNC should also disseminate the information to the prospective millers interested in rice fortification through individual meetings and training workshops.

Recommendation 8: Demand creation through government programmes

To grow the market demand for fortified rice, invite tenders from millers to procure fortified rice for government feeding programmes and offer subsidies to millers to fund the fortification process

Indicative timeline: medium to long term (ideally to be started after the budget is approved)

The expansion of government feeding programmes (DSWD's Supplementary feeding programme and DepEd's School feeding programme) to other regions in the Philippines for the distribution of fortified rice would be essential to increasing the demand for fortified rice consumption[14].

To meet the demand, the Inter-Agency Task Force should start procuring fortified rice by inviting tenders from private millers and/or NFA. NNC should offer subsidies to these millers to enable them to produce fortified rice. For instance, voucher programmes can be implemented to fund the fortification process. This will enable existing and new players to produce fortified rice on a larger scale and initiate the development of a market mechanism for fortified rice.

It is also recommended to engage with millers that have prior experience in fortification in the country. These millers already have understanding of rice fortification and its benefits, hence reducing the burden on the Government for its advocacy efforts.

Furthermore, DOH and NNC can advocate with NFA on fulfilling its statutory responsibility of production and distribution of fortified rice in the Philippines. They should understand the operational and financial constraints encountered by NFA and offer solutions to help them in functioning as the leading implementing agency for rice fortification. Once NFA is involved, DSWD and DepEd can start procuring iron-fortified rice from NFA to meet the requirements of their feeding programmes.

The case studies of rice fortification scale-up in Bangladesh and India can shed some light on the government efforts:

[14] *DSWD and DepEd Feeding Programmes*

Bangladesh:
CASE STUDY

The Government of Bangladesh has integrated the distribution of fortified rice through national social safety net programmes. This helped the private sector manufacturers to secure a sustainable market for FRK. The scale-up of domestic production of FRK can be attributed to the support of WFP, Nutrition International (NI), Global Alliance for Improved Nutrition (GAIN), and other partners (22) (23).

Initially, FRK was imported at higher costs; however, with technical support from WFP, three local privately-funded FRK facilities were set up in 2019. This resulted in significant cost reduction. In fact, these facilities have reached an annual production capacity of more than 1,500 mt of FRK. Now, there are 8 FRK producers in the country (22).

WFP is also providing technical assistance to the Government in establishing a FRK factory (production capacity of 200 kg per hour) and a laboratory facility for kernel testing (22). More than 50 blending units (rice mills) are operational in Bangladesh.

From these cases, it is evident that government efforts are essential to efficiently scale up the rice fortification.

India:
CASE STUDY

In August 2021, the Indian Prime Minister announced the distribution of fortified rice throughout the Public Distribution System and other government schemes in all States and Union Territories by 2024 in a phased manner (24).

In 2022, Food Corporation of India (FCI) in multiple states announced the procurement of fortified rice from private millers. For instance, the procurement of 260,000 mt of fortified rice from private millers was announced in the state of Telangana as a part of 'PM Poshan' (Mid-day meal programme).

Fortified rice was distributed in pre-primary education centres and further expanded to include distribution of fortified rice amongst schoolchildren. The Indian Food Ministry advocated with relevant entities to provide financial assistance to rice millers for installing blending machinery. Currently, 600 out of the 900 major rice mills in the state have installed the required equipment.

To ensure that the millers are provided with FRK, multiple state governments invited tenders from manufacturing companies. The tender requirements were:

- Availability of extrusion machinery to produce FRK
- Ability to transport the FRK to the designated rice millers for a definite period, as instructed in the tender (25) (26) (27).

Such efforts of the Government led to a significant increase in the availability of FRK suppliers in the country. As of May 2020 (before the government announcement), there were 13 FRK suppliers (28), which increased to 157 FRK suppliers across multiple states by April 2022 (29).

Recommendation 9: Awareness creation campaigns

Campaign to generate awareness about the benefits of consuming fortified rice among the population and conduct surveys to understand their perceptions about fortified rice

Indicative timeline: long term (ongoing process)

The consumption of fortified rice would require a social and behavioral change among the population. Filipinos prefer white rice and rarely switch between rice varieties. To understand the acceptability of fortified rice, it is essential to adopt the Social and Behavior Change Communication (SBCC) strategy complemented by consumer surveys. This would help in gauging the initial response to fortified rice amongst consumers.

Consumer surveys, including distributions of fortified rice samples, could be conducted in government distribution programmes. Once the Government is able to generate a certain level of public awareness on fortified rice and to understand the consumer perceptions towards fortified rice, it is essential for the relevant entities to invest in mass awareness campaigns. DOH, in collaboration with NNC, should run public campaigns across TV, print and social media about fortified rice and its benefits.

DOH and NNC can partner with state-owned broadcasters (such as PTV) and other media channels to promote the benefits of consuming fortified rice amongst the population. This would help in generating consumer traction for fortified rice, especially those that are more health conscious and willing to pay a premium. Additionally, promotion boards can be set up in public places such as childcare centers, maternity clinics, hospitals, etc.

Along with television, innovative digital outreach could supplement the awareness efforts, and help reach a certain section of the population (digitally active, younger cohort) at lower costs. Apart from government funding, aid agencies and corporate social responsibility (CSR) funds can substantially enhance this effort.

Conclusion:

POSSIBLE ROADMAP TO COMMERCIALIZATION

As discussed above, the scale-up of rice fortification would require immense efforts from the Government along with WFP, other development partners, and donor agencies. The success will depend on continuing advocacy and awareness building, business model development, restructuring of the mandatory fortification legislation and implementing a regulatory framework, and demand creation.

Given the hesitancy of the private sector to invest in rice fortification without support from the Government, commercialization of fortified rice will take time, and require several favourable, complementary conditions in place. Based on the recommendations in Chapter 7, a possible roadmap to commercialization of fortified rice is mapped as follows:

Invite tenders from millers to create initial demand for fortified rice through government social protection programmes.

Provide financial support (in the form of cheaper and/or subsidized loans from banks, funding from government and/or WFP, donors, etc.) to encourage millers to invest in capacity for blending.

A few large millers that have indicated interest or those that might show interest after understanding business and technical aspects will initiate fortified rice production and supply it to the government programmes.

As millers would have already invested, they could consider selling additional fortified rice in the open market. They could create a nutritious rice brand (niche premium product) and sell it at slightly higher prices.

As awareness spreads gradually (as mentioned in recommendation 9), along with the efforts of and private millers' marketing teams), more millers would be willing to participate in the market.

As the supply of the product increases, costs will also reduce. The final price of fortified rice would become more affordable to customers and would not be only limited to the premium customers who were initially targeted.

The Philippines is in a good position to transition to the next stage of rice fortification. This will require effective coordination between all stakeholders coupled with continued commitment by the Government of the Philippines.

In the long run, continuing government support and wide public acceptance will help create a sustainable ecosystem that will help significantly in reducing MNDs in the Philippines.

Annex:

NATIONAL FOOD AUTHORITY

National Food Authority (NFA), under the Department of Agriculture (DA), is the leading body for the implementation of rice fortification in the Philippines. They have a full-fledged system to procure rice from farmers, maintain buffer stock, and regulate the supply of rice. They have approximately 75 rice mills contributing to approximately 15 percent of the country's total rice consumption. The rice sold by NFA is affordable to the low-income groups of the population, owing to their cheaper prices.

The locations of the rice warehouses owned by NFA are listed in the table below:

Realignment of NFA's roles

In 2019, the Rice Tariffication Law (fully known as Republic Act No. 11203 "An Act Liberalizing the Importation, Exportation, and Trading of Rice, Lifting for the Purpose the Quantitative Import Restriction on Rice, and for Other Purposes") was approved.

The law transformed NFA from a 'trading and regulatory agency' to a 'buffer stocking agency'. Initially, they monopolised rice imports. After the law enactment, the role of NFA shifted, focusing on the acquisition, maintenance, and distribution of rice buffer stock.

Currently, NFA is required to maintain an optimal level of national rice inventory to be sourced solely from local farmers and to distribute rice during emergency situations and sustain the disaster relief programme of the Government during calamities.

Table 9: Location of NFA rice warehouses

Region	Provinces
I	La Union, Benguet, Ilocos Norte, Ilocos Sur, Western Pangasinan, Eastern Pangasinan, Abra
II	Isabela, Cagayan, Nueva Vizcaya, Quirino, Ifugao, Kalinga Apayao, Allacapan, Mt. Province
III	Nueva Ecija, Pampanga, Tarlac, Aurora, Bulacan, Zambales, Bataan
IV	Batangas, Laguna, Marinduque, Mamburao, Oriental Mindoro, Occidental Mindoro, Romblon, Quezon, Infanta, Palawan
V	Albay, Camarines Norte, Camarines Sur, Catanduanes, Masbate, Sorsogon
VI	Iloilo, Guimaras Island, Aklan, Antique, Capiz, Negros Occidental
VII	Cebu, Siquijor, Negros Oriental, Bohol
VIII	Leyte, Southern Leyte, Naval/Biliran, Northern Samar, Eastern Samar, Western Samar
IX	Zamboanga City, Zamboanga del Sur/Pagadian, Ipil/Sibugay, Zamboanga del Norte/Dipolog
X	Cagayan de Oro, Misamis Oriental, Misamis Occidental, Bukidnon, Camiguin, Lanao del Norte
XI	General Santos City, Davao del Norte, Campostela Valley, Davao City, Davao Oriental, Davao del Sur
XII	SPGC, Sultan Kudarat, North Cotabato, Marbel/Koronadal
XIII (NCR)	Central District/Manila, North District/Bulacan, South District/Taguig, East District/Rizal, Integrated Port Services, Metro Transport Service/Valenzuela, Cavite, Batanes
XIV (ARMM)	Maguindanao, Tawi-tawi, Sulu, Lanao del Sur, Basilan
CARAGA	Agusan del Norte, Agusan del Sur, Surigao del Norte, Surigao del Sur

Annex:

KEY SEASONS FOR PRODUCTION AND HARVEST

The climate in the Philippines is of a tropical marine type and mainly influenced by the surrounding seas. The mountainous topography results in varied rice production across the regions.

Table 10: Plantation and harvest seasons of rice in the Philippines

Region	Season	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
North	Wet					Harvest	Harvest	Plantation			Harvest	Harvest	Harvest
	Dry	Plantation	Plantation	Plantation		Harvest	Harvest						
South	Wet			Harvest	Harvest	Harvest					Plantation	Plantation	Plantation
	Dry					Plantation	Plantation					Harvest	Harvest

Plantation
Harvest

Source: Manila Times

Annex:

SELLING PRICE OF RICE

The table below lists the selling prices of rice sold by NFA.

Table 11: Selling price of rice by NFA (2022) (16)

Variety	Authorised Retail Outlets		Government Agencies/ Private Institutions
Local Rice, Well-Milled	Wholesale (Peso/kg)	Consumer (Peso/kg)	(Peso/kg)
WD1	25	27	25
WD2	23	25	23

Source: NFA

The table below details the prices of top rice varieties.

Table 12: Prices of top rice varieties in the Philippines (2021) (17)

Variety	Commercial rice price (Peso/kg)	Imported rice price (Peso/kg)
RMR	33 - 40	-
WMR	37 – 44	42 – 47
Special	45 - 58	50 – 57
Premium	42 – 48	43 – 48

Source: DA

Annex:

VARIETIES OF RICE PRODUCED

Table 13: Rice varieties in the Philippines (2021)

Type of rice	Sub-varieties
White rice	Dinorado, Sinandomeng, Wagwa, San Pablo, Bungkitan, Palawan, Malido, Pinidwa, Dinalaga, Senorita, Tubigan 26, PSB Rc18 (Ala), Rc402 (Tubigan 36)
Black rice	Ballatino, Galo, Pilit Tapul, Malagkit Itim, Malagaya Tapol 2&3
Red rice	Ifugao rice, Kintoman, Brillante, Dinorado, Awot, Kinaban, Kasagpi, Kalinayan, Pilit Budakan -1&2
Violet rice	Batalinaw, Pirurutong, Tininta (Malagkit)
Sticky & Glutinous rice	Imelda Diket, Bongkitan, Diket

Source: International Rice Research Institute, Bureau of Plant Industry, Philippine Seed Board

Annex:

RICE IMPORTING COUNTRIES

Table 14: Top countries from which rice is imported (2020)

Country	Region	Imported quantity (MT)	% of imports out of total
Vietnam	Asia	1,789,752	86%
Myanmar	Asia	158,074	8%
Thailand	Asia	67,733	3%
China	Asia	35,254	2%
India	Asia	23,303	1%
Others	Misc.	13,467	<1%
Total		2,087,583	100%

Source: Trademap

Annex:

RICE FORTIFICATION LAW

The Government of the Philippines passed the Rice Tariffication Law (RTL) in 2019 to replace the existing quota system on rice imports. The law introduced the tariffs system under which traders could import an unlimited quantity of rice, without the requirement of a permit from NFA. Rice traders could easily secure import clearance from the Bureau of Plant Industry (BPI) and DA by paying the appropriate tariff to the Bureau of Customs.

RTL was passed with an intention to meet the country's increasing rice demand and to provide rice at low prices to consumers. However, the implementation of RTL has led to heavy competition among millers and traders. Large supermarket chains, such as Puregold and Savemore, and traders have been importing better-quality rice at cheaper costs, affecting the businesses of the local rice industry.

Millers are unable to cope with the low prices of imported rice; hence, they are compelled to supply rice on wafer-thin margins. In fact, 30 to 40 percent of mills have cease operations since the implementation of RTL, according to the Philippine Confederation of Grains Association (PhilConGrains).

Annex:

KEY RICE BRANDS OPERATING IN THE PHILIPPINES

Table 15: **Key brands operating in the Philippines**

Key brand	Rice mill/company
Mrs. Lam	Mrs. Lam Rice
GlowcoGrp	Global Organic and Wellness Corporation
Golden Grains	R.E.J. Commercial Corporation
Farmers Choice	Northern Luzon Grain Dealer Incorporated
Nutridense rice	Nutridense Food Manufacturing Corporation
Sunnywood	Sunnywood Superfoods Corporation
Sacred Grains	Sacred Grains
Goldmine	Million Star Grains Corporation
Renucci Rice	Renucci Rice
Primavera	Primavera Rice Mill Corporation

Annex:

ROLE OF DIFFERENT ENTITIES IN THE RICE SUPPLY CHAIN

Table 16: Supply chain participants and their role

SN	Key players	Step involved in
1	Input Suppliers	Most farmers in the Philippines procure fertilizers and pesticides from agricultural input stores or input dealers.
2	Farmers	Seed selection, land preparation, crop establishment, crop care and maintenance, harvesting, threshing, and hauling are performed by the farmers. Farmers sell the produce to any of the following: Paddy traders, cooperatives, NFA, and intermediaries which sell to paddy traders
3	Paddy traders	Paddy traders engage solely in selling the rice produce procured from farmers to large miller traders. Their activities include drying, trucking, handling, and storing rice. Paddy traders also lend advance credit to farmers to ensure a steady supply of paddy.
4	Cooperatives	Farmers' cooperatives directly sell rice to institutional buyers (NFA), millers or individual households. Cooperatives usually have mills with a capacity of 2 MT/hour. The number of cooperatives has reduced in the Philippines.
5	Millers	Millers carry out the activities of milling, classifying, packaging, storage, and distribution of paddy.
6	Wholesalers	Wholesalers supply milled rice to retailers or sell it directly to consumers.
7	Retailers	Retailers buy rice from millers or wholesalers. They sell rice through traditional retail stores (Wet markets, sari-sari stores, etc.) and modern retail stores (Supermarkets, hypermarkets, online retail websites, etc.).
8	Associations	The Grain Retailers Confederation of the Philippines (GRECON) is composed of all grain retailers association in the country. GRECON works in coordination with the national Government in the event of price rises in rice. GRECON works in coordination with millers, farmers, and traders.
9	Importers	Rice imports are crucial for the Philippines rice industry as the country is not yet self-sufficient in paddy production.
10	Consumers	Consumers are the end users who influence the demand for rice commodity in the market.

Annex:

COST MARK-UP OF RICE ACROSS THE RICE VALUE CHAIN

The cost mark-up of well-milled rice is depicted in the table below.

Table 17: Value chain and relative financial positions of players in the rice value chain

Player	Product	Cost (PHP/kg)			Profit (PHP/kg)			Margin (PHP/kg)	
		Total cost	Added cost	% to added cost	Selling price	Profit	% to profit	Margin	% to price
Farmer	Fresh Paddy	10.65	10.65	35	16.31	5.66	54	16.31	40
Paddy trader	Dry paddy	18.86	2.55	8	19.37	0.51	5	3.06	8
Rice miller	Well-milled rice	33.89	14.52	48	35.86	1.97	19	16.49	40
Whole-saler	Well-milled rice	37.27	1.41	5	38.51	1.24	12	2.65	7
Retailer	Well-milled rice	39.68	1.17	4	40.75	1.07	10	2.24	5
Total			**30.3**	**100**		**10.45**	**100**	**40.75**	**100**

Source: Philippine Rice Research Institute

Annex:

MONITORING BY FOOD AND DRUG ADMINISTRATION

There are two ways of monitoring by FDA:

- Random inspection: Inspectors conduct random site visits, collect samples, and submit them for testing in laboratories.

- Annual Post Market Monitoring Plan (APMMP): Inspection is conducted with a specific focus on processed foods that are marked under food safety issues, and food items included in food fortification law such as wheat flour, cooking oil, etc. FDA is considering including iron premix under APMMP starting from the year 2023.

The Centre for Food Regulation and Research (CFRR) under FDA provides recommendations based on the results of the inspection conducted. Their recommendations are presented to regional sales offices, the central laboratory and the legal office of FDA. The Legal Office of FDA handles issues regarding food safety violations. After further discussions with these entities, FDA suggests a policy direction and regulation.

Annex:

TECHNOLOGIES FOR RICE FORTIFICATION

Rice can be fortified using multiple technologies, such as dusting, coating, cold extrusion, warm extrusion and hot extrusion. This report focuses on rice fortification through extrusion.

Extrusion is a fortification technique in which FRK is added to the polished rice in ratios ranging from 1:50 to 1:200. Applying the extrusion process for rice fortification can be of two types – cold extrusion and hot extrusion.

Cold Extrusion: The process, also called "shape forming", uses no additional heat except that generated during the mechanical processing of the rice dough. The product temperature during the entire processing operation remains below the melting temperature of the rice starch (30–40 °C), and hence gelatinization of the starch does not take place.

Hot Extrusion: In this process, additional heat energy is applied normally through steam heated barrel jackets and the melting temperature of starch is exceeded (80-110 °C). The dough containing micronutrient premix in the required concentration and other optional additives are pressed through the extruder tube where steam and water are added. The pasta shaped extrudate is cut into rice size pieces at the exit and the wet FRK is subsequently dried. The process results in fully or partially pre-cooked simulated rice kernels that have similar appearance to normal polished rice (30).

Annex:

DSWD and DEPED FEEDING PROGRAMMES

According to the National Feeding Programme in the Philippines, DSWD, in coordination with LGUs, is required to provide at least one fortified meal to children aged 3 – 5 years old in day care centers for a period of not less than 120 days in a year.

The FRK requirement and estimated costs for their supplementary feeding programme for children aged between 3 to 5 years in day care centers are discussed in the table below. The estimates are based on the data provided by UNICEF in 2016 (15).

Table 18: DSWD Supplementary Feeding Programme

Region	Target	Total rice needed in kg	Total FRK needed in kg	Cost of FRK in pesos
I	106,783	1,240,061	6,200	1,860,000
II	74,130	860,865	4,304	1,291,297
III	161,700	1,877,806	9,389	2,816,709
IV-A	187,407	2,176,339	10,881	3,264,508
IV-B	113,095	1,313,361	6,566	1,970,041
V	142,480	1,654,606	8,273	2,481,909
VI	198,360	2,303,535	11,517	3,455,302
VII	151,978	1,764,906	8,824	2,647,359
VIII	113,768	1,321,177	6,605	1,981,765
IX	128,128	1,487,938	7,439	2,231,907
X	130,533	1,515,867	7,579	2,273,800
XI	97,680	1,134,348	5,671	1,701,522
XII	93,440	1,085,110	5,425	1,627,665
NCR	161,387	1,874,172	9,370	2,811,258
CAR	47,355	549,929	2,749	824,893
CARAGA	67,990	789,561	3,947	1,184,341
ARMM	77,169	896,156	4,480	1,344,234
TOTAL	**2,053,383**	**23,845,737**	**119,229**	**35,768,606**

Source: UNICEF, 2016

Similarly, DepEd also has to provide fortified meals to undernourished public school children from kindergarten to grade six. Under this programme, DepEd, in collaboration with WFP, was able to serve fortified rice to 23,000 schoolchildren in 69 schools in Maguindanao in 2021.

The FRK requirement and estimated costs for their school feeding programme to undernourished public school children from kindergarten to grade six are discussed in the table below. The estimates are based on the data provided by UNICEF in 2016.

Table 19: DepED School-based Feeding Programme

Region	Target	Total rice needed in kg	Total FRK needed in kg	Cost of FRK in pesos
I	61,180	1,184,129	5,921	1,776,194
II	27,914	540,271	2,701	810,406
III	94,572	1,830,426	9,152	2,745,639
IV-A	216,524	4,190,787	20,953	6,286,180
IV-B	59,631	1,154,148	5,770	1,731.222
V	87,524	1,694,013	8,470	2,541,019
VI	118,692	2,297,265	11,486	3,445,897
VII	69,095	1,337,323	6,686	2,005,984
VIII	45,809	886,626	4,433	1,329,939
IX	38,268	740,671	3,703	1,111,006
X	43,705	845,903	4,229	1,268,854
XI	44,328	857,961	4,289	1,286,941
XII	42,038	813,639	4,068	1,220,458
NCR	111,518	2,158,413	10,792	3,237,619
CAR	8,212	158,942	794	238,413
CARAGA	28,055	543,000	2,715	814,500
ARMM	63,090	1,221,097	6,105	1,831,645
TOTAL	**1,160,155**	**22,454,614**	**112,273**	**33,681,921**

Source: UNICEF, 2016

Annex:

SUB-TECHNICAL WORKING GROUP FOR RICE FORTIFICATION

The Sub-Technical Working Group for rice fortification includes the National Economic Development Authority (NEDA), Department of Agriculture (DA), Department of Trade and Industry (DTI), Department of Social Welfare and Development (DSWD), Department of Science and Technology (DOST), Nutrition Foundation of the Philippines (NFP), Nutrition International (NI), University of the Philippines Los Banos (UPLB), World Food Programme (WFP) and UNICEF.

Annex: References

1. WFP. *Micronutrient Landscape in South Asia: Status, Strategies and Future*. WFP, 2021.
2. Expanded National Nutrition Survey 2018. Department of Science and Technology - Food and Nutrition Research Institute, 2020.
3. Roehlano Briones, Ella Antonio, Celestino Habito, Emma Porio, Danilo Songco. Strategic Review: Food Security and Nutrition in the Philippines. WFP, 2017.
4. Republic of the Philippines. "Republic Act No. 8976." n.d. (accessed 2022).
5. Nutrition International. From action to results: Multi-sectoral technical assitance for nutrition in the Philippines. Nutrition International, 2021.
6. Bedford, Ryan. Grain and Feed Update. Manila, Philippines: United States Department of Agriculture, 2021.
7. Sharon Piza, Yoonyoung Cho, Nadia Belhaj Hassine Belghith, Eddy Trang, Arianna Zapanta. "Impacts of COVID-19 on Households in the Philippines." The World Bank. August 2020. https://pubdocs.worldbank.org/en/546181605520156388/Results-from-the-Philippines-COVID-19-Households-Survey-conducted-in-August-2020.pdf (accessed 2022).
8. Betigeri, Arvind. "Rice Fortification in Asia and the Pacific." Rice Fortification in Asia and the Pacific. World Food Programme, May 2021.
9. NFA. "General Guidelines on the Suggested Retail Price (SRP) for Milled Rice and Prescribed Labelling of Rice Boxes and Price Tags." National Food Authority. 2018. https://nfa.gov.ph/images/files/announcement/2018/srp_103018.pdf (accessed 2022).
10. Trademap. Trademap. 2021. https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm=1%7c608%7c%7c%7c%7c1006%7c%7c%7c4%7c1%7c1%7c1%7c2%7c1%7c2%7c2%7c2%7c1 (accessed 2022).
11. The Lawphil Project. Republic Act No. 11203. 2019. https://lawphil.net/statutes/repacts/ra2019/ra_11203_2019.html (accessed 2022).
12. Philippine Confederation of Grains Association (PhilConGrains). 2019. https://www.philstar.com/business/2019/07/30/1938951/more-rice-mills-stop-operations (accessed 2022).
13. Alice B. Mataia, Jesusa C. Beltran, Rowena G. Manalili, Betzaida M. Catudan, Nefriend M. Francisco, Adrielle C. Flores. Rice Value Chain Analysis in the Philippines: Value Addition, Constraints, and Upgrading Strategies. Philippines: Philippine Rice Research Institute, 2020.
14. Enhanced School Feeding with Iron Fortified Rice in Maguindanao, Philippines. Maguindanao, Philippines: WFP, 2021.
15. Maglalang, Hector. Philippine Rice Consumption for Social Safety Net Programs. UNICEF, 2016.
16. National Food Authority. National Food Authority. n.d. https://nfa.gov.ph/programs-projects/procurement (accessed 2022).
17. Department of Agriculture. Department of Agriculture. August 2021. https://www.da.gov.ph/wp-content/

uploads/2021/08/Price-Monitoring-August-9-2021.pdf (accessed 2022).

18. Food and Agricultural Organization. n.d. https://www.fao.org/sustainable-development-goals/indicators/211/en. (accessed 2021).

19. "Guidelines on Micronutrient Fortification of Processed Foods." Department of Agriculture. n.d. https://www.fda.gov.ph/wp-content/uploads/2021/05/Administrative-Order-No.-4-A-s.-1995.pdf (accessed 2022).

20. National Nutrition Council. "Tutok Kainan Supplementation Programme." National Nutrition Council. n.d. Tutok Kainan (accessed 2022).

21. Christia Marie Ramos, Inquirer.net. Senators: Let LGUs handle feeding program for 'better success'. October 13, 2021. https://newsinfo.inquirer.net/1501353/senators-let-lgus-handle-feeding-program-for-better-success (accessed 2022).

22. WFP. How WFP supported the Government of Bangladesh to Introduce and Scale up Rice Fortification. WFP, 2019.

23. GAIN Health. "Status of Rice Fortification in Bangladesh." GAIN Health. 2021. https://www.gainhealth.org/sites/default/files/event/documents/status-of-rice-fortification-in-bangladesh-ram-chandra-das.pdf (accessed 2022).

24. Cabinet Committee on Economic Affairs (CCEA). Cabinet Committee on Economic Affairs (CCEA). April 8, 2022. https://pib.gov.in/PressReleasePage.aspx?PRID=1814826#:~:text=Hon'ble%20Prime%20Minister%20of,%2C%20children%2C%20lactating%20mothers%20etc. (accessed May 2022).

25. Food Odisha. "Food Odisha." Food Odisha. 2021. http://www.foododisha.in/Download/EOI-Supply-FRK-Seven-Districts.pdf (accessed 2022).

26. Jharkhand government. "Jharkhand government." 2021. https://www.jharkhand.gov.in/Home/ViewDoc?id=D009DO005SD001527122021013932394 (accessed 2022).

27. Mariya Paliwala. No GST Concessional Rates applicable to Activities of Manufacture, Supply of Fortified Rice Kernels till Sep 30, 2021: AAR [Read Order]. November 23, 2021. https://www.taxscan.in/no-gst-concessional-rates-applicable-to-activities-of-manufacture-supply-of-fortified-rice-kernels-till-sep-30-2021-aar-read-order/141346/ (accessed 2022).

28. FSSAI. "List of Fortified Rice Kernel Manufacturers (as of May 2020)." FSSAI. 2020. https://ffrc.fssai.gov.in/assets/news/file/frk_manufacturers.pdf (accessed 2022).

29. "List of Fortified Rice Suppliers." FSSAI. 2022. https://ffrc.fssai.gov.in/assets/file/FRK_Manfacturers_April_2022.pdf (accessed 2022).

30. Steiger G, Müller-Fischer N, Cori H, Conde-Petit B. "Fortification of rice: technologies and nutrients." The New York Academy of Sciences, 2014: 29-39

31. Aashish Mehta, Shikha Jhaa. 2010. Missing rice in the Philippines: Measurement and Meaning. University of California-Santa Barbara, Asian Development Bank.

Annex: Acronyms

BARMM	Bangsamoro Autonomous Region in Muslim Mindanao
BPI	Bureau of Plant Industry
BPS	Bureau of Product Standards
CAGR	Compound Annual Growth Rate
CFRR	Center for Food Regulation and Research
DA	Department of Agriculture
DepEd	Department of Education
DOH	Department of Health
DOST	Department of Science and Technology
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
ENNS	Enhanced National Nutrition Survey
FDA	Food and Drug Administration
FFI	Food Fortification Initiative
FNRI	Food and Nutrition Research Institute
FRK	Fortified Rice Kernels
GQNSL	Grain Quality and Nutrition Services Laboratory
GRECON	Grain Retailers Confederation of the Philippines

IATF-ZH	Inter-Agency Task Force – Zero Hunger
IDA	Iron Deficiency Anemia
IFR	Iron Fortified Rice
IRRI	International Rice Research Institute
MT	Metric tons
MTPPAN	Medium-term Philippine Plan of Action for Nutrition
NEDA	National Economic and Development Authority
NFA	National Food Authority
NI	Nutrition International
NNC	National Nutrition Council
PhilCon-Grains	Philippine Confederation of Grains Association, Inc.
PHP	Philippine Peso
PPAN	Philippines Plan of Action for Nutrition
PSA	Philippine Statistics Authority
PSB	Philippine Seed Board
RTL	Rice Tariffication Law
SSF	Shared Service Facility
UNICEF	United Nations International Children's Emergency Fund
US	United States
USDA	United States Department of Agriculture
WFP	World Food Programme
WHO	World Health Organization

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