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A Landscape Analysis of Rice Fortification in Sri Lanka an Overview

Ministry of Health, Nutrition and Indigenous medicine In collaboration with World Food Programme August 2017





In Sri Lanka, despite improvements since the end of the civil war in 2009, poor nutrition indicators persist across the population. According to nutrition survey reports in 2012 and 2016, 33.6 percent of children under five years of age and 19.1 percent of women of reproductive age, respectively, are iron deficient, suggesting other concurrent micronutrient deficiencies are likely. Food fortification, the addition of essential vitamins and minerals to commonly eaten foods to improve nutrient intake, has been proven globally as a successful strategy to address micronutrient deficiencies. In Sri Lanka, mandatory salt iodization regulation was passed in 1995 and the 2006 Demographic Health Survey found that 91.8% of children under the age of five lived in households with adequately iodized salt.

Given the importance that rice holds in the Sri Lankan diet (an estimated 301 grams per capita per day available), the Ministry of Health, Nutrition and Indigenous Medicine is eager to pursue opportunities to fortify rice with key vitamins and minerals. This landscape analysis of the rice supply chain in Sri Lanka was conducted in order to provide decision makers a comprehensive understanding of the factors that influence the feasibility and sustainability of rice fortification as a public health nutrition intervention.

Sri Lanka, in most years is a rice-sufficient country, with production of 3 million metric tons of milled rice in 2015 and national rice consumption at 2.3 million metric tons. The analysis found that although a significant proportion of domestically produced rice (90 percent) may enter the commercial marketplace; the majority of the rice (57 percent) is milled by 1,400 small- and medium-scale rice mills. The largest rice mills (approximately 220 mills) are estimated to process approximately 33 percent of domestically produced rice. The remaining approximately 9 percent of rice is milled by custom mills. Thus, the rice supply chain is so fragmented that introducing mandatory rice fortification would be complex and less likely to reach more nutritionally vulnerable populations but points to a growing modern rice milling industry.

Social safety net fortification offers the most immediate opportunity to improve the nutrient intake: for instance fortification of the 2,500 MT rice provided to 160,000 schoolchildren - through the school meal programme supported by the World Food Programme. Other social safety nets operating in the country would have to be assessed to evaluate their potential for incorporating fortified rice.

At this time, rice fortification in Sri Lanka faces limited opportunities for implementation due to fragmented rice supply chain, and limited opportunity through social safety net. A foundation for wider implementation in the future, however, can be set through an increasingly modernized rice milling industry; and a national policy initiative and work plan for food fortification (for wheat flour and rice). As such, it is recommended that in the short-term, focus should be placed on working with the Ministry of Health to implement the national food fortification work plan and with the Institute of Post Harvest Technology of the Ministry of Agriculture to monitor the rice milling industry's capacity to fortify on a mandatory basis in the future.

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The TAG comprises of Dr L.H.B Denuwara (Director, Nutrition Division, Ministry of Health - MoH), Dr Rasanjalee Hettiarachchi (Director, Nutrition Coordination Division, MoH), Dr Renuka Jayatissa (Head, Nutrition Department, Medical Research Institute, MoH), Dr Rohan Karawita (Director, National Food Promotion Board, Ministry of Agriculture), Dr Erandi Weerasekera (Medical Officer, Nutrition Division and Secretary to TAG), and Dr Lakshman Siyambalagoda (Additional Secretary, MoH and Chair of the TAG). Special acknowledgement goes to the late Dr Senarath Mahamithawa, who was the convener of the TAG and the key person in bringing the discussion on rice and wheat flour fortification to the forefront, until his passing in October 2016

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Abbreviations

CU5	Children under five years of age		
CWE	Cooperative Wholesale Establishment		
DHS	Demographic Health Survey		
ENOH	Environmental, Occupational Health, and Food Safety		
FAO	The United Nations Food and Agriculture Organization		
FAC	Food Advisory Committee		
g/c/d	Grams per capita per day		
GoSL	Government of Sri Lanka		
Ha	Hectare		
HARTI	Hector Kobbekaduwa Agrarian Research and Training Institute		
IDD	Iodine Deficiency Disorders		
IPHT	Institute of Post Harvest Technology		
LKR	Sri Lankan Rupee		
MoAg	Ministry of Agriculture		
MT	Metric ton		
MT/a	Metric tons per annum		
MT	Metric tons		
MNPEA	Ministry of National Policy and Economic Affair		
MoH	Ministry of Health, Nutrition and Indigenous Medicine		
MRI	Medical Research Institute		
MsAPN	Multi-sector Action Plan for Nutrition		
NNSSL	National Nutritional Secretariat of Sri Lanka		
PLVV	Pregnant and Lactating Women		
SAC	School-age children		
UIC	Urinary Iodine Concentration		
UN	United Nations		
UNICEF	United Nations Children's Fund		
USD	United States dollar		
VAD	Vitamin A Deficiency		
WHO	World Health Organization		
WFP	World Food Programme		
WRA	Women of Reproductive Age		

Map of Sri Lanka



http://www.nationsonline.org/oneworld/map/sri_lanka_map2.htm. The boundaries, names shown and the designations used on this map do not imply official endorsement or acceptance by the World Food Programme.





Over two billion people worldwide lack the essential vitamins and nutrients needed to grow and live healthy lives. Deficiency of essential micronutrients, such as vitamin A, iron, zinc, folic acid, and iodine, among many others, result in health consequences ranging from serious physical disabilities to life-threatening disorders. Similarly, anaemia (often due to iron deficiency) affects nearly one-third of the world's population and contributes to 20 percent of all maternal deaths.² In Sri Lanka, almost 10,000,000 people are at risk of iron-deficiency.³

With the help of commendable public health efforts by the Ministry of Health, Nutrition, and Indigenous Medicine of Sri Lanka (MoH), in partnership with relevant stakeholders, several programmes were established to address micronutrient deficiencies (MNDs) including micronutrient supplementation for pregnant and lactating women, home fortification using micronutrient powder for young children, and promotion of dietary diversity at household level. MNDs, however, have persisted and more needs to be done to overcome the issue in Sri Lanka.

Fortification of commonly consumed foods, such as salt (with iodine), wheat and maize flour (with multiple micronutrients), milk (with vitamins A and D), vegetable oil (with vitamins A and E) has been practiced globally for more than 90 years, proven safe, and is recognized as an effective approach to prevent MNDs.

In Sri Lanka, rice fortification has a great potential to reduce the prevalence of iron deficiency and other MNDs since rice is so widely consumed (300 g/c/d). Rice is also a suitable vehicle for fortification as the staple in Sri Lanka and because of its large predictable consumption, affordability, and availability. Recognizing the potential of rice as a vehicle for fortification, MoH is considering rice fortification as one of its key strategies to prevent and control MNDs. In this light, MoH, with the support of WFP is taking steps to assess the feasibility and acceptability of rice fortification as part of a solution to lift millions of Sri Lankans out of the vicious cycle of MNDs.

To introduce, implement, and scale up rice fortification, strategic decisions and actions must be made within the government, the private sector, and civil society. This report is a joint collaboration between the MOH-appointed technical advisory group (TAG) for rice fortification and WFP and is intended to inform the potential for elevating the role of fortification for improving nutrition as a part of the Sustainable Development Goals. The rice landscape analysis aims at understanding the possibility of introducing rice fortification as a public health strategy to prevent MNDs in Sri Lanka. The report identifies both opportunities and challenges to consider scaling up rice fortification in the country.

It is hoped that this report will serve as a basis to discuss the possibility for rice fortification in Sri Lanka and to encourage further efforts so that more lives could be improved through an improved fortification programs.

² WHO. (2015) Micronutrient deficiency, iron deficiency, 2015. Available from: http://www.who.int/nutrition/topics/ida/en/. [Accessed: July 30 2015].

³ Dr. Renuka Jayatissa (2017). Presentation at the national food fortification workshop – March 23, 2017 – Colombo.



I. OBJECTIVES OF THE LANDSCAPE ANALYSIS

I.I BACKGROUND

Mass food fortification, or the addition of essential vitamins and minerals (micronutrients) during food processing to commonly eaten staple foods (also termed 'vehicles', such as salt, wheat, rice, and oil), has proven to be a highly cost-effective strategy to address micronutrient deficiencies (MNDs). When properly implemented, food fortification programmes have resulted in drastic reductions in iodine deficiency disorders (IDD) – including anaemia; neural tube defects; iron deficiency anaemia and vitamin A deficiency (VAD).

The 2017 National Strategic Review of Food Security and Nutrition towards Zero Hunger⁴ led by the South Asia Policy Research Institute (SAPRI) in consultation with key stakeholders recommended that innovative and integrated strategies are required to address stagnant levels of malnutrition, including micronutrient deficiencies. Rice fortification offers a high potential to decrease micronutrient deficiencies in regions of the world where rice is the main staple, and where other fortified foods are not consumed in adequate quantities to prevent MNDs. Globally, six countries have mandatory legislation for rice fortification;⁵ though fortification standards and degree of implementation varies by country.⁶ As of December 2016, distribution of fortified rice in social safety nets, such as school feeding programmes, or other targeted food distribution programmes are underway in several countries in the Asian region, including Bangladesh, Cambodia, India (states of Odisha and Karnataka), and Malaysia.⁷

Since the early 1990s, several efforts were made to introduce food fortification in Sri Lanka, starting with the mandatory food regulation for iodisation of salt passed under the Food Act (1995). In 2008, Serendib, a wheat flour mills, opened in Sri Lanka and also began to voluntarily fortify all its flour with iron and folic acid. However, as rice fortification is more complex than salt or wheat fortification, the Food Fortification Technical Advisory Group (TAG), formed under the Ministry of Health, Nutrition and Indigenous Medicine (MoH) recommended that a landscape analysis be carried out to inform the opportunity for rice fortification in the country.

A landscape analysis is crucial and ideally undertaken early during programme development. This analysis provides decision-makers with a comprehensive understanding of the factors that influence the feasibility and sustainability of rice fortification as an intervention to improve a population's micronutrient health. To introduce, implement, and scale up rice fortification programmes, strategic decisions and actions must be taken within government, the private sector, and civil society. This includes determining the most appropriate delivery options; ways to integrate fortification into the rice supply chain; and how to adapt or improve relevant policies and regulatory and institutional frameworks. Such an analysis can also be used to estimate the potential public health benefits and associated costs of the intervention, as well as to engage the global development community and private sector in creating sustainable supply chains for fortified rice.

I.2 OBJECTIVES

The aim of this report is to present a landscape analysis for rice fortification for Sri Lanka. The landscape analysis reviews and summarizes the current nutrition, political and industry landscape as it relates to the rice sector and rice fortification. The objective is to inform decision-making and optimize discussions to introduce rice fortification as one of the nutrition interventions in Sri Lanka.

Specifically, the study will generate information to assess the feasibility of rice fortification in Sri Lanka – with an emphasis on the potential of this public health strategy to improve the micronutrient health of vulnerable populations.

⁴ South Asia Policy Research Institute (SAPRI) et al (2017). National Strategic Review of Food Security and Nutrition towards Zero Hunger. Colombo, Sri Lanka.

⁵ Costa Rica, Nicaragua, Panama, Papua New Guinea, Philippines, United States of America (US). In the US mandatory legislation is only applied in six states but in effect this has contributed to approximately 70% of the US crop fortified.

⁶ Food Fortification Initiative. Global Progress. Available at: http://ffinetwork.org/global_progress/index.php

⁷ Food Fortification Initiative. Rice Fortification Resources. Available at: http://ffinetwork.org/implement/rice.html

1.3 SUGGESTED USE OF RESULTS OF THE LANDSCAPE ANALYSIS

As the landscape analysis tends to bring together existing information related to rice fortification, its results depend on availability and reliability of data, availability of information shared by key-informants and other factors such as timing and duration of the landscape analysis.

As such, the results of the landscape analysis should be used as a starting point for discussions and building consensus on next steps for rice fortification. These next steps can include the need for additional data collection and analysis, definition of road map, strengthening of strategic partnerships, etc.

2. METHODOLOGY

The information in this report is compiled from desk reviews of existing information and reports. The review relied on input from the TAG (Ministry of Health, Agriculture), meetings held with the Institute of Post Harvest Technology (IPHT), and Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI). It should also be noted that the quantitative information presented in this report is largely collected from secondary sources and reports. The quantitative data has been utilised to formulate a general situational analysis, while major trends have also been taken into account.

The initial findings were then presented at the food fortification workshop in March 2017 – which was then discussed by the panel members for validation. The expert panel included Prof. D.A.N. Dharmasena, University of Peradeniya; Dr A. P. Benthota, Rice Research Institute; Prof: L.H.P. Gunarathne, University of Peradeniya; Mr Mahesh Dissanayake, IPHT; Dr Jaanaki Goonerathne, DPP Lanka; and Dr Lakshman Gamlath, Director, Environmental Occupational Health, and Food Safety (ENOH)–MoH.

3. NUTRITION SITUATION ANALYSIS

Sri Lanka's universal health care for all and free education policies over the last few decades have helped the country to achieve most of its Millennium Development Goals (MDGs).⁸ Sri Lanka also stands as one of the countries in South Asia with the best health status, including having the lowest rate of maternal mortality ratio and infant deaths, as well as having the highest proportion of population with access to health services and education (above 90 percent of the population are able to access these services) as compared with other countries in the region. Undernutrition, including anaemia and MNDs, however, remains a setback in these achievements.⁹ The Global Nutrition Report 2016¹⁰ suggests that Sri Lanka has one of the highest prevalence of wasting (19.6 percent¹¹) in the world, ranking 128 out of 130 countries, and is the only country in the world where the prevalence of wasting is higher than stunting.

Good nutrition is essential for full development of cognitive and motor skills, behavioural abilities, IQ, and physical growth. Early childhood undernutrition, including poor nutrition in the womb, often results in stunting and can have permanent developmental effects on a child.¹² Micronutrient deficiencies, particularly iodine and iron, can lead to significant and irreversible cognitive damage.¹³ This is often because children are not fed micronutrient-rich food in adequate quantities and frequency. Anaemia in children is associated with serious consequences, including growth retardation, impaired motor and cognitive development, and increased morbidity and mortality.

3.1 MICRONUTRIENT DEFICIENCIES

In 2012, 15 percent of children aged 6-59 months in Sri Lanka were found to be anaemic (Hb < 11 g/dL), indicating a mild public health situation according to the World Health Organization (WHO) benchmark.¹⁴ In terms of severity,

⁸ Sri Lanka Millennium Development Goals Report 2014. 15 March 2015. Available at: http://www.lk.undp.org/content/srilanka/en/home/library/mdg/sri-lanka-millenniumdevelopment-goals-country-report-2014.html

⁹ UNESCAP, ADB, and UNDP (2015). Asia-Pacific regional MDG report (2014/2015). Bangkok - Thailand.

¹⁰ IFPRI (2016). Global Child Nutrition Report. Washington DC.

¹¹ This figure is based on the 2012 National nutrition and micronutrient survey - Medical Research Institute.

¹² Grantham-McGregor, et al., (2007). Child development in developing countries 1: Developmental potential in the first 5 years for children in developing countries, The Lancet, 369, 60-70, excerpts from p. 63.

¹³ Engle, P., et al., (2007). Strategies to avoid the loss of developmental potential in more than 200 million children in the developing world, The Lancet, 369, 229-42.

¹⁴ Medical Research Institute (MoH, GoSL) and UNICEF (2012). National nutrition and micronutrient survey 2014, 2012. Colombo - Sri Lanka.

Table I: Sri Lanka Nutrition Indicators, 2000-2015

Indicators	Population	2001ª	2006 ^ь	2012°	2016 ^d
Underweight (%)	Children 6-59 mos	29.7	21.1	23.5	n/a
Stunted (%)	Children 6-59 mos	13.9	17.3	13.1	n/a
Wasting (%)	Children 6-59 mos	14.2	14.7	19.6	n/a
Vitamin A deficiency (%)	Children 6-59 mos		29 ^e	n/a	n/a
Vitamin A supplement coverage (%)	Children 6-59 mos		n/a	n/a	n/a
Anaemia (%)	Children 6-59 mos	29.9	n/a	15.1	n/a
	PL women 15-49 yrs	30.3	34	n/a	31.8
	Adolescent 11–18 yrs	22.3			
	Non pregnant women 15-49 yrs	31.6			
Iron deficiency (%)	Children 6-59 mos	n/a	n/a	33.6	n/a
	PL women 15-49 yrs	n/a	n/a	n/a	19.1
Zinc deficiency (%)	Children 6-59 mos	n/a	n/a	5.1	n/a
Calcium deficiency (%)	Children 6-59 mos	n/a	n/a	47.6	n/a
Median UIC (µg/l)	Children 8-12 yrs		n/a	n/a	n/a
	PL women 15-49 yrs		n/a	n/a	157.7
Adequately iodized salt (%)	Household		91.8	n/a	n/a

a Assessment of Anaemia Status in Sri Lanka 2001 - A Survey Report. MRI, 2001. http://pgimrepository.cmb.ac.lk:8180/handle/123456789/6810?mode=full&submit_ simple=Show+full+item+record.

b 2006 Demographic Health Survey. http://www.statistics.gov.lk/social/DHS%20200607%20FinalReport.pdf

c 2012 National nutrition and micronutrient survey 2012. MoH, UNICEF.

e Jayatissa, R. et al.Vitamin A nutritional status in Sri Lanka Department of Nutrition, MRI Ministry of Health Care and Nutrition in collaboration with UNICEF 2006.

Abbreviations: UIC: Urinary Iodine Concentration;

Definitions: --: not known if this indicator was included in the survey N/A: not applicable; Underweight: below minus two standard deviations from the median weight for height of the NCHS/WHO standard; Stunted: fall below minus two standard deviations from the median height for age of the National Center for Health Statistics (NCHS)/WHO standard; Wasted: fall below minus two standard deviations from the median weight for height of the NCHS/WHO standard; Vitamin A deficiency, serum retinol <0.7 µmol/l; Anaemia, haemoglobin <11 g/dl (for children) or <12 g/dl (for non-pregnant women); Iron deficiency, serum ferritin <12ug/l; Median UIC of 100 µg/l is considered adequate iodine status for school-age children aged 6 years or older.

11.3 percent of children assessed were found to be mildly anaemic (Hb 7 - 10.99 g/dL), and 3.8 percent were of the moderate category (Hb < 7g/dL). Over one in three (33.6%) were found with iron deficiency and 7.4 percent were found with iron deficiency anaemia¹⁵.

Geographical variation of anaemia exists, with inter-district comparisons showing prevalence within the range of 4.9 percent in Kegalle district to 26.9 percent in Kilinochchi (Figure 1). Among the 25 districts surveyed, 10 districts, namely: Kegalle, Galle, Hambantota, Matara, Ratnapura, Matale, Nuwara Eliya, Ampara, Mullaitivu, and Kalutara were found to have prevalence of anaemia below the average national level. The other 15 districts reported prevalence figures higher than that of the national level.

In addition to iron-deficiency anaemia, other forms of micronutrient deficiencies, including calcium and zinc deficiency exist,¹⁶ with almost I in 2 (47.6%) children surveyed was found with calcium deficiency (hypocalcaemia < 8.4 mg/dL). The lowest prevalence was seen in the 6 - 11 month age group (38 %) as compared to older age group (46 %). The variations seen in the

Figure 1:Prevalence of Anemia in children aged 6-59 months by district



¹⁵ ibid.

¹⁶ Medical Research Institute (MoH, GoSL) and UNICEF (2014). National Nutrition and Micronutrient Survey: Part II.

different age groups were statistically significant even though there is no clear pattern. There is no difference in the prevalence between male and female children.

Zinc deficiency was found in 5.1 percent of children 6-59 months old. There is a consistent decline in the prevalence seen with increasing age, with 6.2 percent found in children aged 6-11 months as compared to 4.7 percent in children aged 48-59 months. There was no statistically significant difference found in the prevalence between male and female children, and amongst different wealth quintiles.

Maternal anaemia, particularly during pregnancy, is an important contributor to both maternal mortality and morbidity, as well to negative birth outcomes, such as low birth weight. In Sri Lanka, according to the nutrition survey carried out by the Medical Research Institute (MRI) of MoH, it was found that one in three (31.8 percent) of pregnant were anaemic (Hb < 11g/dL), indicating a moderate public health situation. The survey found high inter-district variation in the prevalence of anaemia ranging from a low value of 14.6 percent in Badulla district to a high value of 62.6 percent in Ratnapura district (Figure 2).¹⁷ One in five (19 %) of pregnant women assessed were found with iron-deficiency, and 9 percent were found with iron-deficiency anaemia.





Source: MRI, UNICEF and WFP (2015). National nutrition survey amongst pregnant women.

MNDs affect all age groups, and when found in school children could negatively impact learning capacity and school performance. In another recent nation-wide nutrition survey amongst primary school children aged 6-12 years, one in ten (11.7 percent) of children were found to be anaemic (0.14 million children)¹⁸ In the recent nutrition survey (2015), 31.8 percent of pregnant and lactating (PLW) women were found to be anaemic.¹⁹ The cost of diet study found that between 25-50 percent of the households in the Eastern Province, Uva Province, and Northern and Central Provinces, could not afford to purchase foods consisting of adequate level of micronutrients.²⁰

Although the causes of anaemia are multi-faceted, according to a survey carried out by MRI in 2012^{21} , it was found that of all anaemic children, 12.8 percent had haemoglobinopathies, 4.3 percent had acute infections, and 52.3 percent were iron deficient. Although there are limitations to the use of this data for effective causal analysis, the data points to the fact that one of the key contributing factors could be due to poor intake of iron-rich foods. Similarly, anaemia is still an issue in other age groups, including school-aged children and pregnant

women. This indicates the need to increase the micronutrient density of the diet, which could be achieved at a large scale through food fortification.

3.2 CONSUMPTION OF STAPLE FOODS

In order for food fortification to be effective, the food that is being fortified needs to be consumed regularly in sufficient quantity and by a large proportion of the population. Identifying consumption patterns (e.g., quantities and regional and sub-population differences) is an essential step in planning a fortification programme. For example, understanding consumed quantities of a food and knowing which regions or sub-populations consume greater or lesser amounts of fortified foods provides guidance for setting nutrient standards in fortification and informs monitoring and evaluation efforts.

¹⁷ Medical Research Institute (MoH, GoSL) (2016). Nutrition survey amongst pregnant and lactating women.

¹⁸ Medical Research Institute (MoH, GoSL) (2016). Nutrition survey amongst primary school children.

¹⁹ Medical Research Institute (MoH, GoSL), WFP and UNICEF (2015). National Nutrition and Iodine Survey amongst pregnant and lactating women in Sri Lanka.

²⁰ HARTI and WFP (2014). Minimum cost of nutritious diet in Sri Lanka (October 2013 - September 2014).

²¹ Medical Research Institute (MoH, GoSL) and UNICEF (2012). National nutrition and micronutrient survey 2012.

In Sri Lanka, rice is the key staple food, with consumption at about 300 grams per capita per day (g/c/d) or 109 kilograms per capita per year (kg/c/yr) (Table 2). Rice intake represents approximately 42 percent of the total caloric intake per capita per day (cal/c/d) of 2,536 kcal.²² Protein from rice is also represents a third (20 g) of the total protein intake (59 g/ capita/day).

Additionally, there are regional variations in rice consumption patterns. Average rice consumption is the highest in the Northern Province (128 kg), followed by Southern Province (119 kg), Central Province (110 kg), Eastern Province (100 kg), Western Province (90 kg), Uva Province (87 kg), North Central Province (78 kg), Sabagaramuwa Province (75kg), and North Western Province (67 kg).²³ The pattern of rice consumption against population density is shown in Figure 3.



Figure 3 : Rice consumption by district against population density

In recent years, the Government of Sri Lanka has been promoting consumption of rice and rice-based products to take advantage of the country's self-sufficiency in rice. This also resulted in the shift from consumption of wheat flour to rice.²⁴ In recent years MoH has also discussed the fortification of wheat flour given the likely ease of implementation.²⁵

Table 2: Coverage and availability of typical staple foods^a

U	, ,, ,
Staple food	Availability, 2013 (g/c/d)
Rice, raw milled	301
Wheat flour	101
Maize	14
Starchy tubers	28
Milk	96
Oil or added fat (including ghee)	9
Salt	Unknown
Sugar	155

a FAO. Food Balance Sheets 2013. Rounded to the nearest gram. http://www.fao. org/faostat/en/#data/FBS

Coverage: estimate of the population consuming the staple food; HIES surveys are a proxy for consumption so coverage here refers to the proportion of households reporting purchase of a given staple food. Availability: g/c/d: grams per capita per day

3.3 GOVERNMENT'S FORTIFICATION POLICIES AND STRATEGIES

Addressing malnutrition remains at the forefront of the government's development agenda. This is reflected in the establishment of the National Nutritional Secretariat Sri Lanka (NNSSL) within the Presidential Secretariat to coordinate the multi-sectoral nutrition responses within the country. Recognizing the need to address the slow improvement in under nutrition in women and children through a multi-pronged approach, the government launched an evidence-based Multi-Sector Action Plan for Nutrition (MSAPN) in line with the 2010 National Nutrition Policy, with the objective of implementing nutrition actions across seventeen ministries.²⁶

²² FAO Food Balance Sheets, 2013. Available at: http://www.fao.org/faostat/en/#data

²³ Department of Census and Statistic (2012). Income and Expenditure Survey.

²⁴ Sri Lanka, the emerging wonder of Asia. The development policy framework, Government of Sri Lanka. Department of National Planning, Ministry of Finance and Planning. 2010. Available at: https://www.adb.org/sites/default/files/linked-documents/cps-sri-2012-2016-oth-01.pdf

²⁵ Only two wheat flour mills exist in Sri Lanka: Prima Ceylon and Serendib, which means implementation of wheat flour is relatively much easier than rice, which has many mills island-wide.

²⁶ SUN countries, Sri Lanka. Available at: http://scalingupnutrition.org/sun-countries/sri-lanka

The National Strategic Review of Food Security and Nutrition 2017²⁷ noted that nutrition-specific essential actions²⁸ as recommended by WHO are being implemented in Sri Lanka, although there is a need to improve coverage and quality of these actions. Despite the significant efforts by the government, certain gaps remain. It was noted by the Strategic Review that while Maternal and Child Health programmes have proven to be effective for providing supplements as a targeted short term approach for high prevalence of MNDs such as iron, zinc, vitamin A and iodine,²⁹ very little has been done with regard to food fortification.

Fortification as a nutrition intervention has had a policy basis in Sri Lanka for several years, initiating with regulation for mandatory salt iodization in 1995 under the Food Act. A Food Fortification Committee has been in place since 2009 and a Food Fortification Technical Advisory Group was also established under the leadership of the Ministry of Health, with the membership of other stakeholders, including Ministry of Agriculture, United Nations partners, and academia, as required. Fortification has also been on the agenda of the Food Advisory Committee and the Maternal Child Health Committee. A National Food Fortification Policy Directions has been drafted and will be published in late 2017. There is political will within MoH in support of fortification as one of the key nutrition actions, however, further advocacy is required to established support and understanding on the benefit and safety of fortification amongst other stakeholders.

In March 2017, in collaboration with the World Food Programme (WFP) and Food Fortification Initiative, MoH held a National Food Fortification Workshop for Rice and Wheat Flour to develop a fortification work plan. The main purpose of the workshop was to identify the best way forward to scale up wheat flour and rice fortification in the country.

4. RICE LANDSCAPE ANALYSIS

4.1 **PRODUCTION**

Sri Lanka, with a population of 20.3 million³⁰ (2012), has an area of 6,561,000 ha, of which 2,740,000 ha (2014)³¹ are devoted to agriculture. The agricultural land is divided into two climate zones, wet in the southwest and dry elsewhere³². Arable land was 20 percent (1,300,000 ha) of the total land area in 2014.³³ Rice is one of the largest crops produced in the country, with an estimated 881,000 ha devoted to rice in 2014, or 32 percent of total agricultural area. Paddy production in 2015 was 4.8 million metric tons (mt), or almost 3.0 million mt of milled rice, assuming a 62 percent milling yield. Further, based on the data from rice, it represents almost 70 percent of the total cereals produced in the country in 2014 (2.4 million mt of milled rice out of the total 3.6 million mt cereals produced).³⁴

There are two cultivation seasons: Maha and Yala, which are synonymous with the two monsoons. Maha Season falls during "North-East monsoon" from September to March in the following year. Yala season is effective during the period from May to end of August. When the crop is sown and harvested during above periods, the particular season is defined.³⁵



Figure 4: Rice Production by districts

²⁷ South Asia Policy Research Institute (SAPRI) et al (2017). National Strategic Review of Food Security and Nutrition towards Zero Hunger. Colombo, Sri Lanka.

²⁸ The Lancet series of 2008 and 2013 and WHO recommended a series of essential nutrition-specific actions that could reduce infant and child mortality, improve physical and mental growth and development. WHO recommended essential nutrition action throughout the life cycle, with focus on the first 1,000 days. The actions include micronutrient supplementation during pregnancy, appropriate IYCF practices from birth to 2 years of age, appropriate management of acute malnutrition, and food fortification.

²⁹ http://siteresources.worldbank.org/SRILANKAEXTN/Resources/233046-1222978473355/ch4LKNutritionOct2008-2.pdf

³⁰ Government of Sri Lanka. 2012 Census and Statistics. http://www.statistics.gov.lk/PopHouSat/CPH2011/Pages/Activities/Reports/FinalReport/FinalReport.pdf

³¹ FAO STAT, Land Use. Available at: http://www.fao.org/faostat/en/#data/RL

³² Maclean, J. et al. Rice Almanac, 4th Ed. International Rice Research Institute. Available at: http://books.irri.org/9789712203008_content.pdf

³³ FAO STAT, Land Use. Available at: http://www.fao.org/faostat/en/#data/RL

³⁴ ibid.

³⁵ Maclean, J. et al. Rice Almanac, 4th Ed. International Rice Research Institute. Available at: http://books.irri.org/9789712203008_content.pdf

Out of the 25 districts in Sri Lanka, only six districts, namely Anuradhapura, Polonnaruwa, Ampara, Batticoloa, Kurunegala, and Hambantota have produced paddy with an average of 100,000 mt per year over the last twenty-five years. In fact, these six districts are responsible for more than 50 percent of the total annual domestic paddy production.³⁶

Although paddy is cultivated in all nine provinces in Sri Lanka, the Eastern, North Central, and North Western Provinces are responsible for the majority of production with mean annual production of 544,000, 463, 000, and 344,000 mt, respectively during the period of 1979 to 2003.

According to the Department of Census and Statistics, Sri Lanka has been self-sufficient in rice for most years between 2005-2015,³⁷ in fact producing a surplus in some years - 300 g/c/d on average for the 20.3 million population indicates national consumption needs are 2.2 million mt per year. The government provides support to rice farmers via a fertiliser subsidy (cash transfer of LKR 25,000/ha/yr), a programme that costs in total over LKR 37 billion per year³⁸.

4.2 RICE CONSUMPTION AND CONSUMER PREFERENCES

Several varieties of rice are consumed in Sri Lanka. Although there is no nationally representative dietary consumption data, rice is known to be a widely consumed staple food. According to the data from the Department of Census and Statistics 2012 - 2013, 33 percent of Sri Lankans purchase white Nadu rice, 21 percent purchase white Kekulu rice, and 21 percent purchase red Kekulu - together representing 75 percent of rice consumption in the country. The other 25 percent is spread out between Samba, Nadu red and others (Figure 4). Average household expenditure on rice was LKR 2,134 per month, representing 13 percent of the total household expenditure on food and drinks (LKR 15,651). Of note, the proportion of expenses for food is the highest in the estate sector (28 percent) followed by rural (17 percent) and then urban areas (13 percent). This indicates that among the poorer populations (concentrated in the estate sector and rural areas), a greater proportion of the household income in spent on rice.³⁹



Figure 5: Main types of rice and proportion consumed in Sri Lanka, 2012-2013^a

a Household Income and Expenditure Survey 2012/13, Department of Census and Statistics, GoSL

The type of rice consumed also differs by province. For instance, in the Northern Province, the most consumed type of rice is Nadu red, followed by Kekulu red, Samba and Kekulu white. This information further reflects the potential complexity when considering the types of rice to be fortified, given that no single type of rice is widespread across the districts.

³⁷ Self-sufficiency rate of rice, 2005-2015. Agriculture and Environment Statistics Division, Department of Census and Statistics. http://www.statistics.gov.lk/agriculture/ Paddy%20Statistics/PaddyStatsPages/SelfsufficiencyRateofRice.html

³⁶ Jayasinghe-Mudalige, U., (2010). An Economic Analysis on Spatial Integration of Regional Rice Markets in Sri Lanka. Sri Lankan Journal of Agricultural Economics. 8, pp. 50–65. DOI.

³⁸ Personal communication via email by Professor LHP Gunaratne of the University of Peradeniya.

³⁹ Department of Census and Statistic (2012). Household income and expenditure survey. Sri Lanka.

4.3 RICE SUPPLY CHAIN

According to the recent study on the value chain of rice paddy conducted by the Institute of Policy Studies,⁴⁰ locally produced paddy market channels follow two main circuits: The private sector channel and the public channel (6). The public channel is primarily operated by the Paddy Marketing Board (PMB), a government institution established under Parliament Act No. 14 of 1971.⁴¹

In comparison, a working paper on rice value chain published by Senanayake and Premaratne (2016)⁴² more specifically outlined the paddy marketing channels into five types – private collectors,⁴³ mobile traders,⁴⁴ private millers, PMB, and the Multi-purpose Cooperative Societies (MPCS).

The private sector is estimated to constitute 90-95 percent of the rice industry's market share.⁴⁵ The private sector includes paddy collectors, mobile traders, and millers and is estimated to handle 2.7 out of 3 million mt of domestically produced milled rice.

If the public sector, represented by PMB and MPCS, handles the remainder, then 10 percent of domestic production would indicate public sector procurement of 300,000 mt per year. 2016 records indicated PMB purchased approximately 18,864 mt of paddy from 10,325 farmers across the country;⁴⁶ MPCS procurement quantities are unknown.

Rice farmers

The majority of the Sri Lankan paddy farmers are small-scale producers who own less than two hectares of land.⁴⁷ Almost all the farmers sold their paddy to collectors in the villages and in close by towns - except in the Southern province, where a high proportion (75 percent) of farmers sold their paddy directly to the private rice millers. Thirty-three percent of farmers in the Eastern Province and 67 percent of farmers in the North Central province sold their paddy to PMB. Since PMB purchased a limited quantity, it is expected that the remaining paddy was sold to collectors.

Paddy collectors

There are two categories of paddy collectors – village collectors and town collectors.⁴⁸ Village collectors purchase paddy from farmers directly at the farm, saving them transport costs, whereas town collectors purchase rice from farmers or people bringing the paddy in to town for sale. Farmers often sold their paddy to both groups except in the North Central Province, where all paddy is sold to town collectors, and in the Southern Province where 25 percent of farmers sold their paddy to collectors and the rest was sold directly to millers.

On average, a collector purchases paddy from 65 farmers and sells the paddy largely to local millers (54 percent of the quantity purchased by collectors sold to town millers, followed by 27 percent sold to village millers), with a smaller proportion to millers outside of a given district (19 percent).

Rice millers

Rice mills purchase paddy directly from farmers as well as indirectly from collectors. The well-established large millers in areas with surplus production depend less on paddy collectors and have established links with directly with farmers.⁴⁹ The milled rice is usually sold to wholesalers, but also sometimes sold directly to retailers. Some of the private millers have their own sales outlets and also distribute rice through their own fleets of vehicles to other wholesalers or retailers.⁵⁰

⁴⁰ Institute of Policy Study, 2016 – Rice Value Chain Analysis, unpublished report.

⁴¹ Paddy Marketing Board, Ministry of Rural Economic Affairs. 2016. http://pmb.gov.lk/index.php?option=com_content&view=article&id=73&Itemid=228&Iang=en

⁴² Senanayake, S.M.P. and Premaratne, S.P. An Analysis of the Paddy/Rice Value Chains in Sri Lanka. University of Colombo, Sri Lanka. ASARC Working Paper 2016/04 https:// crawford.anu.edu.au/acde/asarc/pdf/papers/2016/WP2016_04.pdf

⁴³ Private collectors: include village boutique keepers and purchasers in the nearby town.

⁴⁴ Mobile collectors are the traders who come in Lorries or trucks to the producing areas from distant places to purchase paddy.

⁴⁵ Senanayake, S.M.P. and Premaratne, S.P. An Analysis of the Paddy/Rice Value Chains in Sri Lanka. University of Colombo, Sri Lanka. ASARC Working Paper 2016/04 https:// crawford.anu.edu.au/acde/asarc/pdf/papers/2016/WP2016_04.pdf

⁴⁶ Paddy Marketing Board. Ministry of Rural Economic Affairs. Paddy Purchasing Summary Information - 2016 Yala. http://pmb.gov.lk/index.php?option=com_ paddy&view=statistics&lang=en

⁴⁷ Senanayake, S.M.P. and Premaratne, S.P. An Analysis of the Paddy/Rice Value Chains in Sri Lanka. University of Colombo, Sri Lanka. ASARC Working Paper 2016/04 https:// crawford.anu.edu.au/acde/asarc/pdf/papers/2016/WP2016_04.pdf

⁴⁸ Institute of Policy Study, 2016 – Rice Value Chain Analysis, unpublished report.

⁴⁹ Institute of Policy Study, 2016 – Rice Value Chain Analysis, unpublished report.

⁵⁰ Senanayake, S.M.P. and Premaratne, S.P.An Analysis of the Paddy/Rice Value Chains in Sri Lanka. University of Colombo, Sri Lanka. ASARC Working Paper 2016/04 https:// crawford.anu.edu.au/acde/asarc/pdf/papers/2016/WP2016_04.pdf

Wholesalers

It is estimated that 75 percent of the wholesalers purchase rice from millers and the rest (25 percent) from the other wholesalers.

Wholesalers are based in central and municipal wholesale markets established in main cities. They maintain direct contact with large-, small-, and medium-scale millers. Large-scale millers supply the bulk of the milled rice to wholesalers, branded and unbranded. Branded milled rice sacks comes to the market in packages of different weight, most commonly 10 kg, 5 kg, 2 kg and 1 kg.⁵¹

<u>Retailers</u>

Retailers source rice through direct mill purchases (62 percent) or wholesalers (38 percent). There are several types of retailers, including village shops, cooperatives, welfare shops, supermarkets, and retail chains (e.g., Cargills, Keels, etc.). Retail chains purchase milled rice directly from branded large-scale millers or purchase milled rice from small and medium millers and may pack using their own brand. Established retailers, such as Cargill's Food City, operate their own rice mills to process their branded rice.⁵²

Institutional rice outlets

PMB and MPCS have paddy-purchasing points, where farmers bring their paddy for sale at fixed government prices. PMB mills process the paddy, but if there is excess then PMB will also contract private millers to process paddy. Milled rice from PMB is supplied to institutional buyers (e.g., armed forces, hospitals, etc.) and sold through the MPCS and private retailers. The rice milled by MPCS mills is sold through the MPCS network.⁵³

Figure 6: Value chains for paddy rice and milled rice in Sri Lanka^{a,b}



a IPS (2016), unpublished. b Senayake and Premaratne (2016) – an analysis of paddy/rice value chains in Sri Lanka – ASARC working paper

4.3.1 Rice milling

There are varying descriptions of the rice milling industry structure. The Institute of Post Harvest Technology (IPHT) within the Ministry of Agriculture (MoAg) recognizes five categories of rice mills (Table 3).⁵⁴ The estimates in Table 3 suggest that small-and medium-scale mills process 57 percent of rice, while large and leading mills process 33.8 percent, and the remaining rice is processed by custom mills (non-commercial mills utilized by subsistence farmers). These shares could change depending on actual utilization by the mills.

⁵¹ ibid.

⁵² ibid.

⁵³ Ibid and Institute of Policy Study, 2016 - Rice Value Chain Analysis, unpublished report.

⁵⁴ Presentation by Dissanayake, M. 2005, Institute of Post Harvest Technology, Ministry of Agriculture, Sri Lanka.

Table 3: Milling capacity of Sri Lanka^a

	Milling capacity (MT/d)	Number of mills	Total capacity (MT/d)	Total production (MT/yr)⁵	Percent share
Custom mills	0.4	5500	2200	330,000	9.3
Small mills	7.5	1000	7500	1,125,000	31.6
Medium mills	15	400	6000	900,000	25.3
Large mills	35	200	7000	I,050,000	29.5
Leading mills	50+	20	1000	150,000	4.2
Total	-	7,120	23,700	3.55 million MT	

a Presentation by Dissanayake, M. 2017. Institute of Post Harvest Technology, Ministry of Agriculture, Sri Lanka.

b A conservative estimate assuming that these mills only operate 150 days in a year.

About 40 percent of commercial mills (i.e., 648) use modern, state-of-the-art technology for rice processing, including for cleaning, de-stoning, de-husking, polishing and grading. The other commercial mills use traditional (steel hullers) or semi-modern type processors (rubber rolls and steel hullers).⁵⁵ The quality of milling equipment is reflected in the quality of milled rice, as modern equipment is more efficient (resulting in less broken rice grains) and able to sort rice by discolouration or misshapen grains, and remove debris. Lower quality mills have poorer milling yield ratios (i.e. less than 60 percent paddy produce whole head grains).

Some mills store paddy during harvesting season, but more likely, mills operate with day-to-day collection of paddy. Only large-scale millers with considerable storage capacity are able to reap the benefit of low paddy prices during harvesting period and then sell rice for higher prices during the off-seasonal lean period.

4.3.2 Imports

Although the end of the protracted war in 2009 contributed to greatly improving Sri Lanka's self-sufficiency in rice;⁵⁶ imports of rice still fluctuate from year to year. There may be some years where only 19,000 mt of rice is imported (as in 2013), and other years as much as 600,000 mt (2014) or 485,000 mt (2015) may be imported.⁵⁷ During 2012-2016, Pakistan and India provided 80 percent of the imported rice into Sri Lanka. An expected crop shortfall due to drought in 2017 has led the Government of Sri Lanka to enter into a memorandum of understanding with the Government of Myanmar to allow the import of 50,000 mt of rice by June 2017.⁵⁸ To ease the burden on rice imports during this period, the Ministry of Finance has reduced the rice import duty from LKR 15/kg to LKR 5/kg (from USD 96.79/mt to 32.26/mt)⁵⁹ on raw,⁶⁰ Nadu, and Samba varieties only. This is a large decrease in tax, as the import duty in 2016 was LKR 50/kg (USD 322.50/mt) – the duty effectively doubled the price of low-cost, internationally traded, white milled rice, which is traded in the range of USD 300-400/mt.

4.3.3 Exports

Rice exports from Sri Lanka also fluctuate with the sufficiency status. Rice exports were rare (or unreported) prior to 2005, but have increased since the end of the war.⁶¹ Export of Sri Lankan rice, however, is somewhat constrained by the limited demand in the international market for its unique varieties and relatively higher cost compared to neighbouring rice-producing countries. As such, the low quantities exported are likely to target specialty rice consumers and the Sri Lankan diaspora. During 2012-2016, a total of 59,185 mt was exported, or an average of 11,837 mt per year during that period, across a large number of importing countries (30-50). The United Kingdom and United Arab Emirates in several years were the main importers of Sri Lankan rice. The bulk of this rice was exported in 2016 (30,269 MT).⁶²

⁵⁵ ibid.

⁵⁶ Sri Lanka Milled Rice Imports by Year, 1960-2016. USDA via Index Mundi. https://www.indexmundi.com/agriculture/?country=lk&commodity=milled-rice&graph=imports

⁵⁷ UN Comtrade. https://comtrade.un.org/data/

⁵⁸ The Colombo Page News. Sri Lanka to import 50,000 MT of rice from Myanmar. February 2017. http://www.colombopage.com/archive_17A/Feb11_1486823862CH.php

⁵⁹ Economy Next. Sri Lanka cuts import tax on rice amid crop shortfall. January 30, 2017. http://www.economynext.com/Sri_Lanka_cuts_import_tax_on_rice_amid_crop_ shortfall-3-7197-9.html

⁶⁰ "Raw" is used to differentiate between non-parboiled and parboiled rice.

⁶¹ Sri Lanka Milled Rice Exports by Year, 1960-2016. USDA via Index Mundi. https://www.indexmundi.com/agriculture/?country=lk&commodity=milled-rice&graph=exports

⁶² UN Comtrade. https://comtrade.un.org/data/

4.4 PRICE, SEASONAL VARIABILITY

To make rice fortification a success, the fortification process should be economically viable and the increment in the price of rice should be acceptable for the consumer and the food industry. Therefore it is important to understand the market of rice and price fluctuation to assess whether the cost introduced by fortification will be within the acceptable range.63

In Sri Lanka, the government purchase price for paddy rice in early July 2017 ranged from LKR 38/kg to LKR 50/kg, with the highest price for Samba (short bold) variety rice and lowest for Nadu (medium and long grain) (Table 4).⁶⁴

Variety	PMB paddy price ^a (LKR per kg)	Milled rice retail prices in Colombo markets ^b Range between June 2016-2017	Percent fluctuation between June 2016-2017
Red rice (average)	n/a	65.45-88.61	35.4%
White rice (average)	n/a	70.72-83.81	39%
Samba	50 (83, milled rice equiv.)	92.48-101.16	8.6%
Keeri samba	41 (68, milled rice equiv.)	n/a	n/a
Nadu	38 (63, milled rice equiv.)	78-98.88 (red) 77.53-91.69 (white)	26% 18.3%

Table 4: Paddy and Colombo retail market prices for rice varieties

a Paddy marketing board. http://pmb.gov.lk/index.php?option=com_content&view=featured&Itemid=101&lang=en. Milled rice equivalent LKR per kg price calculated by assuming 60% milling yield (i.e. I kg of paddy = 600 grams of milled rice) b Open Market Weekly Average Retail Prices - 3rd week of June, 2017. Main markets in Colombo District. http://www.statistics.gov.lk/price/retail/DCSB-WRP-2017-

06-W3.pdf

Abbreviations: PMB, Paddy Marketing Board; kg, kilogram; wk, week

The Department of Census and Statistics tracks average weekly retail prices for key foods in Colombo (Table 4). Comparing average retail prices to PMB paddy prices indicates 21 percent miller margin - however this does not take into consideration the operational expenses. Prices of red rice on average were consistently lower compared to white rice during 2016 and 2017, but Nadu red rice in particular was more expensive than Nadu white rice, by LKR 0.5-7.5 during the same period. Although rice prices fluctuated minimally between two weeks in June 2017 (-1.5 to 2.7 percent), between June 2016 and 2017 prices rose by 7-39 percent. The high price increase in 2017 compared to 2016 may be attributed to the 2017 crop shortfall.65

Retail rice prices, however, typically rise and fall throughout the year. In general, retail prices of many rice varieties are low during the harvesting season, due to limited storage capacity of most millers, despite low-interest loans offered by the government to improve private sector storage capacity. Harvesting of Yala season falls between August and September and Maha season between February and March. Retail prices decline sharply during the harvesting time, particularly in production zones, and more markedly during the main Yala season than the Maha. Retail prices spike during the festive period in December and January (Christmas and New Year), but not during the traditional Sinhala and Tamil New Year, which falls just after the Maha season in April.

Short grain varieties (Samba) fetch higher prices compared to long grain varieties (Nadu). The southern part of Sri Lanka is famous for long grain varieties, especially red rice or Nadu, whereas more short-grain varieties are found in North, Central, and Eastern Provinces. Farm-gate prices are also affected by transportation costs - rice from regions such as Ampara and Dehiattakandiya are higher due to limited market access. Farmers with lower capital and resources to transport their rice to centralized paddy selling points or markets must rely on collectors, who come directly to the farm to purchase paddy.

Millers claim that consumer demand for rice has fallen due to competition resulting from consumption of other carbohydrate sources, such as wheat flour, bread, pulses, or other grains. There is low government intervention in paddy or milled rice storage. The Cooperative Wholesale Establishment (CWE) handles very small amount of paddy stocks

⁶³ Alavi, S, et al., (2008). Rice Fortification in Developing Countries: A Critical Review of the Technical and Economic Feasibility. USAID.

⁶⁴ Paddy Marketing Board, Ministry of Rural Economic Affairs. 2016. http://pmb.gov.lk/index.php?option=com_content&view=article&id=73<emid=228&lang=en

⁶⁵ The Sunday Leader. Sri Lanka To Import Rice. January 1, 2017. http://www.thesundayleader.lk/2017/01/29/sri-lanka-to-import-rice/

for its own processing. CWE also acts as a rice importer for government, but manages very limited stocks. As a result, national food security and rice prices are highly dependent on the timing of release of milled rice from private millers.

It is difficult to precisely determine the price increment expected for fortified rice. One possible entry point for rice fortification typically is at the point of milling (as is for wheat flour and maize flour). Estimates of incremental cost attributed to rice fortification vary from USD 10-40/mt for the cost of the fortified kernels alone.⁶⁶ Based on estimates secured from main suppliers in late 2012, the cost of the fortified kernels ranged from USD 2.00/kg to USD 2.70/kg delivered to major ports in Southeast Asia. This indicates a cost of USD 20-27/mt of fortified kernels.⁶⁷ If imported, the most likely fortified kernel sources would be within the region, including India, Bangladesh and China. Estimating another 10-15 percent in transportation cost, the suggested incremental related costs for fortified kernels is USD 23-31/ mt (mid-point is USD 27/mt). Based on the average PMB price of USD 462/mt (LKR 71,666/mt)⁶⁸, this could represent an incremental recurring fortificant cost to the miller of 5.8 percent.⁶⁹

Estimating the cost of fortification to consumers, an additional USD 27/mt to the retail price of rice could add LKR 4.18/kg, or 4-5 percent in addition to the prices in Table 4. It is not clear if the additional 4-5 percent would be considered an acceptable price increase for consumers, although it appears that consumers are used to frequent price changes through the year and prices between 2016 and 2017 alone have increased as much as 35 percent for some rice varieties. Other countries practicing mandatory rice fortification have reported retail price increases of approximately 1 percent.⁷⁰ A market survey needs to be conducted to evaluate the acceptability of consumers for purchasing the fortified rice at marginally increased cost.

4.5 KEY POLICIES AFFECTING THE RICE VALUE CHAIN IN SRI LANKA

4.5.1 Policies for rice production, import, and export

Compared to its neighbours, Sri Lanka is considered a relatively high-cost rice producer,⁷¹ as domestically produced rice is 25 percent higher than imported rice.⁷² As such, the government's past and present rice import and production policies are targeted for price stability and protecting rice farmers from cheaper rice in the region and are unlikely to change in the near future. To assist with price stability, the government provides farmer support during periods of depressed rice prices through subsidies and waiving or lowering import duties when there are shortages. However, analysts blame this policy for the resulting rice stockpiling during import waiver periods.⁷³

While it appears that industrial milling of domestically grown rice is growing quickly, and already 90 percent of rice domestically produced is sold commercially, small- and medium-scale mills do the bulk of rice processing in Sri Lanka although they may not be operating efficiently. IPHT attributes Sri Lanka's higher production costs to the existing milling industry's low productivity (milling yields at 62-65 percent compared to 69 percent as a benchmark).⁷⁴ IPHT has an existing programme to work with 100 rice mills throughout the country to modernize operations. As lack of capital to upgrade mills was cited as the main barrier, MoAg has developed a credit-lending scheme to target rice millers.

Building demand for Sri Lankan rice exports may help modernize rice milling further but unpredictable rice surpluses from year to year affect the country's ability to be a consistent rice exporter. The price fluctuations between the harvest and lean periods, as well as high estimated losses (10 %),⁷⁵ suggest that increased storage capacities at both the miller and farmer levels would improve supply (and thus price) stability.

Given the protectionist rice import policies of the government, there needs to be agreement whether fortified kernels fall as a food additive, food, or medicine, and what category is most appropriate given the associated import duties. The Food Control Administration Unit of the Environmental, Occupational Health and Food Safety is responsible for food control in Sri Lanka.

⁶⁶ Personal communication to FFI in 2015-2017 from development partners purchasing fortified kernels and from fortified kernel suppliers.

⁶⁷ The higher costs obtained from DSM (Nutririce) and lower costs obtained from Swagat Foods in India, (producing for PATH's Ultrarice).

⁶⁸ Using OANDA rate of LKRI = 0.00645 USD on 4 July 2017. https://www.oanda.com/currency/converter/

⁶⁹ Note that at 1% addition, pure rice value of fortified kernel is \$4.41. If this is taken into account, it suggests a lower added cost of 4-5%.

⁷⁰ Tacsan, L.C., et al. Rice fortification in Costa Rica: a case study. Sight and Life, 2014. - http://www.sightandlife.org/fileadmin/data/Magazine/2015/29_1_2015/SAL_WFP_Suppl.pdf

⁷¹ Karunagoda, K. et al. Sri Lanka – Agricultural trade policy issues. http://www.fao.org/docrep/014/i2305e/i2305e14.pdf

⁷² Institute of Post Harvest Technology. Modernization of rice processing centres to produce high quality rice. http://ipht.lk/Main%20Activities/Rice%20mills.html

⁷³ Karunagoda, K. et al. Sri Lanka – Agricultural trade policy issues. http://www.fao.org/docrep/014/i2305e/i2305e14.pdf

⁷⁴ Institute of Post Harvest Technology. Modernization of rice processing centres to produce high quality rice. http://ipht.lk/Main%20Activities/Rice%20mills.html

⁷⁵ Presentation by Dissanayake, M. 2005, Institute of Post Harvest Technology, Ministry of Agriculture, Sri Lanka.

5 RICE FORTIFICATION IN SRI LANKA

5.1 POTENTIAL DELIVERY OPTIONS

Generally, delivery options of fortified rice can be classified into three categories,⁷⁶ namely:

- **Mandatory fortification:** When legislation or food regulations are incorporated, mandating fortification of all rice for human consumption. This option would ensure the widest reach to address micronutrient deficiencies across the island. However, to be implemented, it requires a consolidated rice industry, considerable political will and leadership, and industry participation to create and enforce the necessary legislation and monitoring system.
- Voluntary fortification: Fortification is voluntary when the private food industry has an option whether or not to fortify products. Voluntary fortification is a business-oriented approach with fortified food products marketed as "value-added" products, often targeted to specific markets or consumers. The potential for impacting a population's micronutrient health through voluntary rice fortification is dependent upon industry uptake, consumer demand, and market share of companies. Positive impact of reducing micronutrient deficiencies through rice fortification would be dependent upon the reach of fortified products and the number of consumers, especially among the socio-economic groups that are most prone to malnutrition.
- Fortification of rice distributed through social safety nets: Fortified rice may also be distributed through social safety nets, such as school feeding programmes, distributions to the poor or vulnerable groups, food for work programmes, and food aid during emergency situations. Fortifying rice distributed in social safety net programmes reaches the most vulnerable populations, and thus has the potential to make a significant impact on public health. Social safety net fortification can be implemented together with mandatory or voluntary fortification. It can also function as a catalyst to drive private sector investment and the introduction of fortified rice through commercial distribution channels.

5.1.1 Mandatory fortification

A major shortcoming of the current available data is the lack of certainty around the private rice milling industry. While it is promising that apparently a high proportion of the domestically produced rice in Sri Lanka enters the commercial marketplace (90.7 percent), more than half of that rice is milled by a large number of small-medium scale mills.

Although mill size and number estimates are available, the market shares of large and leading mills are highly dependent on production estimates that should be verified by government's institutions with the mandate to monitor rice millers such IPHT. Assuming that fortification in small-medium mills is difficult due to limited capacity and technology, about 220 large and leading mills are capable of fortification, or only 33.8 percent of domestic rice production (1.2 million mt). Assuming 300 g/c/d consumption, this volume of rice would cover 4 million people in Sri Lanka.

The feasibility of mandatory rice fortification highly depends on the verification of the domestic milling structure. If the volume of industrially milled rice is 1.2 million mt in Sri Lanka, then this is a substantial quantity of rice that could warrant at least one fortified kernel manufacturing facility. However, it is likely that industrially produced rice is most frequently purchased by discerning urban consumers who highly value rice quality over price.

5.1.2 Social safety net programmes

In Sri Lanka, the social protection system consists of a range of policies and programmes that are implemented by the government and are targeted toward various vulnerable groups including the poor, elderly, disabled, internally displaced persons, children, and women. The modes of transfer of assistance vary from cash and in-kind transfers to education programmes, pensions and other retirement benefits, healthcare assistance, micro-insurance, and livelihood development programmes (Figure 6). Social protection can be broadly categorised as: (i) social insurance; (ii) social assistance; and (iii) active labour market programmes.⁷⁷

⁷⁶ Codling, K. et al. Identifying Appropriate Delivery Options for Fortified Rice, Sight and Life, 2014. - http://www.sightandlife.org/fileadmin/data/Magazine/2015/29_1_2015/ SAL_WFP_Suppl.pdf

⁷⁷ Tilakaratna, G. (2014). Social protection and the MDGs in Sri Lanka: Implications for the Post-2015 Agenda. Southern Voice Occasional Paper 12.

Although several social assistance programmes exist in Sri Lanka, few include food transfer, particularly rice.⁷⁸ Based on the information listed in the Annex, only the school meal programme supported by WFP involves rice. There are two existing modalities of the school meal programme in Sri Lanka: the first being managed by the Ministry of Education, providing cash worth LKR 23 per child/month to 7,900 schools (1.13 million students) in 20 districts, with students from Grades 1-5 in the country; and the second is also managed by the Ministry of Education with WFP assistance for providing 2,500 mt/year of rice to 160,000 students in Grades 1-9 in 946 schools in five districts.^{79,80}



Figure 7: Government of Sri Lanka social protection programmes

In the main government school meal programme, cash is provided to local caterers to purchase food commodities from the market. On the other hand, within WFP-supported school meals programme, rice is provided as in-kind commodity, providing 2,500 mt of rice per year. Rice is stored at a government warehouse in Colombo; when requested by WFP the rice is dispatched to the target district.⁸¹

The food allowance programme for pregnant and lactating women by the Ministry of Women and Child Affairs (not listed in the table in Annex) provided 5kg of rice per person each month; however, as of May 2016, the food basket has been replaced by a voucher system.

Although there are a number of other government subsidy programmes, these do not involve rice or food distribution, and as a result, are not as easily adapted to include fortified rice.

5.2 POLICIES FOR FORTIFICATION

There are no existing standards for fortified rice or fortified kernels, thus, regulations would have to be introduced prior to any fortification activities. Regulations are essential to ensure that adequate and safe levels of necessary vitamins and minerals are added to address the nutrition situation in Sri Lanka. The Food Advisory Committee (FAC), an inter-ministry committee under the Chief Food Advisor and chaired by the Director General of Health, is responsible for developing mandatory food fortification regulations that would fall under the Food Act. The Minister of Health is responsible for seeking Cabinet approval of a subsequently gazetted regulation.

If a social safety net is identified for fortification, a cabinet paper must be developed to introduce a policy of fortification for the identified programme. The NNSSL under the President's office and the relevant Ministry responsible for the programme would collaborate on these actions.

⁷⁸ ibid.

⁷⁹ Jaffna, Kilinochchi, Mullaitivu, Mannar, and Vavuniya.

⁸⁰ WFP Country Profile 2016-2017.

⁸¹ Information provided to WFP country office from Ministry of National Policies and Economic Affairs, which owns the warehouse at which rice is stored for the WFP-assisted school meals programme.

5.3 FORTIFIED KERNELS SUPPLY

The milling sector in Sri Lanka is undergoing modernization, but the majority of rice milled in the country is still not done on an industrial level. Given the circumstances, and the lower potential volumes of rice that is fortifiable in the near future in Sri Lanka, it would be prudent for the country to consider importation of fortified kernels as opposed to immediate investment in local capacity to produce fortified kernels in-country. Fortified kernels constitute only I percent of fortified rice and importation of kernels and blending these with local rice would likely be the most economical solution. Relatively low levels of investment and the simplicity of the blending process does make local blending a feasible option in Sri Lanka. Neighbouring South Asian Association for Regional Cooperation (SAARC) countries with fortified kernel manufacturing capacity include India and Bangladesh.

Although many rice producing countries consume several varieties of rice, in Sri Lanka these varieties are also very visually distinct from each other. Currently it's not known what proportion of fortifiable rice (i.e. industrially milled) is sold in the marketplace as red rice, raw white rice, or parboiled rice. As a result it is not clear what the volumes of varieties of fortified kernels are necessary. Consumer testing may be required to identify whether a universal fortified kernel could be blended across these varieties of rice.

An important consideration of any blending operation for Sri Lanka must ensure there is minimal additional handling and transportation of the rice with which the fortified kernels need to be blended. Transportation costs rapidly become a major contributor to the overall price of rice, especially given the irregular and at times poor transport infrastructure in the country. Analysis in other countries has highlighted the importance of optimal supply chains for fortified kernels and fortified and non-fortified rice in order to minimise costs.

5.4 CONSUMER AWARENESS AND ACCEPTANCE

Rice consumption is deeply ingrained in Sri Lankan culture. As discussed previously, several types of rice are consumed in Sri Lanka depending on geographical region. It is therefore, important to have a good understanding of the different preferences and how this may impact the willingness of consumers to accept fortified rice. A good consumer acceptance or the possibility of influencing consumer tastes and behavior is a crucial enabling factor for the use of fortified rice, irrespective of whether the distribution is done through government-run safety net programs or through a market based approach.⁸²

An assessment on the consumer preference for various rice attributes, indicated that rice purity was the most important feature for 2 in 5 people interviewed (38 percent), whereas price was considered the least important (4.5 percent), indicating that people are not price sensitive for essential commodities such as rice.⁸³ The type of rice (raw, Nadu or Samba) was also a relatively important attribute (35.63 percent) determining the preference, and this depended on the geographical location of the consumer.

Consumers are often not very aware of the benefits of fortification of staple foods; however, according to Beretta et al (2012), it is also uncertain how aware they need to be.⁸⁴ Mandatory fortification of staple foods has been successful in many countries for a variety of products without most consumers having had an adequate understanding of its benefits. Consumer knowledge of the benefits of fortification may be limited, even among the educated strata of the population.⁸⁵ In Sri Lanka, given the limited availability of fortified foods in the marketplace, specific data on the current knowledge and perception does not exist. However, in a study conducted by De Zoyza et al (2014)⁸⁶, which aimed at assessing consumers' knowledge, attitude and habits in relation to functional foods, it was found that most of the people participated in the study reported not having enough knowledge on nutrition (84 percent). Fifty-eight percent of female and 41.7 percent of male respondents indicated their preference to get food components from natural food items.

⁸² Piccoli, N.B., et al (2012). Rice fortification: Its potential for improving micronutrient intake and steps required for implementation at scale. Food Nutr Bull. 33(4): S360-72.

⁸³ B.R. Walisinghe and L.H.P. Gunaratne (Unknown year). Consumer Preferences for Quality Attributes of Rice: A Conjoint Analysis. http://www.slageconr.net/sjae/sjae101f/ sjae10102.pdf

⁸⁴ Piccoli, N.B., et al (2012). Rice fortification: Its potential for improving micronutrient intake and steps required for implementation at scale. Food Nutr Bull. 33(4): S360-72.

⁸⁶ De Zoyza. et al. (2014). An assessment of consumers' knowledge, attitudes and habits in relation to functional foods. In Proceeding(s) of the SAITM Research Symposium on Engineering Advancements, pp. 192-196, 2014.

Based on the initiative to introduce fortified rice for the pilot project in Kilinochchi district by MoH, with the support of WFP in October 2016, it appears that several myths around fortification remain an issue to acceptance. Some participants attending the workshop expressed mistrust of the non-natural ingredient being added to rice. However, this is not unique to Sri Lanka. In a study conducted in Australia by the Social Research Institute for the Food Standards⁸⁷ it was found that vitamins and minerals added to foods were sometimes included in this category of unhealthy ingredients. The study also found that some consumers mistrust the motivations of food producers in including vitamins and minerals in foods and consider fortification as a technique to market unhealthy foods as healthy.

In light of the existence of negative perception on rice fortification in Sri Lanka, communicating with the public regarding food fortification should be treated with caution as this issue showed evidence of provoking strong negative sentiments. In the study by De Zoyza et al (2014)⁸⁸, it was found that the main source of nutrition information is through media (64 percent) and health staff (54 percent) and only 44 percent of the respondents relied on internet as their source of information. Given the strong effect that the media can have on public opinions in the domain of food safety and nutrition also mean that negative reporting could quickly affect acceptance of fortification. Therefore, it would be important for the MoH and its partners to develop an effective awareness and information dissemination strategy for rice fortification to proactively prevent any negative sentiments that may arise.

6. RECOMMENDATIONS FOR RICE FORTIFICATION

The Ministry of Health has been discussing fortification for several years, and because of the strong cultural preference for rice as a staple grain, rice is the most viable option for mass fortification. In recent years, various committees such as the Food Advisory Committee, Food Fortification Committee, and Maternal Child Health Committee have openly discussed next steps for fortification. An outcome of the March 2017 National Food Fortification Workshop is that roles and responsibilities in the government have been identified and a decision has been made to prioritize identifying a social safety net programme to begin rice fortification implementation.

However, significant considerations for fortification remain due to the cultural perception of rice and distrust of fortification process would require addressing. The current socio-political environment inhibits private sector from adopting rice fortification as well as the creation of enabling environment to fortify in a safe and efficient manner (both on a mandatory and voluntary basis).

Although Sri Lanka is an attractive market for rice fortification (high nutritional need, high rice consumption, broad population coverage), the complexity of introducing it into the country is high. The key recommended next steps to progressing rice fortification could include, but are not limited to:

- 1. Policy Framework and Coordination: Establish coordinating bodies to implement food fortification and ensure cohesive policy framework. Specific steps are for:
 - The Ministry of Health to issue regulations that establish standards for fortified rice and fortified kernels. These standards would have to be introduced prior to any fortification activities to ensure that adequate and safe levels of necessary vitamins and minerals are added.
 - The Nutrition Steering Committee to coordinate the implementation of the rice and wheat flour as articulated in the National Food Fortification Workshop workplan.
 - A multi-sectoral coordination platform for fortification activities between ministries needs to be established.
- 2. Voluntary fortification of rice should continue to be permitted and encouraged amongst local millers. While mandatory fortification is a preferred option to ensure maximum public health impacts, in Sri Lanka there is a highly fragmented milling landscape that is difficult to regulate and gaps in knowledge around industrial rice milling. Mandatory fortification could be explored at a later stage after initial adoption of rice fortification.

⁸⁷ Consumer Awareness, Attitudes and Behaviors to Fortified Foods, prepared for Food Standards Australia New Zealand. Ipso-Eureka. February 2010. https://www. foodstandards.gov.au/publications/Documents/Fortification%20report%20-%20qualitative.pdf

⁸⁸ De Zoyza. et al. (2014). An assessment of consumers' knowledge, attitudes and habits in relation to functional foods. In Proceeding(s) of the SAITM Research Symposium on Engineering Advancements, pp. 192-196, 2014.

Current estimates suggest that approximately 33.8 percent of the domestically grown rice in Sri Lanka (1.2 million mt) could be fortified in industrial rice mills and this would cover approximately 20 percent of the population (4 million individuals). The largest mills are easy entry points to achieve voluntary fortification but might not reach vulnerable households that would benefit from fortification the most. Specific steps are to:

- Conduct a survey of the milling industry through IPHT, and monitor changes that may improve feasibility for mandatory fortification.
- Identify the proportion of industrially milled rice that is red rice, raw white rice, and parboiled rice, as each may require separate fortified kernels.
- Carry out a market survey to evaluate the acceptability of consumers for purchasing the fortified rice at marginally increased cost.
- 3. Social safety net programmes that provide food assistance should be utilized to deliver fortified rice, where possible. Although SSN programmes can be good delivery mechanisms, under the current circumstances most do not operate using existing in-kind food distribution (except for a school meal programme operated under WFP).

The government operated school feeding programme and PLW food packages are potential delivery channels but would have to be adapted to provide fortified rice directly or through existing cash-based or market interventions. If the Ministry of Education's school feeding programme was adapted so that vouchers or cash transfers were used to deliver fortified rice then 16,950 mt/annum of rice could reach 1.13 million children a month. Current estimates suggest that 2,500 mt/annum of rice could be fortified through WFP's school feeding programme, which would cover 160,000 students. In order to determine whether these recommendation is feasible, next steps would be:

- For the Ministry of Health and TAG to work with the Ministry of Education and Ministry of Women and Child Affairs to understand the rice markets in beneficiary communities and whether the cash or voucher systems could be adapted.
- To collect further information on the potential scale that could be reached through the Ministry of Women and Child Affairs' cash/voucher system for pregnant and lactating women.
- For the Ministry of Health in close coordination with relevant ministries to submit a cabinet paper for approval to introduce a policy of fortification for the identified SSN programme.
- 4. Improve advocacy and communication to build a broader understanding of the positive understanding of food fortification and confronts negative misconceptions amongst key stakeholders and the general public. To initiate this effort, specific steps would be:
 - For the Technical Advisory Group to advocate with key stakeholders to establish support and understanding on the benefits and safety of fortification.
 - For the Ministry of Health to develop an awareness and information dissemination strategy for rice fortification, in close collaboration with the Ministry of Industry and Commerce and other relevant stakeholders including private sector.
 - Government to launch a certification system to promote health benefits of fortified foods, which would encourage private sector participation and demonstrate government support.

7. ANNEX

Programme	Institution	Beneficiary	Benefit	Beneficiaries	Expenditure
		Type	Level	in 2011	in 2011
					(Rs. Million)
School	Ministry of	All students in government	Free textbooks	3,410,280	2,200*
textbooks	Education	schools and Pirivens	each year	(students)	
		(Grades 1-11)			
School	Ministry of	All students in government	Free uniform	3,994,813	1,260*
uniforms	Education	schools	material each	(students)	
			year		
School and	Sri Lanka	All students in government	Subsidised bus	2,373,120	2,436*
higher	Transport	schools, Pirivens and	tickets at 10 per	(students)	
education	Board,	universities	cent of the cost		
bus season	Ministry of		per ticket		
tickets	Transport				
Grade 5	Ministry of	Students from low-income	Rs. 5,000 per	45,019	225*
scholarship	Education	households who pass the	year until end of	(students)	
		Grade 5 Scholarship Exam	senior secondary		
			education		
Mid-day	Ministry of	Students of primary and	Mid-day meal	1,117,219	2,486*
meal	Education	secondary schools in			
		Grades 1-5 in selected			
		rural areas and students in			
		special education			
Thriposha	Ministry of	All pregnant and lactating	Two take-home	873,509	980*
	Health	mothers for first six	packs of		
		months as well as infants	Thriposha		
		and children aged 6-59	(cereal) once a		
		months deviating from the	month		
		normal weight and those			
		whose growth is faltering			
Food for	Ministry of	Students in Grades 1-9 in	Cooked meals at	170, 433	457
Education	Economic	selected schools	school		
	Development				
Mother and	Ministry of	Pregnant and lactating	Corn soya blend	197,762	230
child health	Economic	mothers as well as children	ration per		
nutrition	Development	under 5 years of age in	person per		
		selected areas	month		
Fresh milk	Ministry of	Children aged 2-5 years in	Rs. 200 per child	78,329	191*
for nursery	Child	the low-nutrition areas	for 25 days a		
children	Development		month in		
	and Women's		selected		
	Affairs		nurseries		

Table 5: Key social protection programmes for children and women in Sri Lanka

Source: Tilakaratna, G (2014). SOCIAL PROTECTION AND THE MDGs IN SRI LANKA Implications for the Post-2015 Agenda. Southern Voice Occasional Paper 12.

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The United Nations Sustainable Development Goals Fund (SDG-F) is an international multi-agency and multi-donor development mechanism created in 2014 by UNDP with an initial contribution from the government of Spain to support sustainable development activities through integrated and multidimensional joint programmes. The main objective of the SDG-F is to bring together UN agencies, national governments, academia, civil society and business to address the challenges of poverty. The SDG-F Joint Programme for "Scaling Up Nutrition through a Multi-Sector Approach" is implemented by the World Food Programme and the Food and Agriculture Organization of the United Nations together with the Government in Sri Lanka.

