Landscape Analysis for Rice Fortification

Summary of results

Introduction

To create viable, sustainable and cost-effective rice fortification programs, key factors such as rice industry structure, standing policies and regulations and political will, among others, must be identified and studied before a formal process of development and implementation is initiated. That is why carrying out a Landscape Analysis for Rice Fortification should be the first step in introducing, implementing and carrying out a fortification strategy that considers all the key aspects for decision-making by the government, the private sector, and civil society.

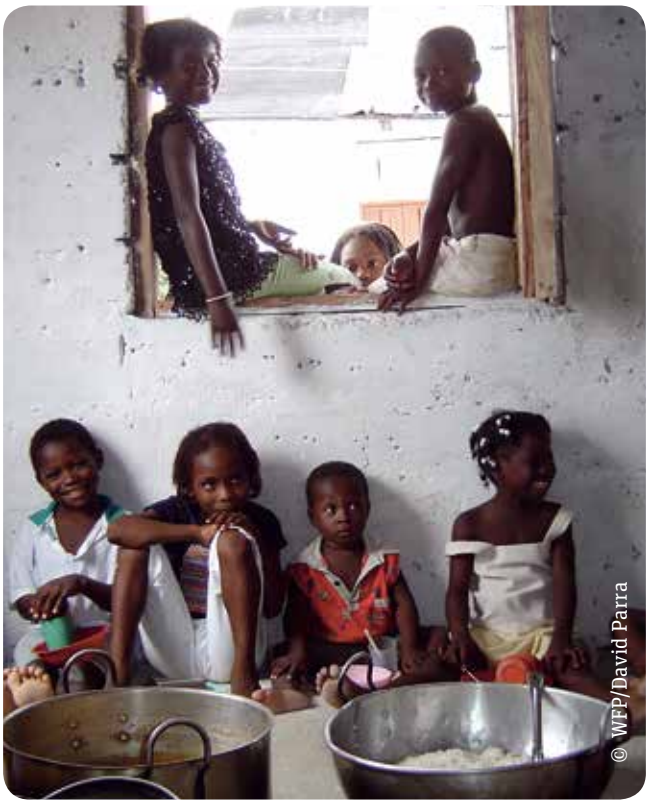
A situation analysis should, at minimum, determine the most viable delivery channels; how to integrate the fortification steps into the rice supply chain; how to create, adapt or improve public policies and existing regulatory frameworks; the estimated costs relative to the strategy's public health impact; and the key stakeholders to be included in the process.

With the objective of informing the group work carried out during the *Scaling Up Rice Fortification in Latin America and the Caribbean* (see page 212 for full workshop report), a Landscape Analyses was commissioned for each participating country. Each profile considered and sought to include all the key components recommended by Yusufali et al in the series on rice fortification in Asia, which precedes this supplement.[1]

Overall, the profiles provide a wealth of information on the situation for rice fortification in the region, but they also have their limitations. The multiple information gaps at the country level and the lack of precision or updating of the data is evident. None of the countries have all the necessary information recommended first hand. It is also important to note that national percentages sometimes hide a much more worrying nutritional reality among the most vulnerable populations.

Despite the above constraints, data collection – commissioned by the Regional Office of the World Food Programme (WFP) – lays the foundation for initiating country-level discussions for, and building on, rice fortification.

The following is a summary of some key data for each country; complete profiles can be requested through: **rebrand.ly/Country-Profiles**



Children waiting for their lunch, Choco Colombia 2004

Colombia

Nutrition situation

Chronic malnutrition in children under 5 years	13.2%
Anemia	**By age group (%)**
6–11 months	59.7
6–59 months	27.5
Women of reproductive age	17.9
Vitamin A deficiency (1–4 years of age)	24.3%
Zinc deficiency (1–4 years of age)	43.3%

Source: Colombian Family Welfare Institute. National Survey of Nutrition Status in Colombia (ENSIN) 2010. Bogota. 2011.

Government/public sector programs for fortification of food and complementary foods

Mandatory fortification programs	Salt › *Fortificants:* Iodine, fluorine
	Wheat flour › *Fortificants:* Vitamin B_1, B_2, B_3, iron
Fortification of specific foods	Bienestarina[a] › *Fortificants:* Vitamins A, D, C, B_1, B_2, B_3, B_6, B_{12}, folic acid
	› *Minerals:* Iron, zinc, calcium, copper, n-3 fatty acids
	› *Population:* Children 6–36 months
	Fortified milk and biscuits › *Fortificants:* Folic acid, iron, zinc
	› *Population:* Children 6–59 months
Supplementation programs	Micronutrient powders › *Fortificants:* (UNICEF/WFP 15-micronutrient
	formula) vitamins A, D, E, C, B_1, B_2, B_3, B_6, B_{12}, folic acid
	› *Minerals*: Iron, zinc, copper, selenium, iodine
	› *Population:* Children 6–59 months

[a] Fortified complementary food

Fortified foods in the commercial market

› Bread	› Margarine
› Pastas	› Vegetable oils
› Crackers	› Fruit juice
› Rice *	› Drinks with juice
› Pasteurized milk	› Instant drinks
› Powdered milk	› Drinks for athletes
› Milk drinks	› Dietary foods
› Yogurt	› Breakfast cereals
› Yogurt drinks	› Vegetable mixes
› Milk substitute drinks	› High protein foods
› Child formula	› Nutrition bars

* Currently about 35% of rice consumed in the country is voluntarily fortified by industry using spray technology, of which the micronutrient retention, stability and efficiency are not known.

Social protection programs that deliver rice

None

Legislative framework for rice fortification

None

Rice consumption patterns

% who consume it daily: **96.0%**

Consumption per person per day (in g): **106**

Annual per capita consumption (in kg): **40**

Characteristics of the rice industry

Rice production (in tons): **2,091,517**

Cultivation yield (t/ha): **4.16–5.7**

Number of mills: **83**

Area planted with rice (ha): **478,878**

Imports (t)*: **680,013**

Source

Camilo Rozo, MSc, PhD, CFS, Landscape Analysis for Rice Fortification: Colombia. Report presented to the World Food Programme Regional Bureau for Latin America and the Caribbean. Link to full profile: **rebrand.ly/Country-Profiles**

* Contraband rice is a challenge in Colombia. It is estimated that it represents 24% of the rice consumed.

Cuba

Nutrition situation

Chronic malnutrition in children under 5 years	–
Anemia	**By age group (%)**
6–11 months	41.4
6–59 months	29.5
Pregnant women	21.6
Pregnant women	8.5 %
Zinc deficiency (1–4 years of age)	–

Source: Food and Nutrition Surveillance System (SISVAN).

Government | public sector programs for fortification of food and complementary foods

Mandatory fortification programs	Salt › *Fortificants:* Iodine
	Wheat flour › *Fortificants*: Vitamins B_1, B_2, B_3, $B_{6,}$, $B_{12,}$ folic acid, iron
Fortification of specific foods	Powdered milk › *Fortificants:* Iron and zinc for every 1000 mL
	› *Population:* Children under 7 years of age
	Fruit puree › *Fortificants:* Iron, ascorbic acid for every 100 g
	› *Population:* Children 6–36 months
	Soy yogurt › *Fortificants:* Calcium | *Population:* Children 7–13 years
	Fortified soy milk › *Fortificants:* Vitamin A
	› *Population:* Older adults over 65 years of age
	Materlac[a] › *Fortificants:* Vitamins A, D, E and B-complex, iron, zinc, copper
	magnesium, manganese, calcium, phosphorus, sodium and potassium
	› *Population:* Pregnant women at risk of malnutrition
	Lactosan[b] › *Fortificants:* Vitamins A, D
	› *Population:* Breast milk substitute
Supplementation programs	Prenatal supplement › *Content:* Iron, folic acid, vitamin A, vitamin C
	› *Population:* All pregnant women
	Iron and folic acid supplement (Mufer)
	› *Content:* Iron, folic acid
	› *Population:* Pregnant women at risk of malnutrition
	Iron drops (Forfer) › *Content:* Iron, folic acid
	› *Population:* Children 6–60 months

[a] Fortified cereal, [b] Fortified cereal/complementary food

Fortified foods in the commercial market

Information not available

Social protection programs that deliver rice

3.18 kg /month of subsidized rice are distributed to the entire population in the family basket and also through social safety nets with different consumption standards.

Legislative framework for rice fortification

None

Rice consumption patterns

% who consume it daily: : **–**

Consumption per person per day (in g): : **–**

Annual per capita consumption (kg): **70**

Characteristics of the rice industry

Rice production (in tons): **–**

Cultivation yield (t/ha): **3.2**

Number of mills: **34**

Area planted with rice (ha): **120,000**

Imports: **50%** of the rice for human consumption

Source: Armando Rodríguez, Landscape Analysis for Rice Fortification: Cuba. Report presented to the World Food Programme Regional Bureau for Latin America and the Caribbean.

Link to full profile: **rebrand.ly/Country-Profiles**

Guatemala

Nutrition situation	
Chronic malnutrition in children under 5 years	46.5%
Iron deficiency	**By age group (%)**
6–11 months	80.1
6–59 months	18.6
Women of reproductive age	14.3
Pregnant women	31.9
Vitamin A deficiency (children under 5)	0.3
Zinc deficiency (children under 5)	25–38.6%

Source: MSPAS. National Micronutrient Survey 2009–2010 (ENMICRON). Guatemala; 2012

**Government	public sector programs for fortification of food and complementary foods**	
Mandatory fortification programs	Salt › *Fortificants:* Iodine
	Wheat flour › *Fortificants:* Iron, vitamins B_1, B_2, B_3, folic acid
	Corn flour › *Fortificants:* Vitamins B_1, B_2, B_3, B_{12}, folic acid, iron, zinc
	Sugar › Vitamin A
Fortification of specific foods	Vitacereal[a] › *Fortificants:* Vitamins A, C, D, E, B_1, B_2, B_3, B_5, B_6, B_7, B_{12}, folic acid, iron, zinc, iodine, calcium
	› *Population:* Pregnant women, nursing mothers and children aged between 6 and 35 months living in municipalities with malnutrition rates above 65%
	Super Cereal plus (My little food)[b] › *Fortificants:* Vitamins A, C, D, E, B_1, B_2, B_3, B_5, B_6, B_7, B_{12}, folic acid, iron, zinc, iodine, calcium, potassium, phosphorus, magnesium, copper, manganese, selenium

Fortification of specific foods	› *Population:* Children 0–2 years old, pregnant and lactating women in the districts of Totonicapán, Sololá and Chimaltenango
	Incaparina[c] › *Fortificants:* Vitamins A, D, K, B_1, B_2, B_3, B_{12}, folic acid, iron, zinc, iodine, calcium
	Bienestarina[d] › *Fortificants:* Vitamins A, B_1, B_2, B_3, B_{12}, folic acid, iron, zinc, calcium
	Peanut +[e] › *Fortificants:* Vitamins A, C, D, E, B_1, B_2, B_5, B_6, B_{12}, folic acid, iron, zinc, iodine, calcium, potassium, phosphorus, magnesium, copper, manganese, selenium
Supplementation programs	Iron › *Population:* Children 6 months to 5 years, children of 5 –10 years, adolescents, pregnancy and postpartum
	Folic acid › *Population:* Children 6 months to 5 years, women of childbearing age, pregnancy and postpartum
	Micronutrient powders › *Population:* Children 6 months to 5 years (replacing iron and folic acid)
	Vitamin A › *Population:* Children 6 months to 5 years

[a] Fortified complementary food

[b] Fortified blended food

[c] Beverage made of corn flour and soy flour fortified with vitamins and minerals

[d] Fortified complementary food

[e] Nutritional supplement

Fortified foods in the commercial market

Information not available

Social protection programs that deliver rice

None

Legislative framework for rice fortification

Micronutrients to be used in rice fortification per the Central American Regulation Model – El Salvador, Guatemala, Nicaragua, Honduras and Costa Rica

Nutrients	Minimum levels of micronutrients in rice *	Minimum levels of micronutrients in the chemical compound of the nutrient to be used in rice fortification *
Iron	14.0 mg/kg	Iron bisglycinate
Selenium	256.0 µg/kg	Sodium selenite
Vitamin B_1	6.0 mg/kg	Thiamine mononitrate (5.3 mg/kg)
Vitamin B_3	51.0 mg/kg	Niacinamide
Vitamin B_6	5.6 mg/kg	Pyridoxine
Vitamin B_9	1.8 µg/kg	Folic acid
Vitamin B_{12}	10.0 µg/kg	Vitamin B_{12} 0.1% WS
Vitamin E	16.1 IU/kg	Tocopheryl acetate
Zinc	14.65 mg/kg	Zinc bisglycinate

* Adapted from the Codex Standard for Rice (Codex Stan 198–1995)

Rice consumption patterns

% who consume it daily: **–**

Consumption per person per day (in g): **30**

Annual per capita consumption (in kg): **11**

Characteristics of the rice industry

Rice production (in tons): **–**

Cultivation yield (t/ha): **2.07**

Number of mills: **25**

Area planted with rice (ha): **11,181**

Imports (tons): **71,089**

Source

Evelyn Roldán, Landscape Analysis for Rice Fortification: Guatemala. Report presented to the World Food Programme Regional Bureau for Latin America and the Caribbean. Link to full profile: **rebrand.ly/Country-Profiles**

Haiti

Nutrition situation

Chronic malnutrition in children under 5 years	22%
Anemia	**By age group (%)**
6–11 months	–
6–59 months	65
Women of reproductive age	49
Pregnant women	–
Vitamin A deficiency (school age children)	32%
Zinc deficiency (children under 5)	30%

Source: Ayoya et al (2012) Precis of Nutrition of Children and Women in Haiti: Analyses of Data from 1995 to 2012; CNSA, Oxfam 2016. Rapport d'évaluation approfondie de la sécurité alimentaire dans le contexte de la sécheresse basée sur l'Approche de l'Economie de Ménages (AEM)

Government/public sector programs for fortification of food and complementary foods

Information not available

Fortified foods in the commercial market

Information not available

Social protection programs that deliver rice

None

Legislative framework for rice fortification

None

Rice Consumption patterns

% who consume it daily:

86% of homes consume it

76% of the population living on less than US$ 2/day consume 70% of rice

Consumption per person per day (in g): **–**

Annual per capita consumption (in kg): **–**

Characteristics of the rice industry

Cultivation yield (tons): **114,400**

Cultivation yield (t/ha): **2.07**

Number of mills: **500**

Area planted with rice (ha): **85,000**

Imports (tons): **415,000**

Source

Yves-Laurent Régis, Landscape Analysis for Rice Fortification: Haiti. Report presented to the World Food Programme Regional Bureau for Latin America and the Caribbean. Link to full profile: **rebrand.ly/Country-Profiles**

Honduras

Nutrition situation

Chronic malnutrition in children under 5 years	23%
Anemia	**By age group (%)**
6–11 months	46%
6–59 months	25.7%
Women of reproductive age	18%
Pregnant women	22%
Vitamin A deficiency *	–
Zinc deficiency **	–

* Adequacy of > 150%. Only in rural and western regions a deficit occurs in 10% of households

** It is estimated that 85% of households have acceptable zinc consumption

Government | public sector programs for fortification of food and complementary foods

Mandatory fortification programs	Sugar > *Fortificants:* Vitamin A
	Salt > *Fortificants:* Iodine
	Wheat flour > *Fortificants:* Iron, B-complex vitamins
Supplementation programs	Micronutrient powder (international cooperation)
	> *Fortificants:* Vitamins A, C, folic acid, zinc, iron
	Micronutrient powder (Mesoamerican initiative)
	> *Fortificants:* Vitamins A, D, E, C, B_1, B_2, B_3, B_6, B_{12}, folic acid, iron,
	zinc, copper, selenium, iodine

Fortified foods in the commercial market

Corn flour (voluntary fortification)

Social protection programs that deliver rice

School Feeding Program (WFP purchases)

Legislative framework for rice fortification

Micronutrients to be used in rice fortification per the Central American Regulation Model – El Salvador, Guatemala, Nicaragua, Honduras and Costa Rica

Nutrients	Minimum levels of micronutrients in rice *	Minimum levels of micronutrients in the chemical compound of the nutrient to be used in rice fortification *
Iron	14.0 mg/kg	Iron bisglycinate
Selenium	256.0 µg/kg	Sodium selenite
Vitamin B_1	6.0 mg/kg	Thiamine mononitrate
Vitamin B_3	51.0 mg/kg	Niacinamide
Vitamin B_6	5.6 mg/kg	Pyridoxine
Vitamin B_9	1.8 µg/kg	Folic acid
Vitamin B_{12}	10.0 µg/kg	Vitamin B_{12} 0.1% WS
Vitamin E	16.1 IU/kg	Tocopheryl acetate
Zinc	14.65 mg/kg	Zinc bisglycinate

* Adapted from the Codex Standard for Rice (Codex Stan 198–1995)

Rice consumption patterns

% who consume it daily: **97**

Consumption per person per day (in g): **99.4**

Annual per capita consumption (in kg): **36.4**

Characteristics of the rice industry

Rice production (in tons): **–**

Cultivation yield (t/ha): **2.3**

Number of mills: **21**

Area planted with rice (ha): **14,605**

Imports (tons): **159,917**

Source

Wilmer Bonilla, Landscape Analysis for Rice Fortification: Honduras. Report presented to the World Food Programme Regional Bureau for Latin America and the Caribbean. Link to full profile: **rebrand.ly/Country-Profiles**

Panama

Nutrition situation

Chronic malnutrition in children under 5 years	19.1
Anemia	**By age group (%)**
6–11 months	–
6–59 months	36.0
Women of reproductive age	40.3
Pregnant women	36.4
Vitamin A deficiency (preschool children)	1.8%
Zinc deficiency (1–4 years)	–

Source: Survey of Living Standards 2008 / Global Nutrition Report 2015; Ministry of Health. National Survey of Vitamin A and Anemia. Panama, 1999

Government | public sector programs for fortification of food and complementary foods

Mandatory fortification programs	Salt › *Fortificant:* Iodine
	Wheat flour › *Fortificants:* Vitamins B_1, B_2, B_3, folic acid, iron
Fortification of specific foods	Nourishing Corn Cream[a] › *Fortificants:* Vitamins A, E, B_1, B_3, B_6, B_{12}, folic acid, calcium, iron, zinc
	Fortified milk drink and biscuit (School Snack Program)
	› *Fortificants:* Vitamins, A, C, D, E, B_1, B_2, B_3, B_6, B_{12}, folic acid, calcium, phosphorus, magnesium, iron, zinc
	Fortified cream and biscuit (School Snack Program)
	› *Fortificants:* Vitamins, A, C, D, E, B_1, B_2, B_3, B_6, B_{12}, folic acid, calcium, phosphorus, magnesium, iron, zinc
Supplementation programs	Folic acid and iron › *Population:* Children with low birth weight (2–24 months) children at term (4–24 months), children 24–59 months, children of school age (5–12 years), women of childbearing age, pregnant and postpartum women
	Vitamin A › *Population:* Children 6–59 and postpartum women in priority districts

[a] Fortified complementary food

Fortified foods in the commercial market

Information not provided.

Social protection programs that deliver rice

SENAPAN food purchase bonus program

Legislative framework for rice fortification

Law 33 (June 26, 2009). Rice Fortification Program in the Republic of Panama. Not enforced.

Micronutrients recommended for rice fortification

Micronutrients	Natural content in white rice	Quantity to add (mg/kg)	Minimum	Average	Maximum
Vitamin B_1	0.7	5	3.1	5.7	8.3
Niacin	15	40	30.9	56.0	81.1
Vitamin B_6	1.9	4	3.0	5.4	7.8
Folic acid	0.1	1	0.6	1.1	1.6
Vitamin B_{12}	0	0.010	0.006	0.010	0.014
Iron (ferric pyrophosphate)	4.1	24	21.8	32.0	42.2
Zinc (oxide)	11.5	25	24.9	36.6	48.3

Source: Ministry of Health

Rice consumption patterns

% who consume it daily: **90**

Consumption per person per day (in g): **99.4**

Annual per capita consumption (in kg): **36.4**

Characteristics of the rice industry

Rice production (in tons): **139,616**

Cultivation yield (t/ha): **5.9**

Number of mills: **24**

Area planted with rice (ha): **86,120**

Imports (tons): **319,155**

Source

Victoria Valdés, Landscape Analysis for Rice Fortification: Panamá. Report presented to the World Food Programme Regional Bureau for Latin America and the Caribbean. Link to full profile: **rebrand.ly/Country-Profiles**

Peru

Nutrition situation

Chronic malnutrition in children under 5 years	32,6%
Anemia	**By age group (%)**
6–11 months	–
6–59 months	32.6
Women of reproductive age	20.7
Pregnant women	28.0
Vitamin A deficiency (< 5 years of age)	11.7%
Zinc deficiency (1–4 years)	–

Government | public sector programs for fortification of food and complementary foods

Mandatory fortification programs	Salt › *Fortificants*: Iodine, fluoride
	Wheat flour › *Fortificants:* Iron, folic acid, B_1, B_2, B_3
Supplementation programs	Micronutrient powders
	› *Fortificants:* Iron, zinc, Vitamin C, vitamin A and folic acid
	› *Population:* Children under 36 months
	Iron › *Population:* Children under 36 months
	Iron and folic acid › *Population:* Pregnant women
	Vitamin A › *Population:* Children and women at risk

Fortified foods in the commercial market

› Milk, Cereals

Social protection programs that currently deliver rice

› Glass of Milk National Program (rations program)

› Cuna Más National Program (day care program)

› Qali Warma (national school feeding program)

Legislative framework for rice fortification

None

Rice consumption patterns

% who consume it daily: **83.2**

Consumption per person per day (in g): **173**

Annual per capita consumption (in kg): **47.4**

Characteristics of the rice industry

Rice production (in tons): **3,128,794**

Cultivation yield (tons/ha): **7.7**

Number of mills: **627**

Area planted with rice: **–**

Imports (tons): **121,948**

Source

Laura Astete Robilliard, Landscape Analysis for Rice Fortification: Peru. Report presented to the World Food Programme Regional Bureau for Latin America and the Caribbean. Link to full profile: **rebrand.ly/Country-Profiles**

Dominican Republic

Nutrition situation

Chronic malnutrition in children under 5 years	7.1%
Anemia	**By age group (%)**
6–11 months	–
6–59 months	28
Women of reproductive age	18%
Vitamin A deficiency (households) *	–
Zinc deficiency (households) **	–

* It is believed that among the poorest there is a moderate risk of 50%

** It is believed that among the poorest there is a moderate risk of 50%

Source: National Micronutrient Survey, 2012; Menchu et al, The Quality of the Diet of the Dominican Republic Approximate with the Data of the ENIGH-2007

Government | public sector programs for fortification of food and complementary foods

Mandatory fortification programs	Wheat flour
	› *Fortificants:* Iron, B_1, B_2, B_3, and folic acid at the minimum levels
Supplementation programs	Iron, folic acid, vitamin C
	› *Population:* Pregnant women, children 6–23 months old
	Vitamin A
	› *Population:* Women who have given birth, children aged
	6 months to 4 years
	Calcium
	› *Population:* Pregnant and postpartum women

Fortified foods in the commercial market

› Premium rice

Social protection programs that deliver rice

Not available

Legislative framework for rice fortification

None

Rice Consumption patterns

% who consume it daily: **94.3**

Consumption per person per day (in g): **156.6**

Annual per capita consumption: **–**

Characteristics of the rice industry

Rice production (in tons): **11,812,172**

Cultivation yield (tons/ha): **–**

Number of mills: **300**

Area planted with rice (ha): **161,706**

Imports (tons): **377,385**

Source

Andrea Cabral C., Landscape Analysis for Rice Fortification: Dominican Republic. Report presented to the World Food Programme Regional Bureau for Latin America and the Caribbean.

Link to full profile: **rebrand.ly/Country-Profiles**

Reference

1. Yusufali, R., Ghoos, K. Landscape Analysis for Rice Fortification. Scaling Up Rice Fortification in Asia, *Sight and Life* on behalf of the World Food Programme, 2015.