



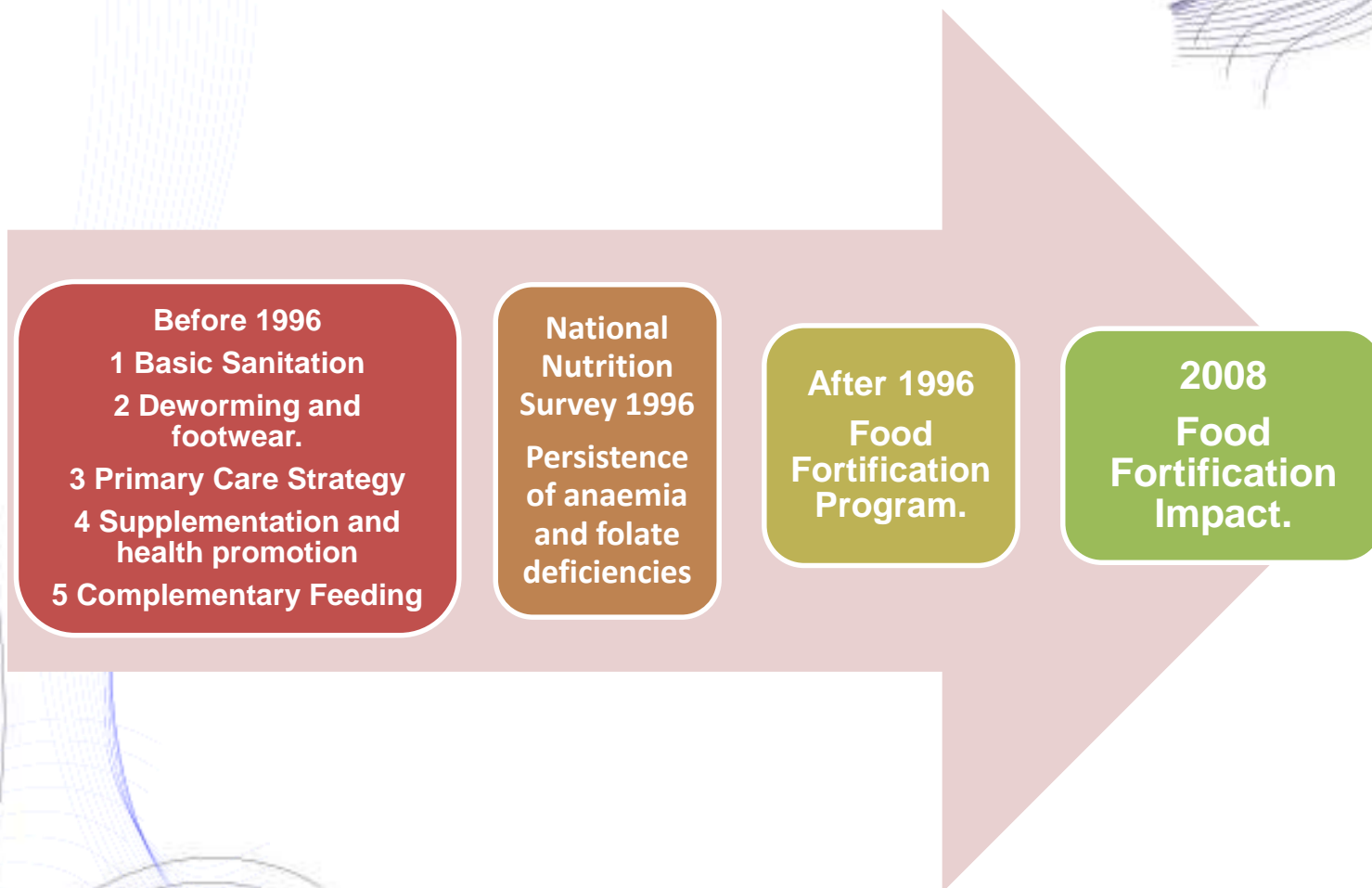
# Rice Fortification in Costa Rica: a case study

Scaling Up Rice Fortification  
in Asia  
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# Overview of fortified food program impact in Costa Rica





# Legal framework

## Decrees under the Law

### **1974 General Health Law, Section III, Article 226**

"Any producer or food manufacturer shall comply with the provisions of the Ministry of Health decree ordering fortification of certain foods or equalization, to compensate for the absence or inadequacy of nutrients in daily food supply of the population".

***Food fortification committee, created in 1998 in a separate piece of legislation  
Decree No. 28086-S***

### **2001 Executive Decree No. 30031-S**

Rice Mandatory fortification was issued in 2001. (National program mandate by government).

Modified by Decree No 33124-S of June 02, 2006

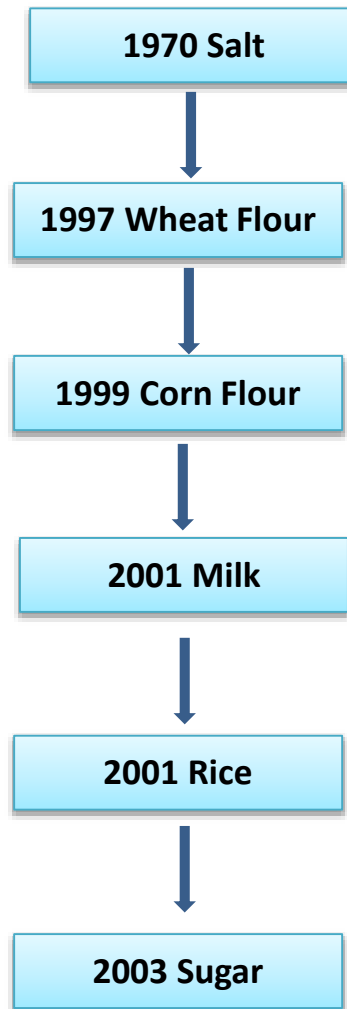
### **2007 Claim before the Constitutional Tribunal**

objecting the fortification: Obstacle to free trade agreements

The ruling was in favour of the fortification legislation because of the overriding importance of the health outcomes.



# Commodities Fortification in Chronological Order







# Costa Rica has fortified multiple commodities with a variety of fortificants

FOOD	Average daily Consumption	Legal Framework	Fortificant added	Quantity	Daily consumption	Percentage of the DRA
Rice	130 g	No. 30031-S 2001	Folic Thiamin Vitamin B12 Niacin Vitamin E Selenium zinc	1,8 mg/kg 6,0 mg/kg 10,0 µg /kg 50,0 mg/kg 15,0 UI/kg 105,0 µg 19,0 mg/kg	234 µg 0,78 mg 1,3 µg 65,0 mg 1,95 UI 13,6 µg 2,5 mg	58,5 55,7 54,2 361,0 8,7 24,7 16,7
Sugar	71.4 g	No. 2701-S 1974/ 1998/2003	Vit. A	5 mg/kg. (5000 ug/kg)	357 ug	44.6
Wheat Flour	74 g	No. 26371-S. (1997) No. 30039-S modified (2001	Thiamin Riboflavin Niacin Folic Acid Iron (fumarate)	6,2 mg/kg 47,2 mg/kg 55 mg/kg 1,8 mg/kg 55mg/kg	4,07 mg 4,07 mg 0,45 mg 3,49 mg 133 ug	29,0 22,6 32,0 218 33,2
Milk	107 ml	No. 29629-S 2001	Iron (bisglycinate) Vit.A. Folic Acid	1,4 mg/250 ml 180 ug/250 ml 40 ug/250 ml	0.60 mg 77 ug 17 ug	4,2 9,6 4,2
Corn Flour	18.0 g	No. 28086-S 1999	Iron (bisglycinato) Niacine Thiamin Riboflavin Folic Acid	22 mg/kg 45 mg/kg 4 mg/kg 2,5 mg/kg 1,3 mg/kg	0,40 mg 0,81 mg 0,07 mg 0,04 mg 23,4 ug	2,8 4,5 5,1 2,8 8,8
Salt	9.8 g	No.18959- MEIC-S (1970-1989)	Iodine Fluoride	30 – 60 mg/kg 175 – 225 mg/kg	294 – 588 ug 1,71 – 2,2 mg	196 – 255 57 – 73,5



## Fortified Foods Contribution to RDA

Nutrient	Nutrient total quantity from fortified foods	Recommendation	Contribution to RDA in percentages
Vitamin A	434 µg	800 µg	54.2
Folic Acid	407 µg	400 µg	101.8
Thiamine	1.30 mg	1.40 mg	93.0
Riboflavin	3.53 mg	1,60 mg	220.6
Niacin	69.9 mg	18.0 mg	388.0
Iron	5.07 mg	14 mg	36.2
Vitamin B12	1.3 µg	2.4 µg	54.2
Vitamin E	1.2 mg	15 mg	8.7
Selenium	13.6 µg	55 µg	24.7
Zinc	2.5 mg	9.5 mg	16.7

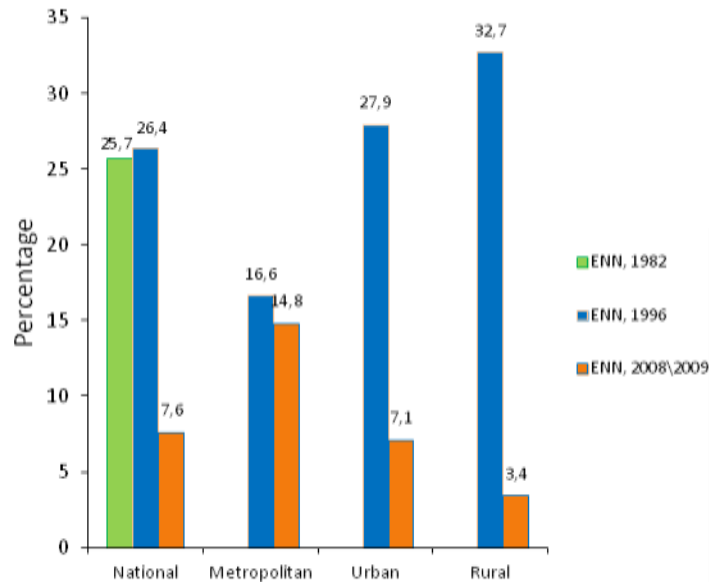


# Prevalence of anaemia and iron deficiency in preschool children

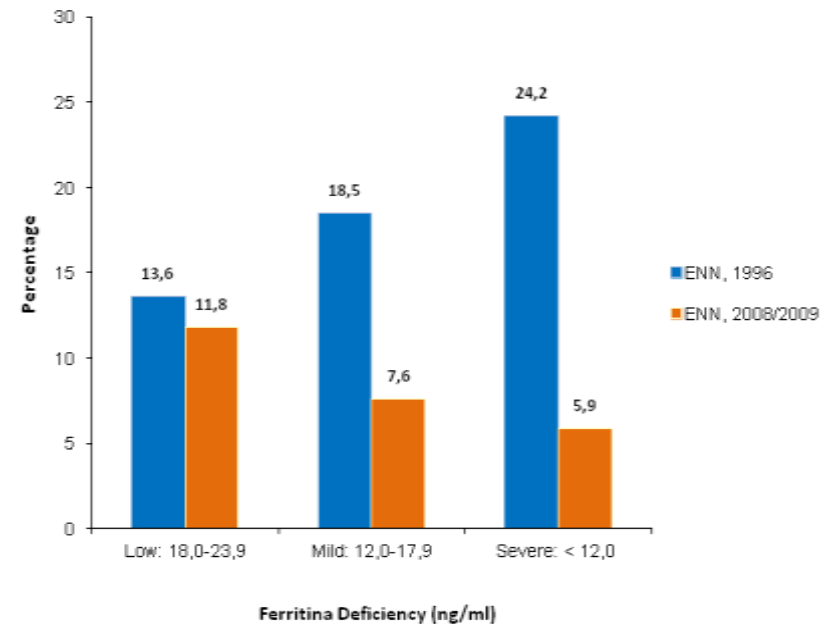
## National Nutrition Survey

### Costa Rica, 1982-1996-2008 / 2009

#### ANAEMIA



#### FERRITIN

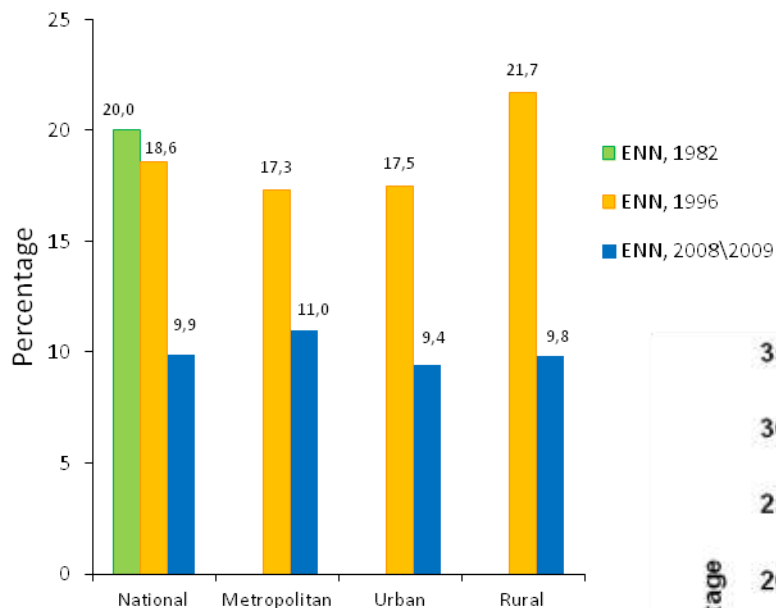


Preschool: children < 5 years hemoglobin (Hb) < 11.0 mg/dl, 5-6 years < 11,5 mg/dl

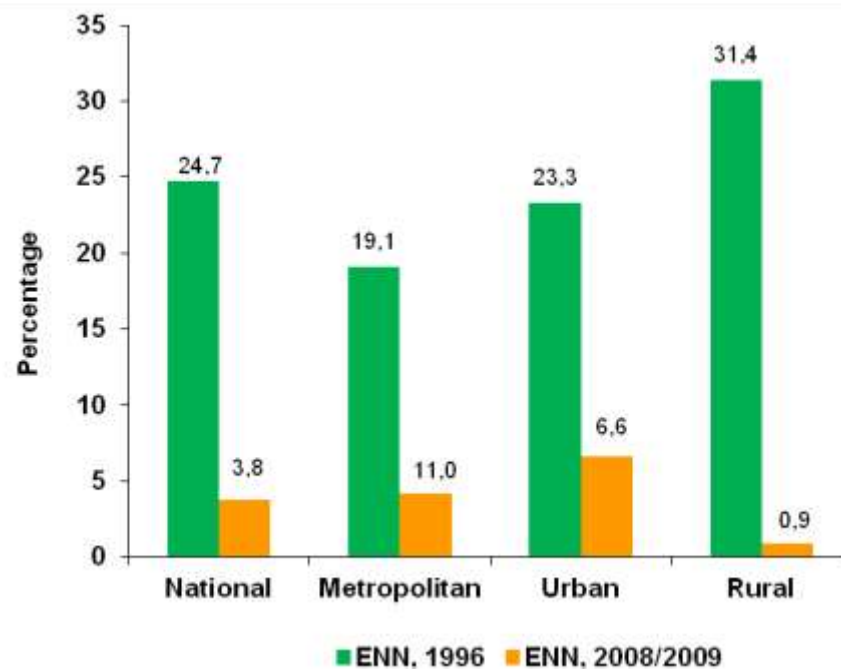


# Prevalence of anaemia and folate deficiency in women of childbearing age by area National Nutrition Survey Costa Rica, 1982-1996-2008 / 2009

## ANAEMIA



## FOLATE

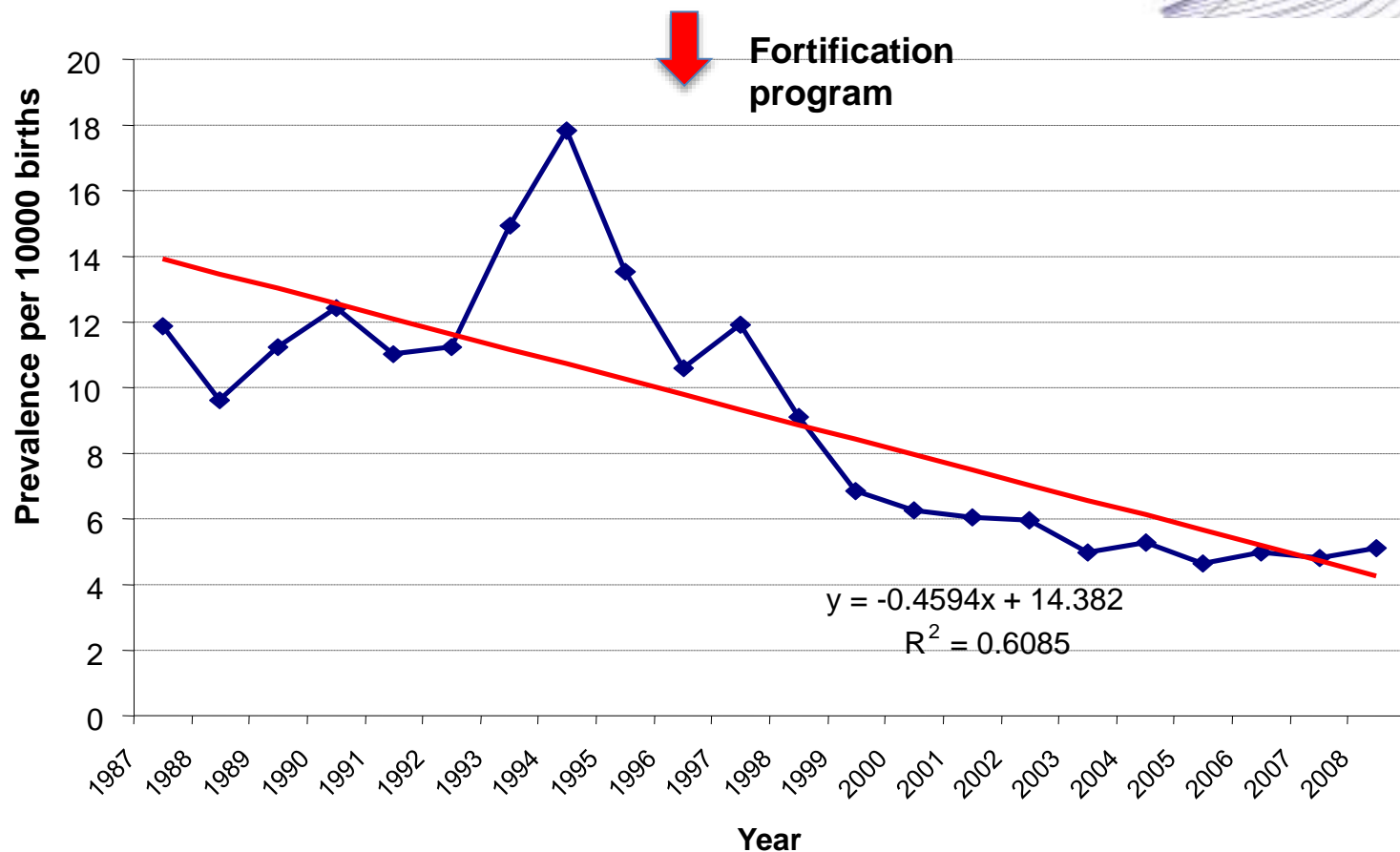


Women  $\geq 15$  years: Hb < 12.0mg/dl





## Birth Prevalence of NTDs in Costa Rica. 1997-2008.





# General background on rice consumption

## Period 2010/2011

- *Costa Rica has a population of 4 million.*
- *Rice is a staple food and meets about 30 percent of the daily caloric intake of the population*
- Production: 290 thousand tons
- Planted area: 80,000 Ha
- Yield: 3.8 MT / Ha S and L
- Consumption: 231,000 tons of milled rice
- Consumption Per Capita: 51 Kg (150g/day)
- 80/20 Quality: consumed by 55%
- Proportion of cost of rice in the Basic Food Basket: 9%



## Number of millers

National Association of Rice Industrial Sector (ANINSA) brings together 100% of the national rice industry

1. Corporación Arrocera Costa Rica (3 plants)
2. Arrocera El Porvenir (2 plants)
3. Molinos El Porvenir
4. Arrocera La Julieta
5. Arrocera Liborio
6. Distribuidora de alimentos Montes de Oro (DAMOS)
7. Cía. Arrocera Industrial (2 plants)
8. Cooparroz
9. Derivados del Maíz Alimenticio (DEMASA)
10. Coopeliberia
11. Rosa Tropical

*The rice corporation (CONARROZ) is the sole entity allowed to import rice within the set quota.*



## Criteria for selection

The following was considered as criteria to select the 7 micronutrients and fortificant levels:

- nutrient deficiencies in the population
- interaction between nutrients
- nutritional requirements of the population
- level of consumption of the food commodity (rice)
- Tolerable Upper Intake Level (UL) - level at which no effects are observed
- level of the nutrient provided by other fortified foods
- no iron or riboflavin included due to changes in taste and appearance (we are fortifying other commodities with iron and B2)
- restitution of the vitamins that are lost in the milling





## **Rice fortification technology experience: coating, extrusion and blending (innovative millers)**

There are two private fortified grain manufacturers, one that uses a coating technology and another that uses a cold-extrusion technology. Both technologies are used in Costa Rica.

These two manufacturers supply the country's 11 milling companies, which, in turn, blend fortified grains into their traditional rice and then sell this fortified rice through their distribution channels.

All of the country's rice supply is fortified.



## Dosage in milled rice

For every 1,000 grams of milled rice,  
5 grams of fortified rice: 0,5%  
(coated grain or extruded grain)  
are included.



# Dispensers





## Additional cost to fortifying rice

5 grams of fortified rice (grain coated or extruded grain) per 1,000 grams of milled rice are added.

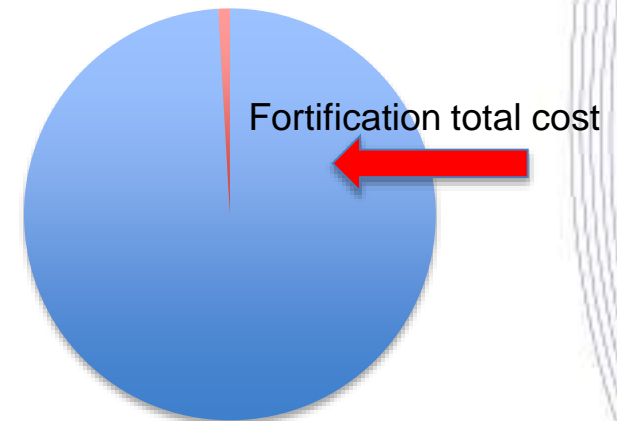
Cost of blended rice with extruded kernels: \$1,90/k

Cost of blended rice with coated kernels: \$2/k

Cost of a kg of fortified kernels	Cost of 5 g of fortified kernels	Cost of a kg of rice quality 80% whole grain (includes mixing)	Share of fortification total cost
(A)	$(A/1000*5 = B)$	(C)	$(B/C*100)$
\$ 2	\$0,01	\$1,13	0,9%

**Source:** Cost model of industrialization  
Ministry of Economy Trade and Industry, May 2011.

**Note:** fortified kernels is rice with nutrients







## Impact on the manufacturing cost



Installation.  
Calibration.  
Maintenance.  
Operating team Manual.

Housekeeping  
Deep Cleaning  
Revisions



## Additional cost to fortifying rice who pays

The Ministry of Health budget financed the health needs research, but technology development was financed by fortified grain producers seeking profit opportunities. A fortification premix supplier, supported the industry by investing in the development of blending technology.

A significant portion of the cost to develop a rice fortification program was covered by the private sector.

The government's only costs to maintain the program at this time are labour and laboratory equipment necessary for ongoing monitoring, evaluation, and quality-control activities.

The incremental cost of fortification is passed on to consumers, but this in a setting of relatively inelastic demand and government-controlled retail and wholesale prices: the Ministry of Economy Trade and Industry included the added cost in the rice retail price. By achieving universal fortification, there were no competing unfortified rice products available and, consequently, no additional resources that would have been needed to create consumer demand.



# Quality control (enforcement)

Internal monitoring is assigned to the rice manufacturers and importers; and external quality control and evaluation is the responsibility of the Ministry of Health.

Internal monitoring is performed

- Companies that provide the fortified product meet the parameters established in the Decree.
- Sampling of rice is undertaken every hour, grain counting
- Sampling is also analyzed in third party laboratory under procedures guidelines to determine compliance.

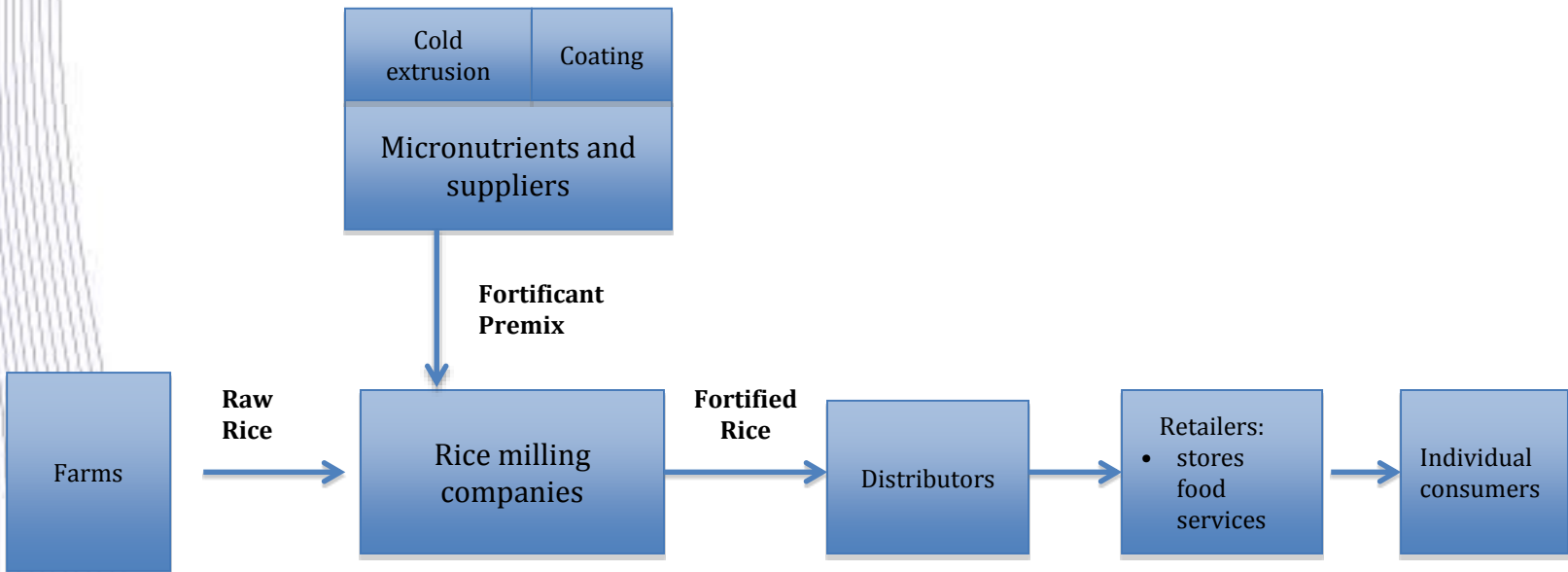
External monitoring is performed by the government's quality-control agency, obtaining samples from retailers (POS) as opposed to upstream sampling at manufacturing sites, this way it allows quality control across the supply chain. The analysis are carried out in the INCIENSA (Instituto Costarricense de Investigación y Enseñanza en Nutrición y Salud) laboratories.



# Supply Chain

Engaging rice millers and leveraging existing distribution channels

*By working with supply-side players and ensuring compliance with mandatory legislation, the government was able to reach universal consumption*







## **Consumer acceptability with the introduction of fortified rice in Costa Rica**

- Consumers can not tell the difference between fortified and non fortified rice
- The fortified rice goes unnoticed
- It has no color, smell or look different from non fortified rice
- Rice can be washed without losing nutrients
- 100% acceptance



## Partnership process

- Technical approach of the proposal
- Harnessing alliance with the industry
- Support for negotiations with industry association: study premix options and costs, taking into account market price.
- Ministry of Economy includes the cost of fortification within the cost model of rice processing.
- The cost of fortification was transferred to the consumer without a significant increase in the price.
- INCIENSA (government's quality-control laboratory)



# Partnerships

## **Policy:**

- Ministry of Health – Ministry of Economy
- National Commission of Micronutrients ( in charge of the program: taking corrective measures and adjustments if needed. The MoH holds the Commission´ s Presidency )

## **Technology development and Premix tests:**

- Kuruba
- DSM

## **Technology assessment and stability of micronutrients:**

- INCAP

## **Advocacy: gaining general support for a universal coverage**

- ANINSA – National Association of Industrial Rice sector
- CONARROZ - National Rice Corporation

## **Monitoring and quality Control**

- Ministry of Health with INCIENSA laboratory



## Key lessons regarding scaling up rice fortification

- To formulation of public policy that make fortified rice for human intake mandatory nationwide
- To take into account producing companies conditions in legal provisions. It is more feasible to extend it to the rice industry private sector when centralized (ANINSA)
- To consolidate alliances among different sectors and key actors is an essential process for promoting rice fortification and avoid resistance (Micronutrients National Commission: cross-sector)
- To share social responsibility is fundamental
- Focus on social rights (UNICEF)
- To be used as successal experience in new commodities fortification.





## Key lessons regarding scaling up rice fortification

- To have the political, technical and financial support of the government in order to guarantee reinforcement (Decree and constitutional court sentencing)
- To continue fortifying even after obtaining positive results
- To develop on-going research to evaluate results and quality controls
- To sustain over time epidemiological surveillance – monitoring changes in the market and nutritional habits of people (Nutritional surveys)
- Universal fortification eliminated the additional resources that would have been needed to create consumer demand.



**thank you**