Implementing national fortification programs: Critical factors for success

2nd International Congress on Micronutrients and Child Health
All India Institute of Medical Sciences, New Delhi
November 2014

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Global Alliance for Improved Nutrition
The Global Nutrition Challenge

1.7 billion people affected by micronutrient deficiencies

165 million children stunted

129 million children underweight

3.5 million deaths of children under five

2-3 percent loss of Gross Domestic Product (GDP) at national level

1.7 billion people affected by micronutrient deficiencies
Solutions

- Dietary diversification
- Supplementation
- Fortification

Combined, these methods have brought vitamin and mineral deficiency under control in developed countries. It is time now to deploy these solutions for the benefit of the peoples developing countries.
# Food Fortification is not A New Idea

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Country/Region</th>
<th>Year(s)</th>
<th>Food Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iodine</td>
<td>Switzerland</td>
<td>1923</td>
<td>Salt</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>1930</td>
<td></td>
</tr>
<tr>
<td>Vitamin D</td>
<td>Denmark</td>
<td>1930</td>
<td>Margarine</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>USA, UK</td>
<td>1923</td>
<td>Milk</td>
</tr>
<tr>
<td>B1, B2, Niacin, Fe</td>
<td>Canada</td>
<td>1933</td>
<td>Wheat flour</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>1941</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chile</td>
<td>1954</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Central America</td>
<td>1974</td>
<td>Sugar</td>
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</table>
Over the last 70 years, food fortification has played a major role in the health of populations in industrialized countries and several nutritional deficiencies have been eliminated

Fortification is a cost-effective strategy:

“Probably no other technology available today offers as large an opportunity to improve lives and accelerate development at such low cost and in such a short time”

(source: Enriching Lives, The World Bank)
Food fortification programs
Critical factors for success - Reach

Population at risk of MND

Population consuming fortifiable food
Food fortification programs
Critical factors for success

Situation analysis

• To collect, review, analyze, and interpret information related to
  ➢ the problem of MN deficiencies and
  ➢ food fortification as a strategy for their elimination – fortifiable foods?

• Determine the prevalence of micronutrient deficiencies
  ➢ What to measure?
  ➢ Who to measure?
  ➢ How to measure?
Food fortification programs
Critical factors for success

Situation analysis

Choosing a suitable food vehicle

- Food consumption data for potential food vehicle(s)
- Marketing and distribution data for the food vehicles(s)
- Determining the technical and economic feasibility
Food fortification programs
Critical factors for success

Situation analysis

Food industry and market analysis

- Involvement of food industry
- Complex relationship to economic development

- Review of the food industry capacity
- Review of role of public-private share and role
- Review investment climate for FF
Food fortification programs
Critical factors for success

Situation analysis

Food laws and regulation

- Voluntary fortification
- Mandatory fortification
- Monitoring and enforcement
- Role of government and food industry
## Food fortification programs

### Food Vehicles and Type of Fortification

| Mass fortification                                      | 1. Salt       |
|                                                       | 2. Fats and oils |
|                                                       | 3. Wheat flour  |
|                                                       | 4. Rice        |
|                                                       | 5. Milk        |
| **Targeted fortification**                             | 1. MNP – children, women |
|                                                       | 2. RTE supplementary food |
| **Market driven**                                      | 1. Wheat products |
|                                                       | 2. Beverages   |
|                                                       | 3. Others      |
| **Other types of fortification**                       | 1. Point of use fortification of hot-cooked meals |
|                                                       | 2. Fortified dal analogue |
Consumer segmentation & delivery channels

Traditional Marketing

Distributor

Retailer

Producer

MOH, NGOs
Govt Systems

Health & NGO Salespersons

Commercial channels

Commercial Consumer

High Risk Consumer

ICDS
MDM
PDS
Food fortification in India
Salt Iodisation

Kangra valley study

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<thead>
<tr>
<th></th>
<th>1956</th>
<th>1962</th>
<th>1968</th>
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<tr>
<td>A</td>
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<td></td>
<td></td>
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<tr>
<td>B</td>
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<td>C</td>
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Food fortification in India
Salt Iodisation

Iodised Salt Production in Lakh MT

HH – 71%
UIE – 133 ug/l


Food fortification in India
Efficacy of wheat flour fortification

St John's Research Institute
WFF has picked up momentum in India. Gujarat has been doing it for few years now. Several other state govts are introducing it in PDS and are using it in Mid Day Meal.
Food fortification in India
Rice fortification

Efficacy of Iron Fortified Extruded Rice: 6-13 y old school children (20 mg Fe/d)

![Graph showing prevalence % over time for different groups: ID Fe, Control, IDA Fe, and Control. The graph indicates a decrease in prevalence over 7 months for each group.](image-url)
Food fortification in India
Rice fortification

• Large pilot done in collaboration with PATH and Naandi Foundation
• At the central kitchen at Vizag, children were provided iron fortified rice for more than one year (Ultra Rice)
• The project covered 35,000 – 50,000 children daily
• The study was done to determine the technical and operational feasibility of integrating fortified rice in MDM
• PATH also used this opportunity to study a number of operational issues
• The Ultra Rice kernels were prepared in India
Food fortification in India
Milk fortification


- Milk is a good source of vitamin A
- Processed low fat milk – low levels of fat soluble vitamins, A &D
- GoI supported milk fortification for > 2 yrs – 1989-91. All dairies under NDDB was fortifying low fat milk with 2000 IU/L of vitamin A
- Some dairies under NDDB, continue – Bihar, TN
- Market driven commercial fortification – several private dairies
- Limitations of reach !!
Food fortification in India
Point of use fortification - ICDS

Prevalence Mild Anemia for NFK and FK at 0, 12 and 24 Weeks

Prevalence Iron Deficiency Anemia for NFK and FK at 0, 12 and 24 Weeks

Anaemia

14mg microencapsulated ferrous fumarate, 500IU’s Vitamin A (acetate 250 CWS) and 0.05mg folic acid per 25g serving

Iron Deficiency

IDA

Am J Clin Nutr 2007:85;1127-33
Food fortification in India
MNP – Home fortification of CF

![Graph showing changes in Hb levels over weeks of treatment with different fortified products.]

*Indian Pediatr 2007:44;91-100*
Food fortification in India
MNP – Home fortification of CF

Enhancements to Nutrition Program in Indian Integrated Child Development Services Increased Growth and Energy Intake of Children$^1,2$

Rasmi Avula,$^3*$ Edward A. Frongillo,$^3*$ Mandana Arabi,$^4$ Sheel Sharma,$^5$ and Werner Schultink$^4$


1. A quasi experimental longitudinal design was used
2. 15 AWCs with ‘enhanced’ program and 15 with normal program
3. Multilevel linear regression was used to examine changes over time
4. The enhanced program significantly increased growth in WAZ and HAZ
5. ICDS would be more effective in improving child nutrition if it included these enhancers
Food fortification in India
MNP – Home fortification of CF

Dietary Intake of Bioavailable Iron in Four Model Diets in Nine-month Olds

0.8 mg Iron Requirement
Food fortification in India
MNP – Home fortification of CF

**Dietary Intake of Bioavailable Iron in Four Model Diets in 12-24 month Olds**

- Weaning foods without meat
- Weaning foods with high meat
- Weaning foods with no meat + Fortified cereals
- Weaning foods with no meat + supplement with iron

0.8mg Iron Requirement

Legend:
- Yellow: Fruit
- Green: Vegetables
- Red: Meat
- Black: Cereal
- Orange: Fortified Cereal
- Purple: Supplement
Food fortification in India
Market-driven fortification

- Biscuits
- Breakfast cereals
- Fruit juices, beverages
- Margarine, butter, milk, other dairy products
- Health/energy drinks
- Several special foods
Food Fortification in India

Barriers - Consumers

- Nutrition Low Purchase Priority
- Price Sensitivity
- No Perceived Need. *Hidden Hunger*
- Prevention & Future Benefits

*The most at risk choose the least expensive product*
Food Fortification in India

Barriers - Producers

• Little Price or Volume Increase
• Competition and Price Pressure
• Low Profit Margins
• Low Capacity Utilization

*It is not the Cost*
*It is the Competition*
Food fortification

Why should the government take the lead

• Health Mandate: Responsibility to protect population health. Individuals often cannot make good choices when the benefit is preventive or in the future. Health is a Merit Good

• Positive Externalities – when benefits accrue not only to consumers, but to society as a whole, then government’s role is to encourage greater reach of such interventions
Food fortification programs
Critical factors for success

Success depends on knowing what works
Bill Gates, Vice Chair, BMGF
Food Fortification
Critical success factors

1. Targeted interventions needed to few physiological groups and during critical periods
2. Convergence with other impactful interventions and sectors is absolutely necessary
3. Agenda setting and advocacy to ensure nutrition being adequately addressed is also critical for success

Integrated approaches needed to ensure most vulnerable populations are reached