GAIN’S GLOBAL STRATEGY ON FOOD FORTIFICATION TO IMPROVE PUBLIC HEALTH – ASIA HIGHLIGHTS

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GAIN
GAIN was founded at a UN global summit on children in 2002.

GAIN works through partnerships and alliances with the goal of reaching 1 billion people by 2015 with nutritious foods that have sustainable nutritional impact.

Currently, GAIN-supported programs reach 789 million men, women and children across over 30 countries.

GAIN implements its programs through a number of initiatives:

- Large scale food fortification;
- Multi-nutrient supplements;
- Nutritious foods for mothers and infants;
- Agriculture and nutrition; and
- Nutrition in the workplace, supply chains and communities.
Globally…

- Globally, about $\frac{1}{4}$ children under 5 (165 million, 26% in 2011) are stunted\(^1\)
  - $\frac{3}{4}$ of them are located in Sub-Saharan Africa and South Asia
  - South Asia: 39% of children are stunted

- In 2011, the five countries with the highest numbers of stunted children under 5 were
  1. India (61.7 million)
  2. Nigeria (11 million)
  3. Pakistan (9.6 million)
  4. China (8 million)
  5. Indonesia (7.5 million)

\(^{1}\)2013 UNICEF report: Improving Child Nutrition: The achievable imperative for global progress
Asia...

- Asia (East & South Asia): home to almost 4 billion people
- >1/3 of children under 5 yrs in East & South Asia stunted (too short for their age)*
  - 18% of babies are born with low birth weight
  - 27% of under 5’s weigh too little for their age
  - 13% of under 5’s are wasted (i.e. rapid weight loss due to illness/lack of food)

Global hidden hunger: facts and figures

Source:
Micronutrient deficiencies in children

Severity of Vitamin A Deficiency

Note: Severity cutoffs based on serum or plasma retinol <0.70 μmol/L in preschool-age children (mild: ≤2%–<10%; moderate: ≥10%–20%; severe: ≥20%)


Severity of Zinc Deficiency

Note: Prevalence of risk of deficiency is based on the percent of children under 5 years of age with low height-for-age or growth stunting, and its public health significance is classified as low (<20.0%), moderate (>20%–40%), or high (≥40%)

Source: World Health Organization, Global Health Observatory Database: http://apps.who.int/ghodata/

Severity of Iron Deficiency

Note: Prevalence of deficiency is based on the percent of children 6–59 months of age with hemoglobin below 110g/L, and its public health significance is classified as none (<5.0%), mild (≥5.0%–<20.0%), moderate (≥20.0%–<40.0%), or severe (≥40.0%)

Emerging evidence of hypovitaminosis D and hypocalcaemia

A cross-sectional study conducted among 595 women of reproductive age and 532 children, <5 years from 19 provinces of Vietnam

<table>
<thead>
<tr>
<th></th>
<th>Mild and moderate hypocalcaemia (%) [Ca^{2+} = 0.8-1.15\text{mmol/L}]</th>
<th>Vitamin D insufficiency (%) [25(OH)D&lt;30\text{nmol/L}]</th>
<th>Vitamin D deficiency (%) [25(OH)D:30-49.9\text{nmol/L}]</th>
</tr>
</thead>
<tbody>
<tr>
<td>All young children</td>
<td>98.77</td>
<td>36.7</td>
<td>20.62</td>
</tr>
<tr>
<td>All women (WRA)</td>
<td>97.41</td>
<td>40.41</td>
<td>17.34</td>
</tr>
</tbody>
</table>

Asia – poverty and dietary diversity

JH Rah, Low dietary diversity is a predictor of child stunting in rural Bangladesh, European Journal of Clinical Nutrition, 2010


“Household socioeconomic status influenced the risk of stunting”


Countries may lose 2 to 3% of their Gross Domestic Product (GDP) as a result of iron, iodine, and zinc deficiencies

“...in Timor Tengah Selatan, only 25% of households could afford to meet the nutrient requirements, whereas in urban Surabaya, 80% could.”

“One billion people in the world suffer from chronic hunger. Two thirds of them live in Asia.”

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Strategies addressing the problem of VMD

► Supplementation
► Dietary diversification, other food based approaches (biofortification)
► Public health measures
► Food fortification
Fortification: solution to reduce nutrient gap

Addressing wide-spread deficiencies in vitamins and minerals by enriching commonly consumed and accessible foods in a cost efficient way

*Photo*: Fortified Food Products of GAIN and Partnership Programs
Food Fortification:
Selection of Food Vehicles

STAPLE FOODS AND CONDIMENTS
wheat/maize flour, oils, fats, sugar, salt

BASIC FOOD PRODUCTS
breads, biscuits, breakfast cereal, dairy products

VALUE ADDED FOODS
beverages, convenience foods, candies
Key micronutrients before and during 1,000 days are crucial for lifelong potential

**Iodine**
- Needed for fetal brain development and IQ, WHO states ID as most common preventable cause of early childhood mental deficiency
- Reduces risk of miscarriage and stillbirth

**Folic acid**
- Adequate pre-pregnancy folate levels reduce incidence of spina bifida by 41% and reduce perinatal mortality due to NTDs by 66%

**Iron**
- Reduces pregnancy complications, perinatal and maternal mortality related to iron deficiency anemia (hemorrhage)
- Can reduce anemia in <24 months by up to 62%

**Vitamin A**
- Needed before and during pregnancy to boost maternal vit A levels, immune system, and iron intake
- Intake through breast milk can improve Vitamin A status of nursing infants and lower mortality by 11%
- 40% reduction in vitamin A deficiency among 1-3 year olds

**Zinc**
- Supplementation improves immune function, reduces incidence of diarrhea and pneumonia - more LSFF research needed

**Nutrition interventions**
- LSFF
- Targeted interventions (e.g., supplementation)
- School feeding

Women of reproductive age
-9–0 months
0–6 months
6–24 months
Childhood
Multiple fortified products for different lifecycle stages

- Staple foods and condiments
- Products business led
- MNP
- YYB
- FCF
- LNS
- RUTF

Large Scale approach
Mixed approach
Targeted approach

Possible targets and distribution channels

www.gainhealth.org
# GAIN’s fortification efforts in a snapshot

<table>
<thead>
<tr>
<th>Country</th>
<th>State</th>
<th>Food vehicle</th>
<th>Fortified with</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>Rajasthan – IPS project</td>
<td>Wheat flour</td>
<td>Iron, folic acid, vitamin B12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oil &amp; milk</td>
<td>Vitamin A &amp; D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soy-day</td>
<td>Iron &amp; folic acid</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td></td>
<td>Soybean oil</td>
<td>Vitamin A &amp; D</td>
</tr>
<tr>
<td>Bihar &amp; Madhya Pradesh</td>
<td></td>
<td>Wheat flour</td>
<td>Iron, folic acid, vitamin A &amp; B12</td>
</tr>
<tr>
<td>National (USI)</td>
<td></td>
<td>Salt</td>
<td>KIO₃</td>
</tr>
<tr>
<td>Bangladesh</td>
<td></td>
<td>Oil</td>
<td>Vitamin A</td>
</tr>
<tr>
<td></td>
<td>Complementary food supplement</td>
<td>Multiple micronutrients</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Soy sauce</td>
<td></td>
<td>Iron</td>
</tr>
<tr>
<td></td>
<td>Complementary food supplement</td>
<td>Multiple micronutrients</td>
<td></td>
</tr>
<tr>
<td>Vietnam &amp; Cambodia</td>
<td>Condiments</td>
<td>Iron</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oil</td>
<td></td>
<td>Vitamin A</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Oil</td>
<td></td>
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WHO/FAO Guidelines on Food Fortification

- Published in 2006 after consultative process
- A practical handbook for implementing fortification projects
- Contains global recommendations for premix specifications for various fortified foods.
- Advice on:
  - Setting programmatic goals and objectives
  - Development of communication and SM
  - Development of legislation, policies and QA/QC protocols
  - Monitoring and evaluating program effectiveness
  - Estimating program cost-effectiveness
Critical Programmatic Decisions

► Choice of food vehicle
  • Consumption level of vehicle
  • Appropriate technology
  • Cost-effectiveness (industry concentration)

► Choosing the right premix formula
  • Micronutrient needs of population
  • Bioavailability of fortificant with diet
  • Cost

Guidelines on Food Fortification
Core Messages

► Vitamin and Mineral Deficiencies (VMDs) take a huge toll on health and economic development globally

► Developing countries, particularly Asia, have the highest burden of VMDs and highest numbers of stunted children

► Data suggests existence of vitamin D deficiency in Asia

► Solutions to the problem exist and are cost-effective

► Fortification needs to follow WHO guidelines

► More consumption data is needed
Key findings of a systematic review of 201 quality studies…

Fortification for children
- Significant ↑ in serum micronutrient concentrations
- Food fortified with vitamin A, iron & multiple micronutrients, - >↑ in hemoglobin concentrations
- Positive trends on height for age, weight for age & weight for height Z scores

Fortification for women
- Calcium and vitamin D fortification: significant impacts in the post-menopausal group
- Iron fortification: significant ↑ in serum ferritin and hemoglobin levels in WRA and pregnant women
- Folate fortification: significantly reduced the incidence of congenital abnormalities (NTD)
- Lack of evidence of fortification against morbidity and mortality outcomes in women and children