Global Fortification Impact & Trends

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Hidden hunger or micronutrient deficiency affects 2 billion

Effects of Hidden Hunger
- Poor brain development
- Poor immune function
- Various adverse physical outcomes (e.g. spina bifida)
- Decreased work productivity

Within the first 1,000 days there is a “window of opportunity” — from conception to the age of 2 — to ensure optimal intakes of key micronutrients and improve physical and cognitive growth which in turn will have positive impacts for life
Example: iodine deficiency damages the developing brain

Salt iodization is the most cost effective way to tackle iodine deficiency and leads to improvements in IQ and educability, and helps prevent infant mortality, miscarriages and goitre.

Sources: Stanbury et al., 1998; Delange et al., 1999
Fortifying staples – the economics make sense

<table>
<thead>
<tr>
<th>Micronutrient</th>
<th>Life-saving benefits</th>
<th>Economic benefits</th>
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<tbody>
<tr>
<td>Iron</td>
<td>Reduces maternal and newborn death</td>
<td>Improves work productivity</td>
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<td>Improves cognition</td>
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<td>Folic Acid</td>
<td>Reduces neural tube defects, hence newborn deaths</td>
<td>Reduces health-care expenditures/ improves quality of life</td>
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<tr>
<td>Iodine</td>
<td>Reduces stillbirths</td>
<td>Improves cognition</td>
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<td>Vitamin A</td>
<td>Reduces under-five deaths (measles, pneumonia)</td>
<td>Reduces health-care expenditures required</td>
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If main benefits are economic, benefit:cost methods work best
If main benefits are lives-saved, cost-effectiveness methods work best

Acknowledgments: Horton, 2015
Horton and Ross (2003;2007) compare benefits (higher wages) and costs (fortification) for 10 countries with high levels of anemia, and conclude that the median benefit:cost ratio is 8.7:1.

For salt iodization an estimate for low and middle income countries suggests benefit:cost is around 30:1 (Horton, 2008).
GUIDING PRINCIPLES FOR FORTIFICATION

Guiding principles

1. Fortification should be a component of national health strategies where: existing food supplies and limited access to nutritious foods fail to provide adequate levels of nutrients in diets; and there is a fortifiable vehicle

2. Fortification is complementary to other evidence-based interventions which address hidden hunger, and it can play a major role in underpinning the prevention of micronutrient deficiencies across populations including periods of preconception and 1,000 days

3. Fortification is delivered through national food systems

4. Government-driven mandatory fortification works best, but must work closely with the private sector to ensure effective delivery of mandated programs
APPROPRIATE PUBLIC HEALTH OBJECTIVE OF LARGE-SCALE FOOD FORTIFICATION: SHIFT DISTRIBUTION OF INTAKES AT POPULATION LEVEL

- Distribution of intakes in population
- Distribution of “adequate intakes”
- Estimated average requirement (EAR)
- Deficiency detected (biomarker/symptom)
88 COUNTRIES MANDATE FORTIFICATION OF WHEAT, MAIZE FLOUR AND/OR RICE (GFDx, 2018)
30 COUNTRIES MANDATE FORTIFICATION OF AT LEAST ONE TYPE OF OIL, GHEE OR FAT (*GFDx, 2018*)

* India has mandatory fortification for at least one type of oil
** Map shows country with mandatory fortification for at least one kind of oil not necessarily all edible oils
IODIZATION IN OVER 140 COUNTRIES HAS SIGNIFICANTLY IMPROVED IODINE NUTRITION (GFDx, 2018)
Iodine: we’re in an unprecedented position: only 19 countries iodine insufficient in 2017, down from 54 only 14 years ago

Sources: IGN - Global Iodine Scorecard 2017
FOLIC ACID: REDUCTIONS IN NEURAL TUBE DEFECTS (NTDS) AFTER FLOUR FORTIFICATION WITH FOLIC ACID INITIATED

Prefortification NTD per 10,000

Postfortification NTD per 10,000

Folic acid in flour ranged from 1.2-2.2 mg/kg

FFI 2012, updated 2015
IRON FORTIFICATION IS ASSOCIATED WITH A DECREASED ANEMIA PREVALENCE IN NON-PREGNANT WOMEN

Each year of flour fortification was associated with a 2.4% decreased anemia prevalence among fortification countries (n=12).

Among non-fortification countries, no reduction in anemia prevalence was observed over time among non-fortification countries (n=20).

Analysis controlled for Human Development Index and Malaria. Source: Barkley 2015
In West Java from 2011 to 2012 oil fortification with vitamin A improved vitamin A status of women and children.

Evaluation study showed that fortified oil contributed 26% of daily need for children aged 12 to 23 months, 38-40% among older children, and 29–35% for women.

The vitamin A status of all beneficiaries improved from 2011 to 2012. Vitamin A deficiency dropped significantly during this time, falling from 6.5–8% to 0.6–6%

What is the potential for impact of food fortification?

- Dietary contribution of nutrients from fortified food vehicles
  - Coverage and utilization
  - Actual nutrient content of food at point of consumption or purchase

How is this potential distributed across population groups and particularly among those who might be most vulnerable to inadequate nutrient intakes?

- Representative sample stratified by potential risk factors for low micronutrient intakes (e.g. poverty, region of residence)
18 FACT surveys assessing large-scale food fortification programs completed in 16 countries between 2013-2017

<table>
<thead>
<tr>
<th>Country</th>
<th>Salt</th>
<th>Oil</th>
<th>Wheat flour</th>
<th>Maize flour</th>
<th>Semolina flour</th>
<th>Sugar</th>
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1 GAIN also conducted 12 surveys in 6 countries to assess targeted fortification programs for infants and children

2 Not shown: FACT modules were also included in Universal Salt Iodization (USI) Partnership Project surveys to assess salt iodization programs in Ethiopia, Ghana, India (national), Indonesia, Niger and Philippines
Coverage of wheat flour at household level

*Defined as commercially produced; **Iron present at any level above intrinsic level
Household coverage of foods in Kano, Nigeria 2015

Choice of Vehicle:
Home produced far more widely consumed compared with industrially processed, vehicles

N = 896 households for all vehicles
*Fortifiable refers to a food vehicle that was not made at home and is assumed to be industrially processed.
**Households were classified as fortified if they provided a sample or reported consuming a brand that was confirmed to be fortified by quantitative analyses.
Household coverage of foods in Kano, Nigeria 2015

Bottleneck: Monitoring and enforcement of fortification compliance

- Oil: 98.4% consumes food, 35.9% consumes fortifiable food*, 7.6% consumes fortified food**
- Wheat flour: 83.9% consumes food, 83.8% consumes fortifiable food*, 22.7% consumes fortified food**
- Semolina flour: 13.1% consumes food, 10.9% consumes fortifiable food*, 6.9% consumes fortified food**
- Maize flour: 77.1% consumes food, 11% consumes fortifiable food*, 1.7% consumes fortified food**
- Sugar: 94.5% consumes food, 94.4% consumes fortifiable food*, 21.1% consumes fortified food**
- Salt: 96.9% consumes food, 96.9% consumes fortifiable food*, 64.1% consumes fortified food**

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Implications for food fortification

• Food fortification programs can achieve high coverage and potential for impact among at-risk populations when there is appropriate:
  • strong design (i.e. appropriate vehicles are selected), and
  • strong implementation (i.e. ongoing monitoring and enforcement of standards to ensure fortification occurs)

• FACT fills an important gap in the availability of tools to assess coverage and generate data for program decision making during program implementation
National Fortification Delivery Model and the Unfinished Agenda

1) Build/Enabling Environment
- Establish and advocate for need to improve population nutrient intake and lack of sufficient strategies to address this need
- Develop standards & appropriate legislation
- Set program goals
- Build partnerships (e.g. alliances)
- Targeted advocacy
- Develop monitoring system

2) Scale-up/Improve
- Set up compliance & enforcement framework
- Procure equipment & premix, do training
- Develop marketing & comms strategy
- Develop monitoring system

3) Measure
- Initiate production and distribution
- Expand coverage
- Ensure quality
- Ensure utilization

Continual programme improvements

62 LMIC still need to mandate fortification of a grain)

Compliance is around 50%
www.gainhealth.org

Only 16 countries have published data on coverage
Global Fortification Data Exchange (GFDx)

Providing actionable food fortification data all in one place

www.FortificationData.org
Kenya food fortification – past and current GAIN support

- Through a US$2.38M grant to the MOH, GAIN supported national efforts to catalyze large-scale food fortification of maize flour, wheat flour and vegetable oil.
- The project was initiated in 2011, mandatory fortification was established in June 2012 and by 2015, there were over 150 brands of certified products, with over 80% of fortified oil available in the market.
- Enablers:
  - KNFFA, government and industry strengthening
  - Development of monitoring tools
  - Development of Communication and Social marketing Strategy
  - Development of M & E framework
  - Development of Web-based database.
- Now GAIN is building a coalition among all partners to catalyze an advocacy campaign to improve coverage and compliance in Kenya
Four sets of activities to make the future fortified

1. Advocacy to **build and expand** new national programs
2. Technical assistance and political changes to **improve compliance and standards**
3. Actions to improve **monitoring, research and evaluation** of programs
4. New innovations and food vehicles (e.g. rice, tea)
“The reasons for investing in fortification is the potential of our children. It is both compelling and self-evident.”

King Letsie III

THANK YOU

Asante Sana