Challenges of Measuring Biological Impact in Food Fortification

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Effectiveness of Large-Scale Fortification
Micronutrient Forum
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Does food fortification have a public health impact?
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Effectiveness trials
Real-life conditions
Challenges with measuring biological impact in food fortification programs through effectiveness trials
Lack of a control group

- As of September 2009
- Mandatory fortification with folic acid
- Wheat flour used to make bread
- No opportunity for a control group that does not get fortification
- Difficult to infer causality for fortification
Is it plausible that fortification contributed to biological impact?

Costa Rica Children 1-7 Years:
Prevalence Pre and Post Fortification with Iron

<table>
<thead>
<tr>
<th>Condition</th>
<th>1996</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron Deficiency</td>
<td>26.9</td>
<td>6.8</td>
</tr>
<tr>
<td>Anemia</td>
<td>19.3</td>
<td>4</td>
</tr>
<tr>
<td>Iron-Deficiency Anemia</td>
<td>6.2</td>
<td>0</td>
</tr>
</tbody>
</table>

Foods fortified with iron: wheat flour, maize flour, milk

Martorell 2015
SOLUTION
Gather complementary information to argue for fortification’s contribution

Potential to benefit (presence of micronutrient deficiencies)
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- Fortification policy created and legislation passed

Martorell 2015
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- Foods are fortified at mandated levels and compliance is monitored and enforced

Martorell 2015
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Program Impact Pathway

1. Potential to benefit (presence of micronutrient deficiencies)
2. Fortification policy created and legislation passed
3. Bioavailable fortificant is mandated for food(s) that are consumed by the nutritionally needy
4. Foods are fortified at mandated levels and compliance is monitored and enforced
5. Fortified foods are consumed in adequate amounts (meaningful contribution to requirements)

Martorell 2015
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Public health impact (reductions in micronutrient deficiencies)

Martorell 2015
Establishing a baseline before fortification implementation

- 1951: Wheat flour fortification mandated
- 1965: Iron compound changed to ferrous sulfate
- 1974: First national survey to assess anemia

Hertrampf 2008
Plan for evaluation

Steps
- Engage stakeholders
- Ensure use and share lessons learned
- Justify conclusions
- Gather credible evidence
- Describe the program
- Focus the evaluation design

Standards
- Utility
- Feasibility
- Propriety
- Accuracy

CDC 1999
SOLUTION

Use other methods to assess fortification’s contribution

- Cross-sectional survey
- Non-pregnant women of childbearing age: % iron deficiency
- Families: monthly per capita consumption fortified wheat flour

National Micronutrient Status and Fortified Food Coverage Survey, Oman, 2004

Grimm 2012
SOLUTION

Use other methods to assess fortification’s contribution

Prevalence of Iron Deficiency Among Non-Pregnant Women 15-49 Years in Oman

>= 1 kg/mo
26.8

< 1 kg/mo
38.8

Monthly Per Capita Consumption of Fortified Wheat Flour

Grimm 2012
Impact evaluation surveys can be costly
Use existing data

- Wheat and maize flour fortification mandated in June 2004: iron & folic acid
- National Information System on Live Births
- No primary data collection required
Use existing data-collection systems

- Nationally representative DHS survey
- Added micronutrients module
- Blood samples: iron, vitamin A, vitamin D, calcium, folate, vitamin B12 status
- Urine samples: iodine status

Conclusions

- Measuring biological impact of food fortification programs through effectiveness trials presents many challenges

- Some of these challenges can be overcome by:
  - Gathering complementary information which allows assessing the plausibility that fortification contributed to biological outcomes
  - Planning for impact evaluation surveys while planning for fortification implementation overall
  - Employing non-traditional impact-evaluation study designs
  - Using existing data and data-collection systems to reduce costs
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Join the Food Fortification Initiative group on LinkedIn

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