Monitoring & Evaluating Food Fortification Programs: An Overview

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Laird J. Ruth
Centers for Disease Control and Prevention (CDC)

International Micronutrient Malnutrition and Control (IMMPaCt) Program
www.cdc.gov/immpact

Flour Fortification Initiative
www.ffinetwork.org
Topics

• Monitoring definition and concepts
• Food fortification monitoring system overview
• General principals for setting up a monitoring system
• Data sources for monitoring
Monitoring: definition and concepts
Framework for Monitoring of Food Fortification Programs

- **FOOD**
  - National or Imported
  - **IMPORTED FORTIFIED FOOD**
    - Certificate of Conformity or Inspection (Food Control Dept. and Customs)
      - Quality Auditing with Conformity Assessment (Food Control/ witnesses)
  - Importation Warehouse

- **VITAMIN/MINERALS PREMIX**
  - **INTERNAL MONITORING** (Factories or Packers)
    - Internal Monitoring (Factories or Packers)
      - Factory Inspection (Corroborating trial) and Technical Auditing (Government Food Control Unit)
      - Verification of Legal Compliance (Corroborating trial in retail stores) (Food Control and Units of Standards and/or Consumer Protection)

- **EXTERNAL MONITORING** (Factories or Packers)
  - **EXTERNAL MONITORING** (Factories or Packers)
  - **COMMERCIAL MONITORING** (At retail stores)

- **PROCESS M&E**
  - Assessment of program inputs, activities, and outputs (provision)

- **EFFECTIVENESS M&E** (Communities, households, individual)
  - Assessment of impact on behavior (consumption, awareness), biochemical, clinical and functional outcomes

**FOOD CONTROL**

**PROGRAM M&E**
Process (Program) Monitoring

- **Inputs** extend to the financial, human, and material resources used for a program.

- **Activities** are the specific actions taken or work performed through which inputs, such as funds, technical assistance and other types of resources are mobilized to produce specific outputs.

- **Outputs** include the products, capital goods and services that result from an intervention, which are relevant to the achievement of outcomes.

- **Outcomes** extend to the likely or achieved effects, or impact of a program in the target population.
Logic Model of M&E
Food Fortification Program
Monitoring Definition:

• The continuous, ongoing collection, review, analysis, and use of information and outcomes, to assess how the program is performing against predefined criteria.
Program Monitoring

- On-going collection of data and information to help assess the “processes” of program implementation, i.e. inputs and activities carried out, and products and services (outputs) generated by the program according to pre-established criteria, and review of performance quality (i.e. answering the question, “how is the program proceeding?”).
Monitoring and Evaluation Pipeline

**Monitoring**
“Process Evaluation or Program Performance”

**Evaluation**
“Effectiveness Evaluation”

**Inputs**
- Resources
- Staff
- Funds
- Materials
- Facilities
- Supplies
- Training
- Fortified food availability
- Trained staff
- Quality of services
- Marketing
- IEC activities

**Outputs**

**Short-term and intermediate effects**
- Behavior change
- Attitude change
- Changes in trends

**Outcomes**

**Long-term effects**
Changes in:
- Biochemical indicators of deficiency and excess
- Clinical indicators of deficiency and excess
- Morbidity
- Mortality
- Education status
- Quality of life
- Economic impact

**Impact**

**Levels of Evaluation Efforts**

**Number of Projects**
- All
- Most
- Some
- Few

**Monitoring and Evaluation Pipeline**
Food Fortification Monitoring System Overview
Why Monitor a Food Fortification Program?

1. To ensure that fortified foods meet nutrient content and safety standards

2. To assess access, utilization and coverage of fortified foods by the people (the consumer)

3. To effectively manage and sustain the fortification program to eliminate vitamin and mineral deficiencies
Monitoring system

- **Access**: are the fortified products available and affordable to the target population?
- **Utilization**: are the fortified products being purchased by the target households?
- **Coverage**: are the fortified products being consumed by the target population?
# Indicator example #1

<table>
<thead>
<tr>
<th>Question</th>
<th>Measure</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access</strong>: are the fortified products available and affordable to the target population?</td>
<td>Increased production of fortified flour according to specifications</td>
<td>• Proportion of fortified / unfortified flour produced</td>
</tr>
</tbody>
</table>
## Indicator example #2

<table>
<thead>
<tr>
<th>Question</th>
<th>Measure</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Utilization</strong>: are the fortified products being purchased by the target households?</td>
<td>Increased purchase of fortified flour and byproducts</td>
<td>•Proportion of households with flour “labeled” as fortified</td>
</tr>
</tbody>
</table>
## Indicator example #3

<table>
<thead>
<tr>
<th>Question</th>
<th>Measure</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coverage</strong>: are the fortified products being consumed by the target population?</td>
<td>Increased proportion of non-pregnant women (15-49) regularly consuming fortified flour</td>
<td>• Proportion of non-pregnant women (15-49) regularly consuming fortified flour</td>
</tr>
</tbody>
</table>
General Principals for Setting up a Monitoring System

1. Responsibility at each level needs to be clear:

   a) For whom are the data collected (stakeholders)?
   b) What data are collected (questions and indicators)?
   c) How are the data collected (methodology)?
   d) Who collects the data (personnel)?
   e) When are the data collected (frequency)?
   f) Who analyzes the data?
   g) Who reports the data and when?
   h) Who does what based on the information?
Example: Process Monitoring of Flour Fortification

**Is sufficient fortified flour accessible?**

- **Determine for whom to collect data**
  - National Fortification Alliance

- **Determine what you need to know**
  - Amount of fortified flour (local and/or imported) relative to population needs

- **Determine how and who collects data**
  - 1. Analyze flour industry production and sales data
  - 2. Retail assessment

- **Determine how often to collect data**
  - Annually (on-going)

- **Determine who reports data**
  - Milling companies and distributors; MoCommerce
Monitoring Implementation

- Do **pilot run of monitoring system** (data collection, analysis, and reporting process) to:
  - Correct potential problems
  - Allow “Stakeholders” to experience the system and:
    - Their role, level of effort, and importance in the process
    - The specific kinds of information that would be available to them through the monitoring system

*Parvanta, 2003*
Data Sources for Monitoring

• Existing data systems
  – Health statistics data; anemia from ANC
  – Multiple Indicator Cluster Surveys (MICS)
  – Reproductive health surveys
  – Household Expenditure and Income Survey (HEIS)
  – Other surveys from other sectors (NGOs, government, Universities, etc)
Data Sources for Monitoring

• Sentinel monitoring (purposive sampling)
  – Schools
  – Worksites
  – Public health clinics

• Qualitative research and reports
  – Universities
  – Industry
Program Evaluation

Objective assessment of a program that covers its need, design, implementation, effectiveness, efficiency and sustainability.
Aim of Evaluation

- Analyzes why intended impacts were or were not achieved
- Explores unintended results
- Informs practice, decision-making and policy
Evaluation questions

• Does the intervention achieve the intended purpose?

• Can the changes in outcomes be explained by the intervention, or by some other factors occurring simultaneously?

• Do intervention impacts vary across different groups of intended beneficiaries, regions, and over time?

• Are there any unintended effects of the intervention, either positive or negative?

• How cost-effective is the intervention in comparison with alternative projects?
Steps in designing a flour fortification monitoring & evaluation system

FIGURE 1. Recommended framework for program 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

24
Describing the program: 
Macro Logic Model for M&E

- Inputs
- Activities
- Outputs
- Primary/Direct Outcomes
- Secondary Outcomes
- Tertiary/Functional Outcomes

**PROCESS** (Program)

**EFFECTIVENESS** (Subjects)

**MONITORING**

**EVALUATION**
Monitoring & Evaluation Pipeline

MONITORING
“Process Evaluation or Program Performance”

EVALUATION
“Effectiveness Evaluation”

Inputs

Number of Projects

Outputs

Levels of Evaluation Efforts

All
Most
Some
Few

Short-term and intermediate effects

Resources
Staff
Funds
Materials
Facilities
Supplies
Training

Fortified food availability
Trained staff
Quality of services
Marketing
IEC activities

Behavior change
Attitude change
Changes in trends

Impact

Long-term effects

Changes in:
• Biochemical indicators of deficiency and excess
• Clinical indicators of deficiency and excess
• Morbidity
• Mortality
• Education status
• Quality of life
• Economic impact
Collecting credible data

• Depend on the purpose of the evaluation

• Can be simple and not costly … or very complex and expensive
Example with flour fortification and anemia reduction in women

• Baseline and survey 2-3 yrs after

• Baseline and survey 2-3 yrs after, looking at potential confounding factors

• Baseline + end survey with control

• Allow to say if there was a change in anemia level or not

• Allow to say that impact may be related to the program

• Allow to say that the impact is more likely due to the program
Choice of indicators

- Effectiveness indicators are related to outcomes
  - Change in behaviours
  - Consumption of foods/micronutrients
  - Biochemical/ physiological/ functional
    - For anemia: hemoglobin, serum ferritin, inflammatory responses (CRP, AGP) and others if budget allows
Data sources for Evaluation

- Program based monitoring (sentinel system):
  - PHC based (e.g. 1st trimester pregnant women). Sentinel health centers.
  - Mothers of children seen in PHC
  - School based monitoring (high school girls). Sentinel schools
  - Large employers of female workforce. Sentinel worksites

- Population based monitoring:
  - Periodic national/sub-national cluster surveys

*Parvanta, 2003
Example from flour fortification program in RSA
## Micronutrient Status of non-pregnant women of reproductive age before & after implementing National Fortification Program

<table>
<thead>
<tr>
<th>Micronutrient</th>
<th>Pre-fortification Period (95% CI)</th>
<th>Post-fortification Period (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum Folate &lt; 2.5 ng/ml</td>
<td>16.3%</td>
<td>0%</td>
<td>0.001</td>
</tr>
<tr>
<td>Red Blood Cell Folate &lt; 164 ng/ml</td>
<td>26.4%</td>
<td>1.9%</td>
<td>0.000</td>
</tr>
<tr>
<td>Serum Ferritin &lt; 12.0 µg/ml</td>
<td>25.0%</td>
<td>25.0%</td>
<td>0.74</td>
</tr>
<tr>
<td>Hemoglobin &lt; 11.0 g/dl</td>
<td>7.5%</td>
<td>5.0%</td>
<td>0.51</td>
</tr>
<tr>
<td>Vitamin B12 &lt; 145 pg/ml</td>
<td>6.3%</td>
<td>11.3%</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Modjadji SEP., Alberts RL. Folate and iron status of South African non-pregnant women of childbearing age before and after fortification of foods. SAJCN: Vol 20, No 3; 89, 2007.
Neural Tube Defects Surveillance System

- NTD surveillance system was established in 2002
- 12 public hospitals in 4 provinces
- Since 2002, 53,000 births/year have been monitored
- Prevalence of NTDs was reduced by 30.5% after mandatory fortification (p<0.05)

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>Rate/1000 Births</td>
<td>Rate/1000 Births</td>
</tr>
<tr>
<td>Eastern Cape</td>
<td>2.11</td>
<td>1.26</td>
</tr>
<tr>
<td>KwaZulu Natal</td>
<td>1.05</td>
<td>0.78</td>
</tr>
<tr>
<td>Mpurnalanga</td>
<td>1.36</td>
<td>1.02</td>
</tr>
<tr>
<td>Free State</td>
<td>1.29</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.41</strong></td>
<td><strong>0.98</strong></td>
</tr>
</tbody>
</table>

95% CI: 1.15-1.67
95% CI: 0.69-1.26

Perinatal Mortality Surveillance System

- Causes of death >7 days old recorded in 164 sentinel health care facilities
- NTD perinatal mortality decreased by 65.9% (P<0.001)
- As a control, the perinatal mortality rate of hydrocephalus, unrelated to NTDs, did not change significantly (P=0.77)

Reduction in Perinatal Mortality Rates from NTDs in South Africa

How often to evaluate?

- Done periodically but not frequently
- Elaborates on the information on program implementation and impact generated through the ongoing monitoring system
- It is often targeted to problems identified through the monitoring process.
When to do impact evaluation?

- Once process monitoring system indicates:
  - Adequate program implementation
    - Need regular production and distribution of fortified product
    - Usually after 1 yr, more often after 18-24 mo
  - Adequate program coverage for minimum period (depends on target nutrient)

Not Before!
Justifying and sharing conclusions

• Critical in order to sustain successful aspects and adapt program if improvements required
• Compare data from various sources (if available)
• Get stakeholders involved to embrace results and take actions
• Communicate and disseminate
Helpful Publications @ www.cdc.gov/eval

Framework for Program Evaluation in Public Health

An Evaluation Framework for Community Health Programs
Helpful Resources: Web Based

• NEW! Intro to Program Evaluation for PH Programs—A Self-Study Guide:
  http://www.cdc.gov/eval/whatsnew.htm

• Innovation Network:
  http://www.innonet.org/

• W.K. Kellogg Foundation Evaluation Resources:

• University of Wisconsin-Extension:
  http://www.uwex.edu/ces/lmcourse/
Remember ..... 

There Are No Perfect Monitoring Systems

Only "Best We Can Do" Ones

*Parvanta, 2003
Thank You!

lairdruth@cdc.gov

Monitoring and Evaluating
Food Fortification Programs:
General Overview Technical Consultation July 7, 2006
USAID - www.a2zproject.org