Micronutrient Powders: Current Global Program Implementation Status and Challenges

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Presentation Overview

• Rationale
• Evolution
• Challenges
• Way forward
• Summary
Energy (kcal) intake from complementary foods in breastfed children

- **2-3 feeds/d**
  - Complementary food: 200 kcal/day
  - Breastmilk: 413 kcal/day

- **3-4 feeds/d**
  - Complementary food: 300 kcal/day
  - Breastmilk: 379 kcal/day

- **12-23 months**
  - Complementary food: 550 kcal/day
  - Breastmilk: 346 kcal/day

Dewey K and Brown KH FNB 2003
% of nutrient requirements from complementary foods (children 9-11 months)

Dewey K Ped Clin N Amer 2001;48:87-104
Dietary Interventions
Total & Absorbed Iron Content

Infant Requirements
8-12 months = 0.8mg
However, in many settings, fortified infant cereals are not accessible or affordable to large parts of the population.
Mass fortification of flour with iron, folate, and other micronutrients

LIMITATIONS OF MASS FORTIFICATION

• Special groups will have limited benefits
  – Flour intakes of infants and young children are insufficient to meet nutrient demands
    ➡ Special strategies are needed to meet their nutritional needs
What is home fortification?

• An innovation to improve diet quality of nutritionally vulnerable groups, such as young children

• Aims to ensure that the diet, i.e. complementary foods and breast milk combined, meets the nutrient needs of young children
There are two main types of home fortificants:

- Micronutrient Powders (MNP)
- Small-quantity lipid-based nutrient supplements (SQ-LNS)
Home Fortification with MicroNutrient Powders (MNP)

- Single-serve sachets of powdered vitamins and minerals
- Semi-solid ‘complementary’ foods are suitable for fortification at home
- Successfully used in many settings as ‘Sprinkles’, Chispitas, Babyfer, MixMe and Ongera
Advantages of MNP

- Lipid coating prevents interactions between vitamins, minerals and food, as well as changes in taste and color of food
- Lightweight, easy to store and transport
- Inexpensive (1 sachet=$0.02 (INR=1))
Advantages of MNP

- Do not conflict with breastfeeding
- Can be added directly to common foods
- Easy to use and highly ‘acceptable’
Guiding Principles for Complementary Feeding of the Breastfed Child

1. Exclusive breastfeeding (EBF) for 6 months and introduction of complementary foods at 6 months
2. Maintenance of BF for up to two years and beyond
3. Responsive feeding
4. Safe preparation and storage of complementary foods
5. Adequate amount of complementary foods needed
6. Appropriate food consistency
7. Adequate meal frequency and energy density
8. Adequate nutrient content
9. Use of vitamin-mineral supplements or fortified products for infants and mother
10. Increase feeding during illness and after illness (e.g. diarrhea)

Available at http://www.who.int/nutrition/publications/guiding_principles_compfeeding_breastfed.pdf
MNPs promise to achieve higher compliance than iron drops/syrups

Iron drops/syrups
- Metallic taste
- Staining of teeth
- Difficulty in measurement

MNPs
- No changes to taste
- Easy to add
- Non-medical approach
Evolution of MNP programs

- 1990: MNP invented & developed
- 1995: Programs start
- 2000: First program guidelines
- 2005: Home fortification technical advisory group formed
- 2010: WHO guidelines MNP 6-23 M & HFTAG program guidance
- 2015: Community of practice & toolkit
- Program scale up
Home fortification of foods with multiple micronutrient powders reduced anaemia by 31% and iron deficiency by 51%.

Home fortification of foods with multiple micronutrient powders is recommended to improve iron status and reduce anaemia among infants and children 6–23 months of age.

In malaria-endemic areas, the provision of iron should be implemented in conjunction with measures to prevent, diagnose and treat malaria.

WHO guidelines (2011) provides basis for program decision, HFTAG guidance note provides program implementation guidance.

Available at http://www.gainhealth.org/hftag/

Guideline:

*Use of multiple micronutrient powders for home fortification of foods consumed by infants and children 6–23 months of age*
Standard MNP formulations provide one Recommended Nutrient Intake for children 6-59 months

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<thead>
<tr>
<th>Micronutrients</th>
<th>Children (6–59 months)</th>
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<tr>
<td>Vitamin A µg RE</td>
<td>400</td>
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<tr>
<td>Vitamin D µg</td>
<td>5</td>
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<tr>
<td>Vitamin E mg</td>
<td>5</td>
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<td>Vitamin C mg</td>
<td>30</td>
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<td>Thiamine (vitamin B₁) mg</td>
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<td>Riboflavin (vitamin B₂) mg</td>
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<td>Niacin (vitamin B₃) mg</td>
<td>6</td>
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<td>Vitamin B₆ (pyridoxine) mg</td>
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<td>Vitamin B₁₂ (cobalamine) µg</td>
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<td>Folate µg&lt;sup&gt;a&lt;/sup&gt;</td>
<td>150.0</td>
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<td>Iron mg</td>
<td>10.0</td>
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<td>Zinc mg</td>
<td>4.1</td>
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<td>Copper mg</td>
<td>0.56</td>
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<td>Selenium µg</td>
<td>17.0</td>
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<td>Iodine µg</td>
<td>90.0</td>
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HFTAG 2011

Maria Elena Jefferds, Laura Irizarry, Arnold Timmer, and Katie Tripp

Food and Nutrition Bulletin 2013, vol. 34, 434-445
22 countries were implementing MNP interventions in 2011.
2013

43 countries implementing MNP interventions – reaching 3.6 M children

implementing MNP interventions
planning MNP interventions
no interventions ongoing or planned
no data
not targeted
## MNP interventions at scale

<table>
<thead>
<tr>
<th>2011 – 4 countries reach large (national) target</th>
<th>2013 – 14 countries reach large (national) target</th>
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<tr>
<td>Bangladesh</td>
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<td>Syrian Arab Republic</td>
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<td>Yemen</td>
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Food and Nutrition Bulletin 2013, vol. 34, 434-445
UNICEF NutriDash 2014
Links of MNP programs with other programs

- Not integrated (n=13)
- Aneamia/micronutrient deficiency prevention and control (n=10)
- Infant and Young Child nutrition programme (n=31)
- School feeding programme (n=3)
- Social protection (n=1)
- Other (n=1)
Social marketing through a combination of community-based and private sector channels to increase MNP access in Madagascar

% of children 6-23 months receiving minimum meal frequency, minimum dietary diversity and minimum acceptable diet in past 24 hours, Fenerive Est and Vavatenina Districts (2012-2014)

Ramalanjaona et al; Presentation at 2014 Micronutrient Forum
Effects of a large-scale micronutrient powder and young child feeding education program on the micronutrient status of children 6–24 months of age in the Kyrgyz Republic

Serdula et al, EJCN doi:10.1038/ejcn.2013.67
Program Challenges

1. Funding of MNP programs
2. Procurement, quality of MNP product
3. Management/coordination of programs
4. Monitoring of programs and its impact
Way forward

MNP formulation/packaging

- Optimize iron forms to reduce potential non-benefits for microbiota and infections
- Explore addition of other growth promoting nutrients (such as calcium, magnesium, phosphorous)
- Reduce antinutrient content (e.g. by adding phytase)
- Develop more environmentally friendly packaging

Dosing frequency

- Assess dose-response relationship between MNP intake and change in micronutrient status and functional outcomes

Adapted from de Pee et al Sight and Life 2013: 51-56
Way forward (2)

Delivery science

– Rapid appraisal methodology for designing behavior change strategy (incl locally tailored package design)
– Evaluate best practices on how to monitor and sustainably scale up the intervention
– Improve links with malaria-control programs (where indicated)
– Strengthen demand for infant and young child services, and water, sanitation, and hygiene interventions

Adapted from de Pee et al Sight and Life 2013: 51-56
Summary: Home Fortification with MNP

- WHO recommends home fortification with MNPs to improve iron status and reduce anemia among infants and children 6–23 months of age
- MNP programs experienced rapid scale up since 2011
- MNP programs have the potential to strengthen overall infant and young child feeding practices
Join the HFTAG Community of Practice on MNP programs at http://network.hftag.org

Slide Credits

Saskia de Pee
Judy McLean
Stanley Zlotkin