



IYCN USAID's Infant
& Young Child
Nutrition Project

Child Anemia

Scope, consequences and solutions

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Photo: Aurelio Ayala III

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What is anemia?

- Low hemoglobin concentration
- Low packed volume of red blood cells
- Anemia vs. iron deficiency anemia (IDA)
 - Not all anemia results from inadequate iron intake
 - IDA occurs when iron stores are inadequate in addition to low hemoglobin
 - Reasonable to assume that iron deficiency is responsible for 50% of anemia (Stolzfus et al, 2003)

What causes anemia?

- Genetic disorder (e.g., hemoglobinopathy)
- Infection (malaria, chronic infection)
- Blood loss
- Inadequate iron intake
 - Requirement higher during periods of high growth (e.g., infants and young children)
 - Difficult to meet requirement without supplements or fortified foods, especially with monotonous cereal-based diet

How common is child anemia?

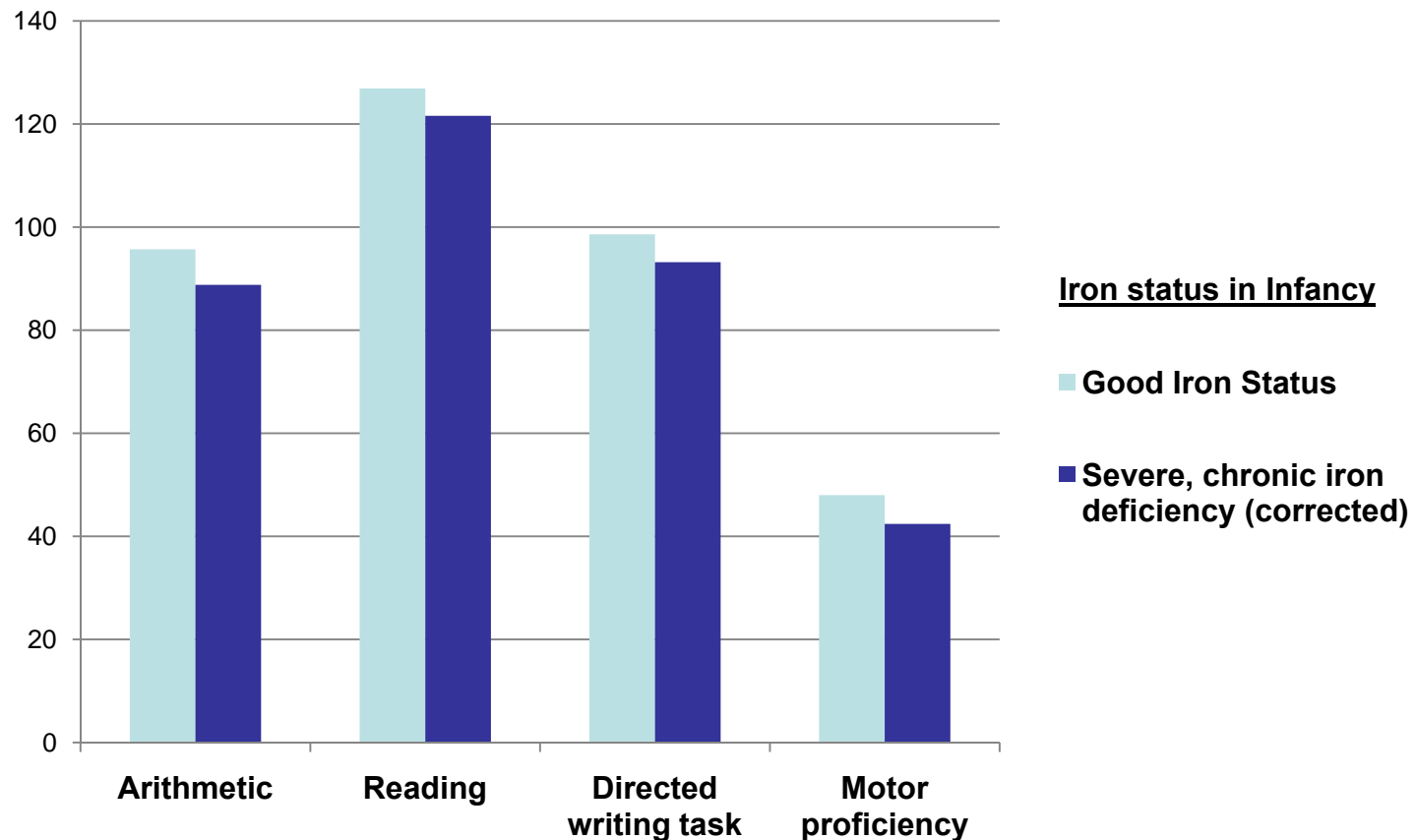
Global prevalence: 47.4%, or 293.1 million infants and children

Region	Prevalence (%)	Number (000,000)
Africa	64.6	93.2
Asia	47.7	170.0
Europe	16.7	6.1
Latin America / Caribbean	39.5	22.3
North America	3.4	0.8
Oceania	28.0	0.7

What are the consequences?

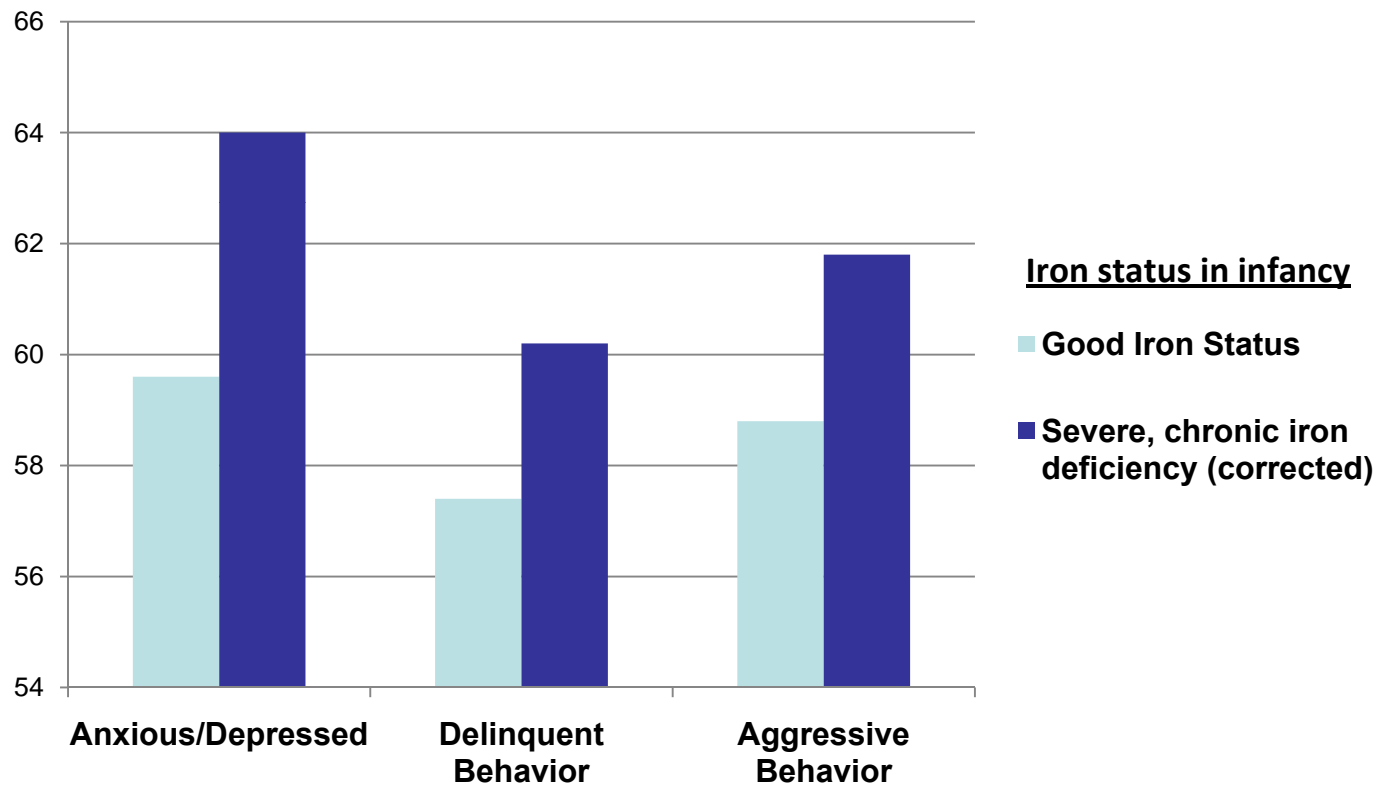
Observational study 10-year follow-up, Costa Rica

Cognitive and motor performance



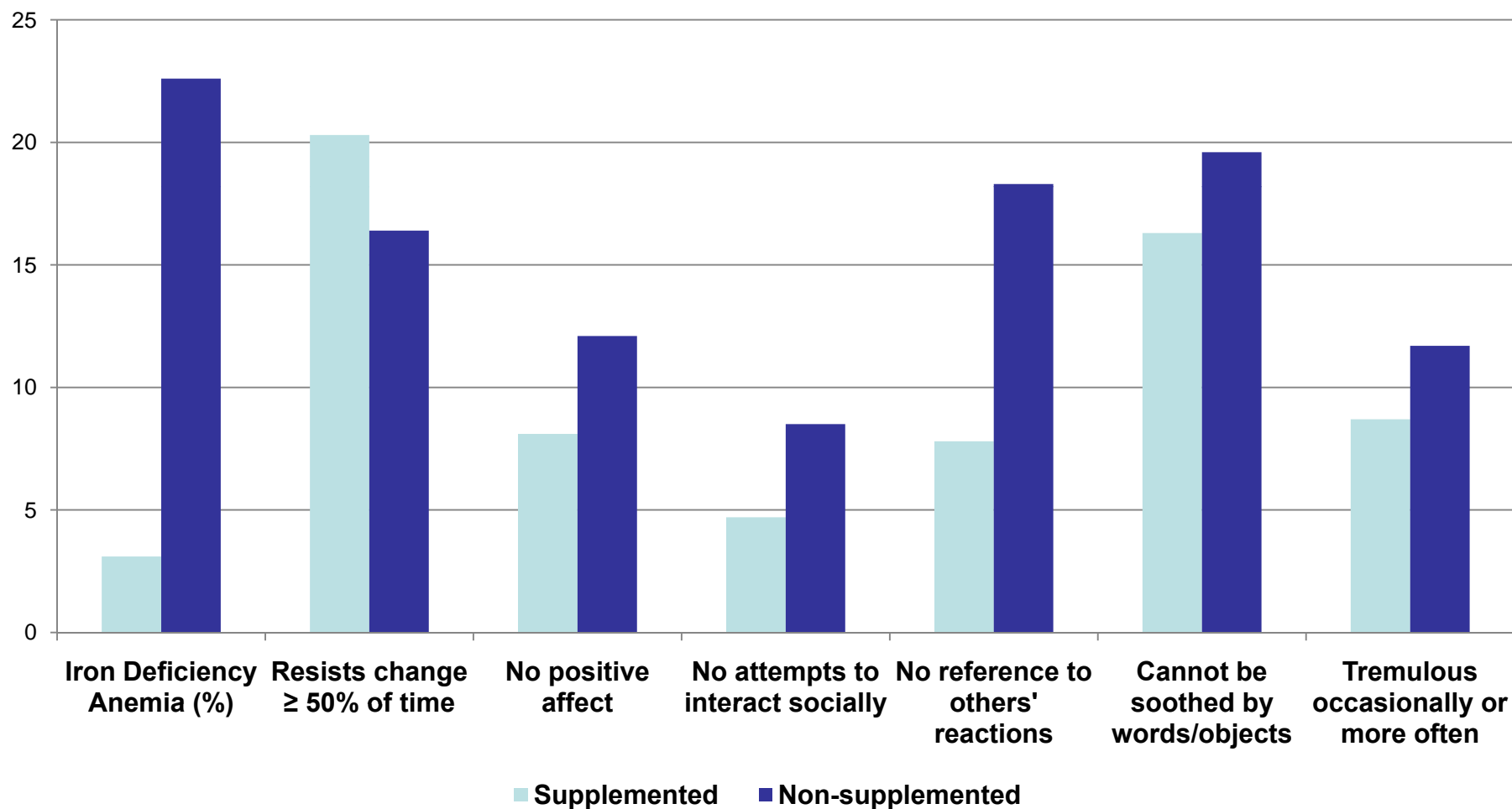
Observational study 10-year follow-up

Behaviors



Prevention Study

Supplemented vs. Non-supplemented at 12 months of age, Chile



Source: Lozoff et al, 2003

What are the solutions for IDA?

Iron syrup	Fortified complementary food
<ul style="list-style-type: none">• Acceptability problems for moms and kids<ul style="list-style-type: none">• Dental stains• Metallic taste	<ul style="list-style-type: none">• Expensive
<ul style="list-style-type: none">• Costs associated with bottle breakage and transport of heavy liquid	<ul style="list-style-type: none">• Poor low income market penetration

Micronutrient powders

- Vitamins and minerals for mixing with solid or semi-solid foods at the time of consumption (“home fortification”)
- Target iron deficiency, but multiple micronutrients
- Single daily dose (no measurement of sachet)
- Lightweight
- No “breakage”
- No staining
- No metallic taste
- < 5 cents per sachet



Two common formulations

Nutritional anemia formulation

Micronutrient	Amount
Iron	12.5 mg
Zinc	5 mg
Folic Acid	160 µg
Vitamin A	300 µg RE
Vitamin C	30 mg

- Iron dose based on WHO/ UNICEF/INACG recommendation for infants 6-24 m, where the prevalence of anemia exceeds 40 percent
- Other nutrient levels based on WHO RNI and RDAs for children 6-24m

Multiple micronutrient formulation

Micronutrient	Amount
Vitamin A	400 µg RE
Vitamin C	30 mg
Vitamin D	5.0 µg
Vitamin E	5 mg a-TE
Vitamin B1	0.5 mg
Vitamin B2	0.5 mg
Vitamin B6	0.5 mg
Vitamin B12	0.9 µg
Folic Acid	150 µg
Niacin	6 mg
Iron	10 mg
Zinc	4.1 mg
Copper	0.56 mg
Iodine	90 µg
Selenium	17.0

Do micronutrient powders work?

Country studies

Ghana(4)	Israel
China	Canada (Aboriginal peoples)
Bolivia	India
Sri Lanka	Bangladesh (3)
Pakistan	Mongolia
Cambodia	Haiti

Meta-analysis findings

- “...as effective as iron drops for treating anaemia”
- “...home fortification is highly effective at reducing iron deficiency and decreases the prevalence of anaemia by half.”
- “...results of...prevention trials suggest positive effects...on child development, but further research is needed.”



Source: Dewey, Yang, and Boy; 2009

Photo: Aurelio Ayala III

How to program micronutrient powders?

- Consuming 60 doses (sachets) over 4 months protects against anemia for 6 months
- Possible mechanisms
 - Child Health Days
 - Immunization contacts
 - Growth monitoring and promotion contacts
 - Other?



Thank you



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