Implementing national fortification programs: Critical factors for success

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The Global Nutrition Challenge

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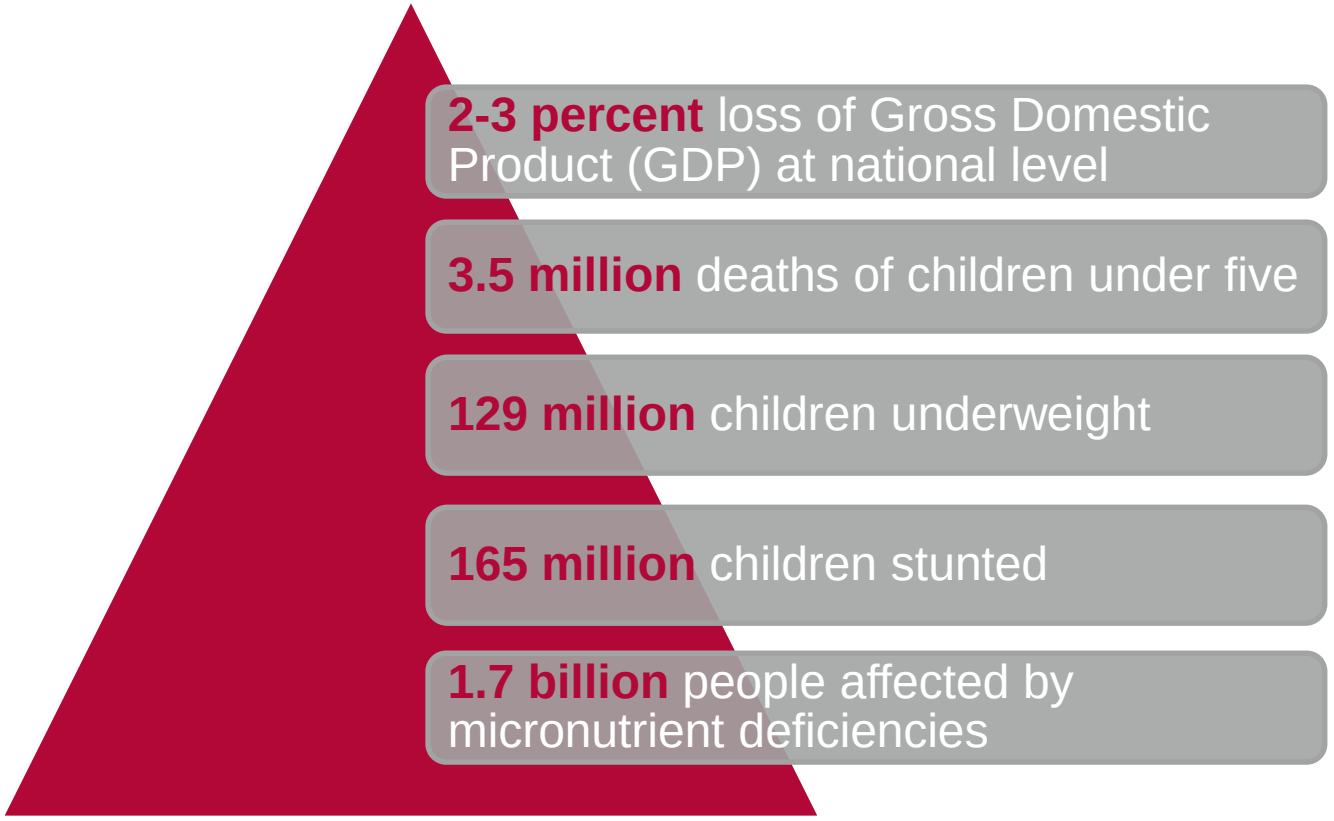

Micronutrients

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Zinc

Vitamin D

Cobalt

Iodine

Thiamin

Riboflavin

Vitamin B_6

Vitamin E

Magnesium

Manganese

Iron

Selenium

Folate

Vitamin B_{12}

Niacin

Vitamin A

Phosphorus

Vitamin K

Vitamin C

Cobalamin

Chromium

Solutions

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- Dietary diversification
- Supplementation
- Fortification

Combined, these methods have brought vitamin and mineral deficiency under control in developed countries.

It is time now to deploy these solutions for the benefit of the peoples developing countries

Food Fortification is not A New Idea

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Iodine	Switzerland 1923 USA 1930	Salt
Vitamin D	Denmark 1930	Margarine
Vitamin A	USA, UK 1923	Milk
B1, B2, Niacin, Fe	Canada 1933 USA 1941 Chile 1954	Wheat flour
Vitamin A	Central America 1974	Sugar

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Over the last 70 years, food fortification has played a major role in the health of populations in industrialized countries and several nutritional deficiencies have been eliminated

Fortification is a cost-effective strategy:

"Probably no other technology available today offers as large an opportunity to improve lives and accelerate development at such low cost and in such a short time"

(source: Enriching Lives, The World Bank)

Food fortification programs
Critical factors for success - Reach

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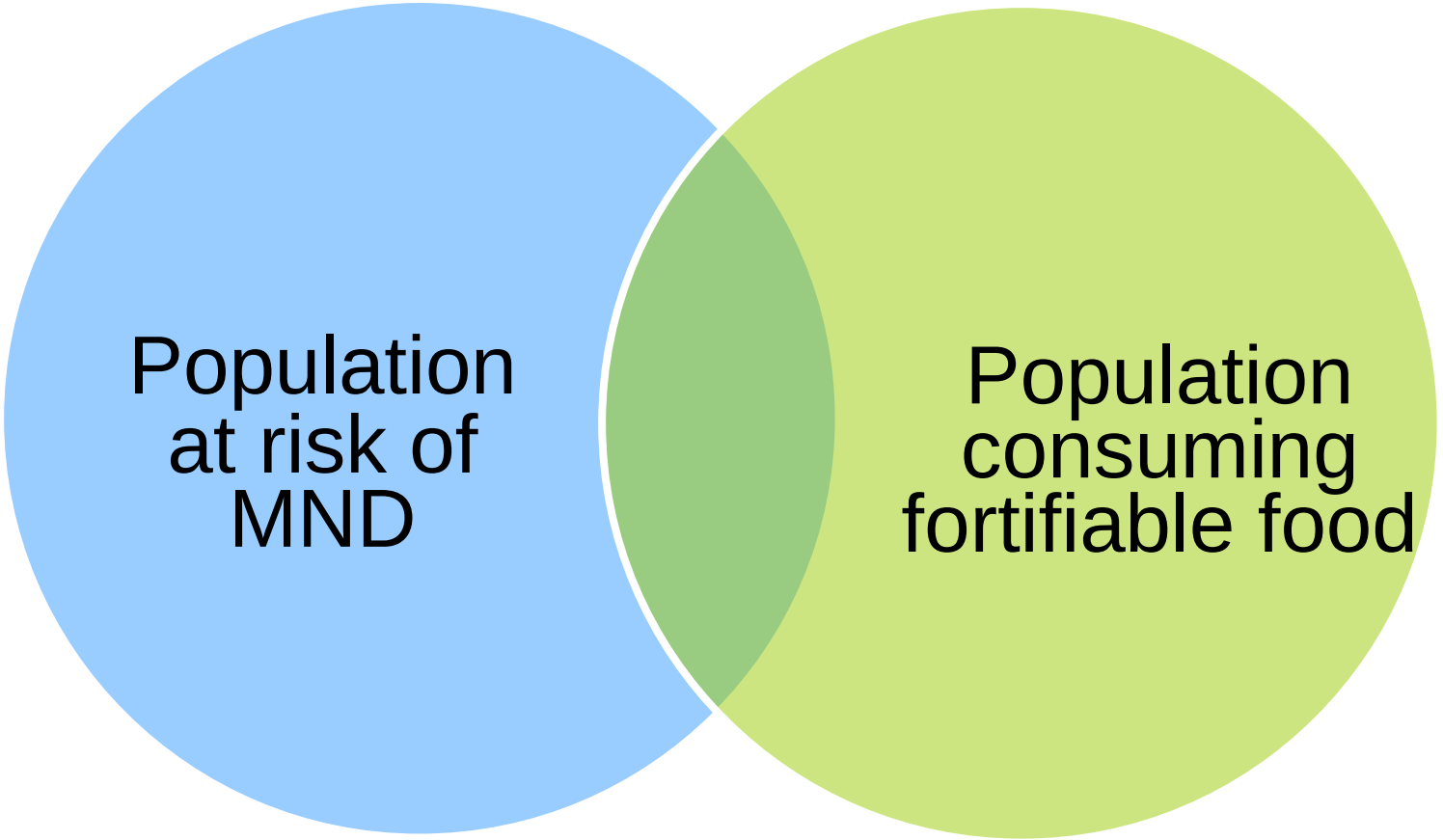

Food fortification programs
Critical factors for success

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Situation analysis

- To collect, review, analyze, and interpret information related to
  - the problem of MN deficiencies and
  - food fortification as a strategy for their elimination – fortifiable foods?
- Determine the prevalence of micronutrient deficiencies
  - What to measure?
  - Who to measure?
  - How to measure?

Food fortification programs
Critical factors for success

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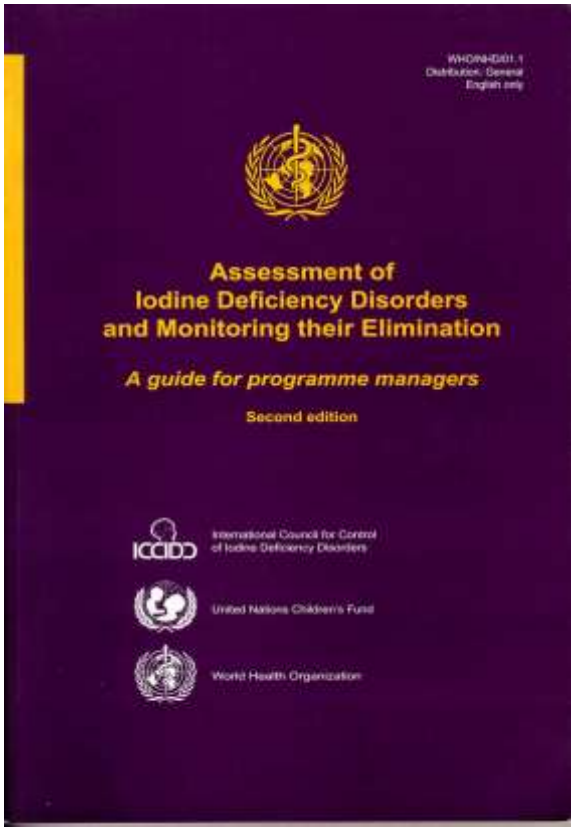

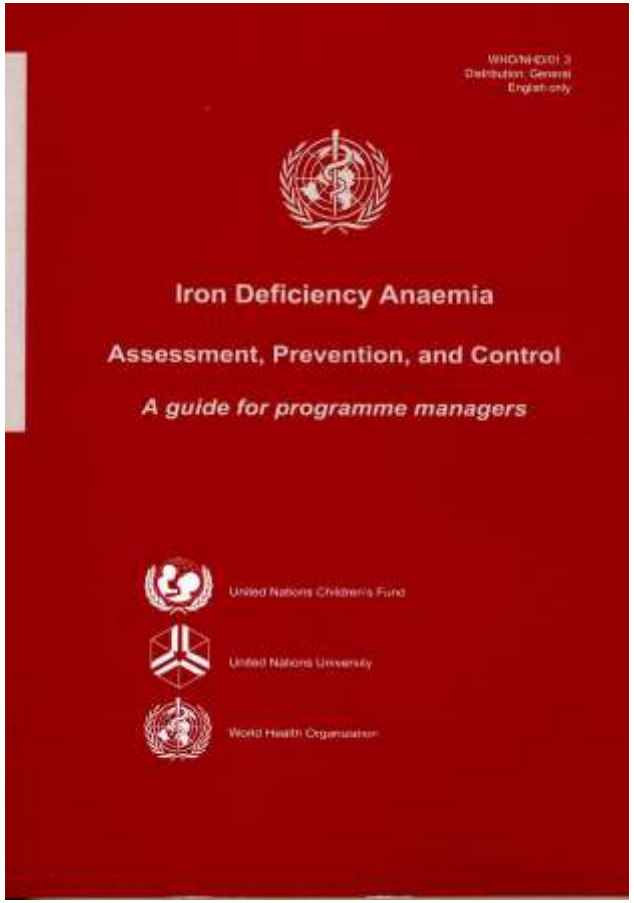

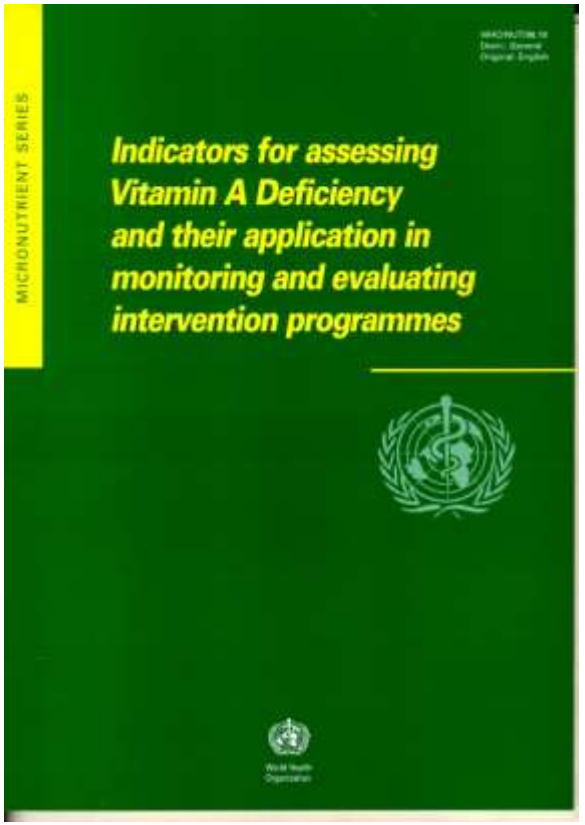

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Critical factors for success

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Situation analysis

Choosing a suitable food vehicle

- Food consumption data for potential food vehicle(s)
- Marketing and distribution data for the food vehicles(s)
- Determining the technical and economic feasibility

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Situation analysis

Food industry and market analysis

- Involvement of food industry
- Complex relationship to economic development

- Review of the food industry capacity
- Review of role of public-private share and role
- Review investment climate for FF

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Situation analysis

Food laws and regulation

- Voluntary fortification
- Mandatory fortification
- Monitoring and enforcement
- Role of government and food industry

Food fortification programs

Food Vehicles and Type of Fortification

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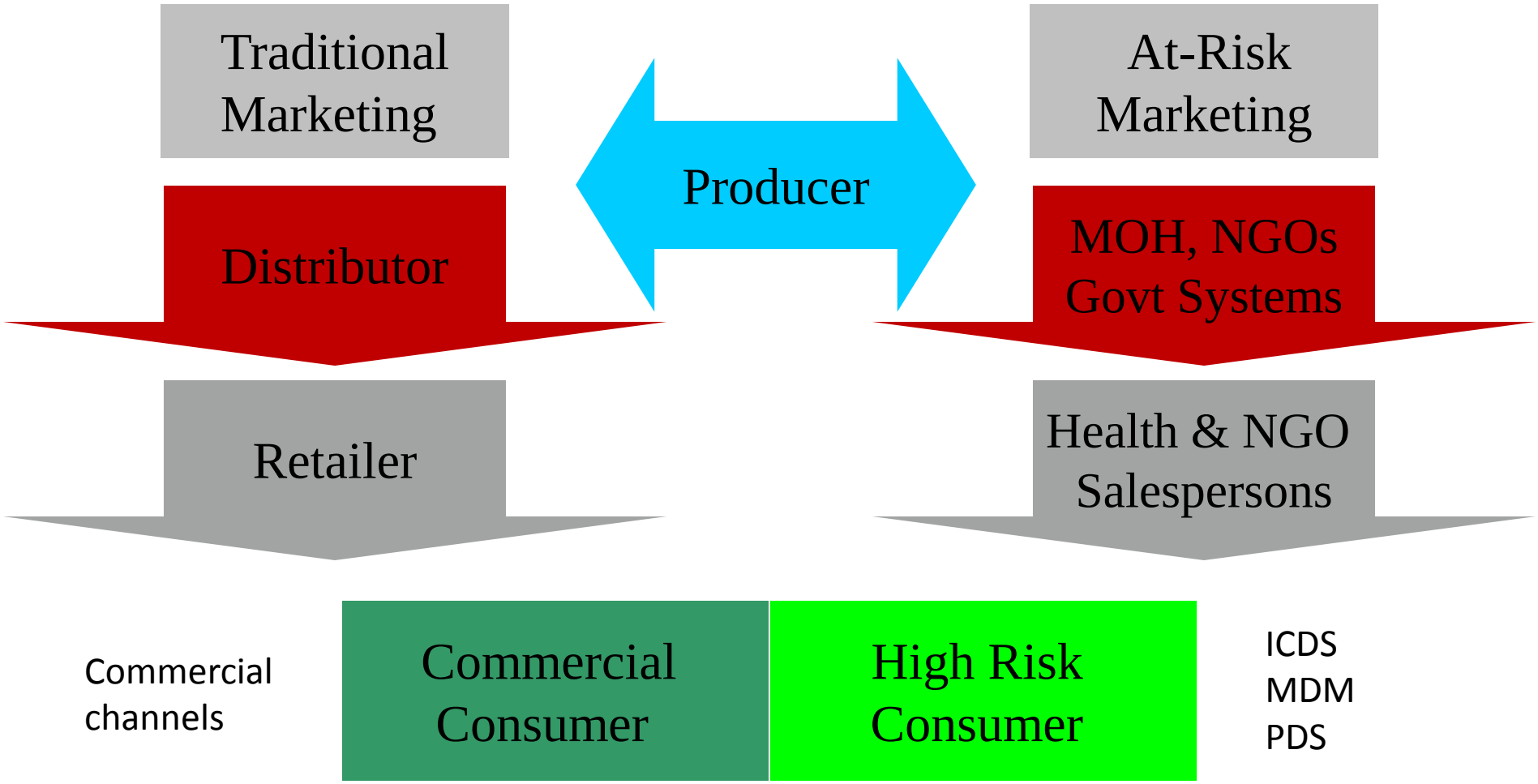
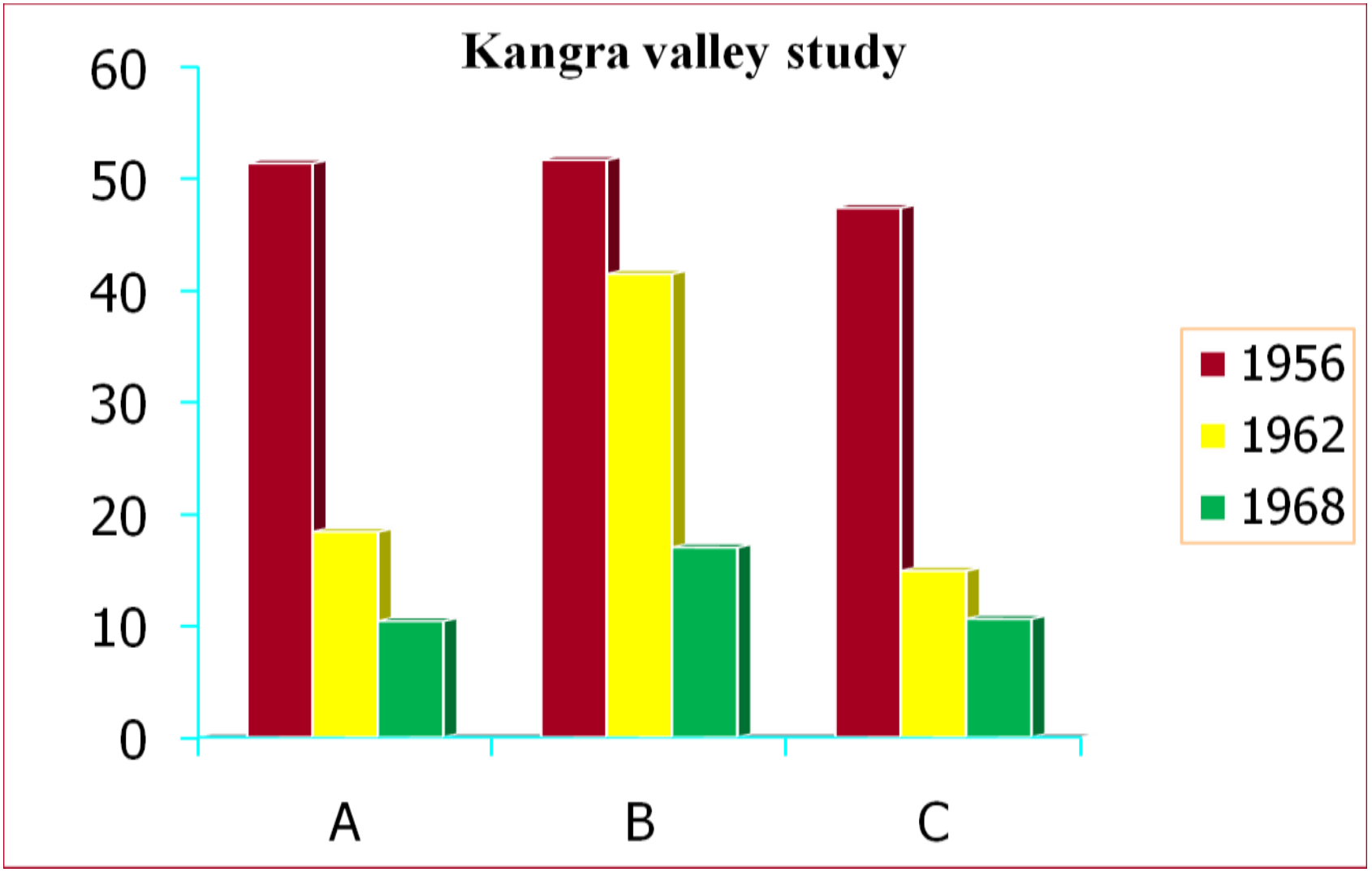
Mass fortification	1. Salt 2. Fats and oils 3. Wheat flour 4. Rice 5. Milk
Targeted fortification	1. MNP – children, women 2. RTE supplementary food
Market driven	1. Wheat products 2. Beverages 3. Others
Other types of fortification	1. Point of use fortification of hot-cooked meals 2. Fortified dal analogue

Consumer segmentation & delivery channels



Food fortification in India

Salt Iodisation



Food fortification in India

Salt Iodisation

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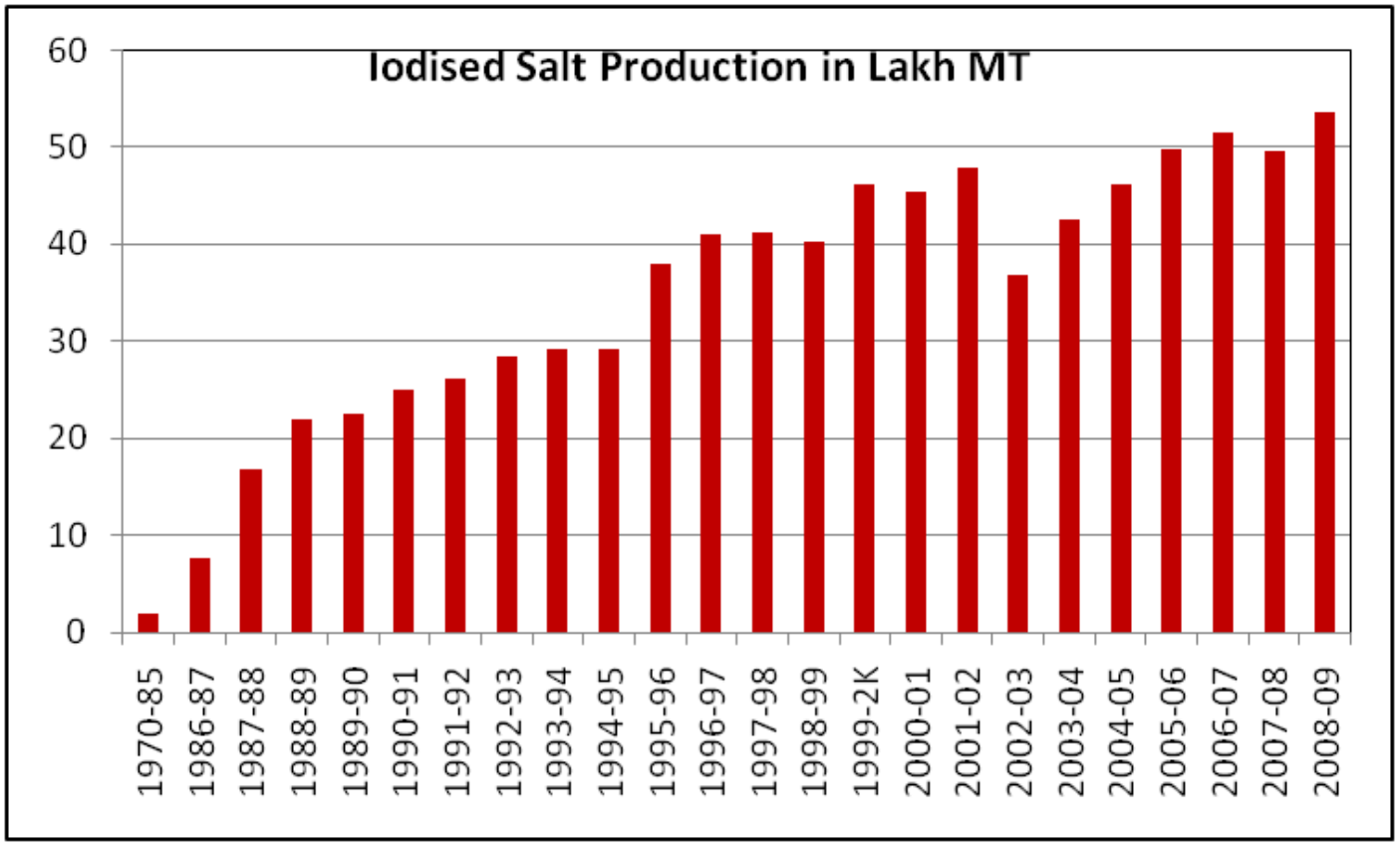

HH – 71%

UIE – 133 ug/l

Food fortification in India

DFS – Iodine and Iron fortified salt

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1. Fortification of common salt with iron: effect of chemical additives on stability and bioavailability. Rao BS, Vijayasarathy C. ***Am J Clin Nutr. 1975 Dec;28(12):1395-401***.

2. The use of common salt (sodium chloride) fortified with iron to control anaemia: results of a preliminary study.
   Nadiger HA, Krishnamachari KA, et al. ***Br J Nutr. 1980 Jan;43(1):45-51***.

3. Fortification of salt with iron and iodine to control anaemia and goitre: Development of a new formula with good stability and bioavailability of iron and iodine, Bagepalli S. Narasinga Rao; ***The United Nations University Press; Food and Nutrition Bulletin; Volume 15 (1993/1994), number 1, March 1994.***

4. Impact evaluation of iron & iodine fortified salt. Nair KM, Brahmam GN, Ranganathan S, et al. ***Indian J Med Res. 1998 Nov;108:203-***11.

5. Dual fortification of salt with iodine and iron: a randomized, doubleblind, controlled trial of micronized ferric pyrophosphate and encapsulated ferrous fumarate in southern India. *M Andersson, P Thankachan, S Muthayya, et al.* **Am J Clin Nutr 2008;88:1378–87**

Food fortification in India

Efficacy of wheat flour fortification

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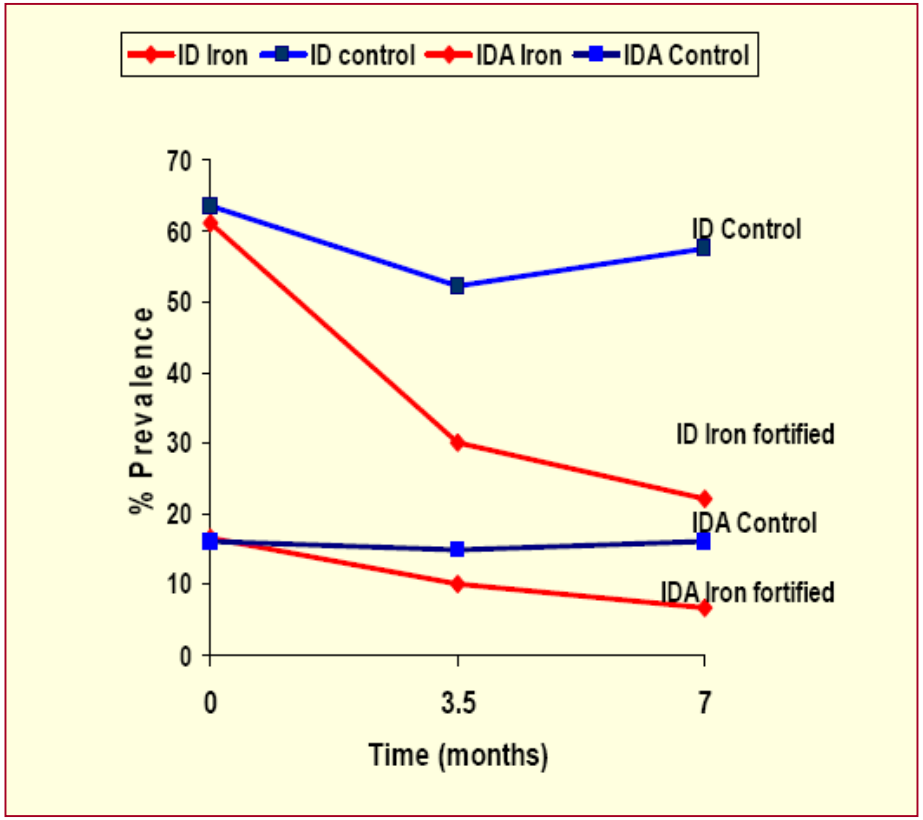

Food fortification in India

Wheat flour fortification

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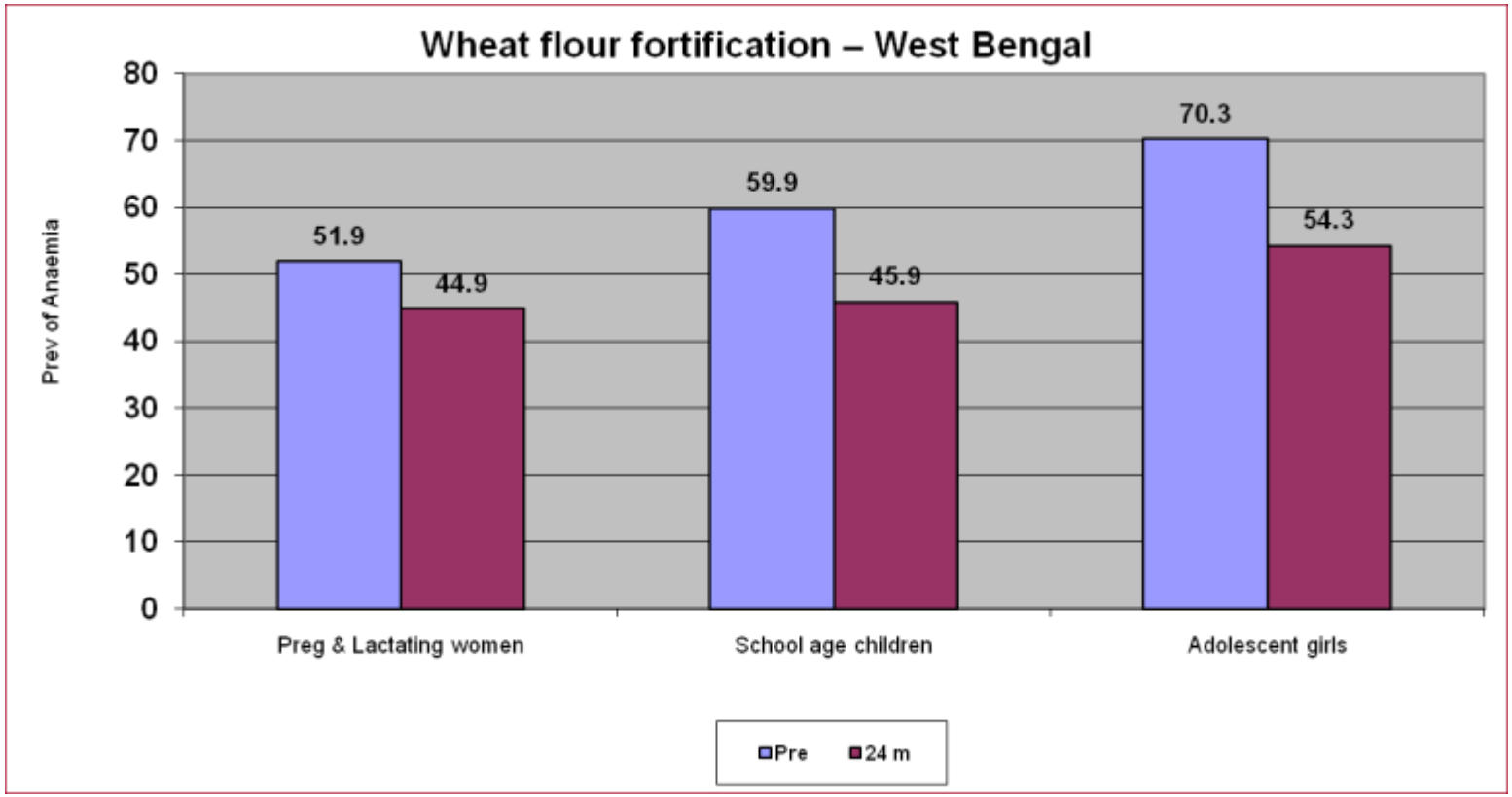

WFF has picked up momentum in India. Gujarat has been doing it for few years now. Several other state govts are introducing it in PDS and are using it in Mid Day Meal

Food fortification in India

Rice fortification

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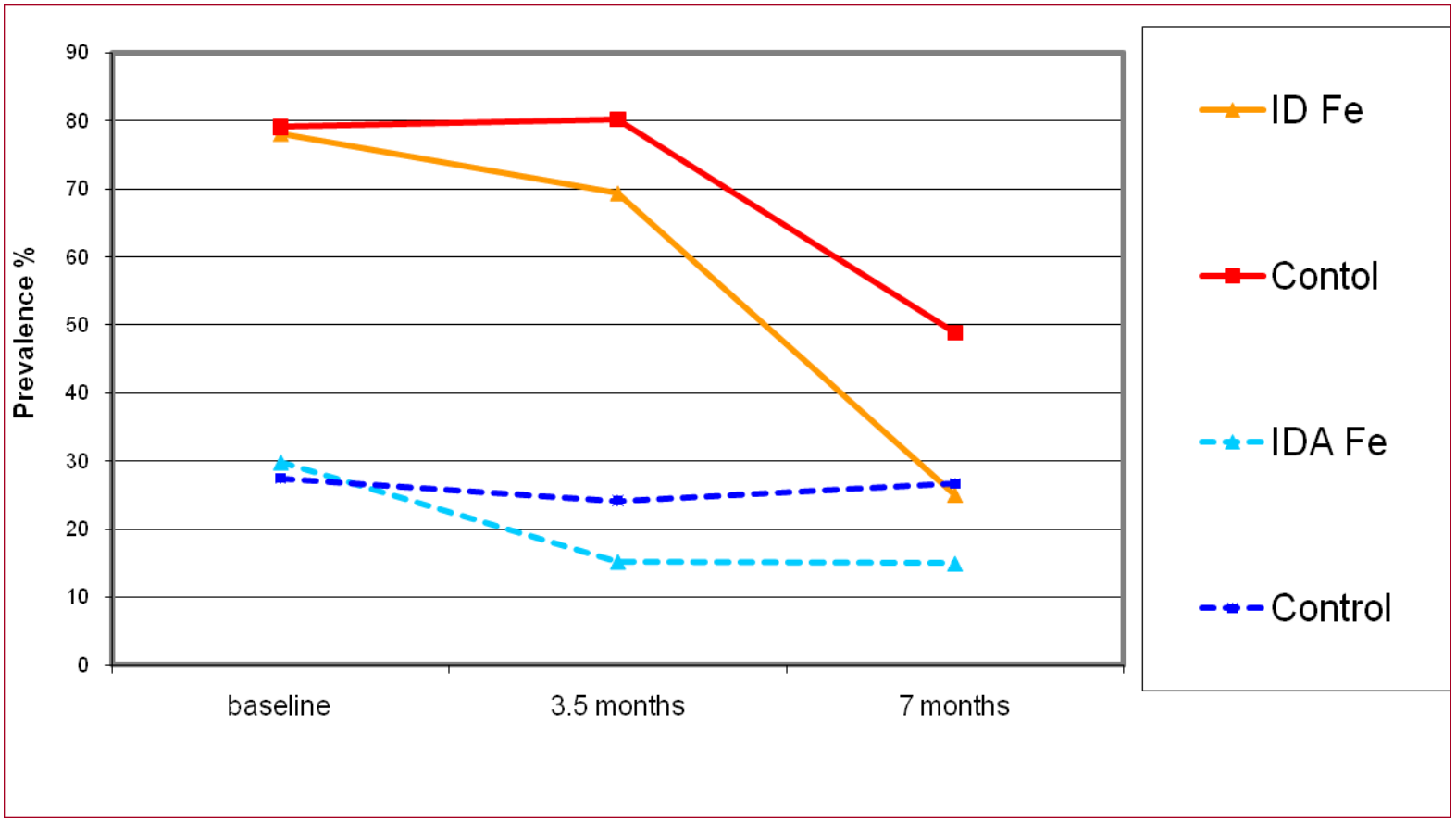
Efficacy of Iron Fortified Extruded Rice: 6-13 y old school children (20 mg Fe/d)



Food fortification in India

Rice fortification

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- Large pilot done in collaboration with PATH and Naandi Foundation
- At the central kitchen at Vizag, children were provided iron fortified rice for more than one year (Ultra Rice)
- The project covered 35,000 – 50,000 children daily
- The study was done to determine the technical and operational feasibility of integrating fortified rice in MDM
- PATH also used this opportunity to study a number of operational issues
- The Ultra Rice kernels were prepared in India

Food fortification in India

Milk fortification

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- Effect of fortified milk on morbidity in young children in north India: community based, randomized, double masked placebo controlled trial. *Sunil Sazawal, et al. BMJ 2006:334:*

- Milk is a good source of vitamin A
- Processed low fat milk – low levels of fat soluble vitamins, A &D
- GoI supported milk fortification for > 2 yrs – 1989-91. All dairies under NDDB was fortifying low fat milk with 2000 IU/L of vitamin A
- Some dairies under NDDB, continue – Bihar, TN
- Market driven commercial fortification – several private dairies
- Limitations of reach !!

Food fortification in India

Point of use fortification - ICDS

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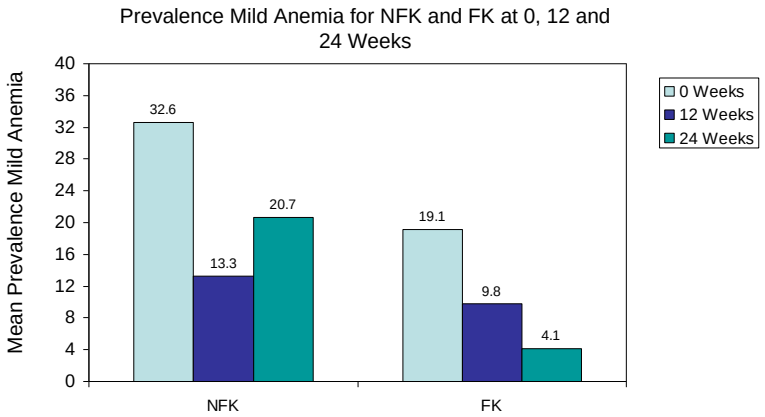
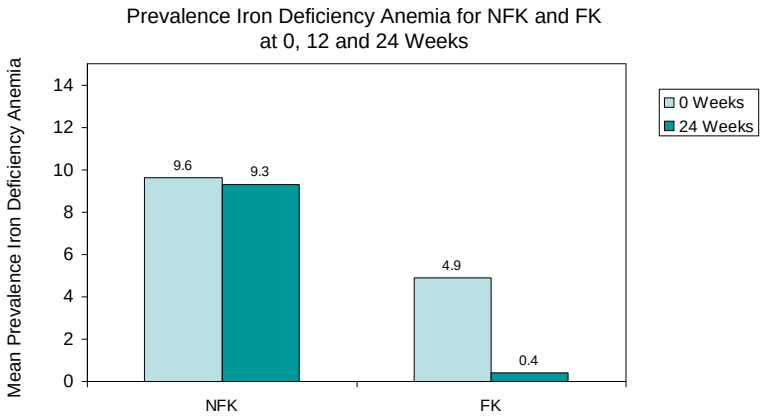
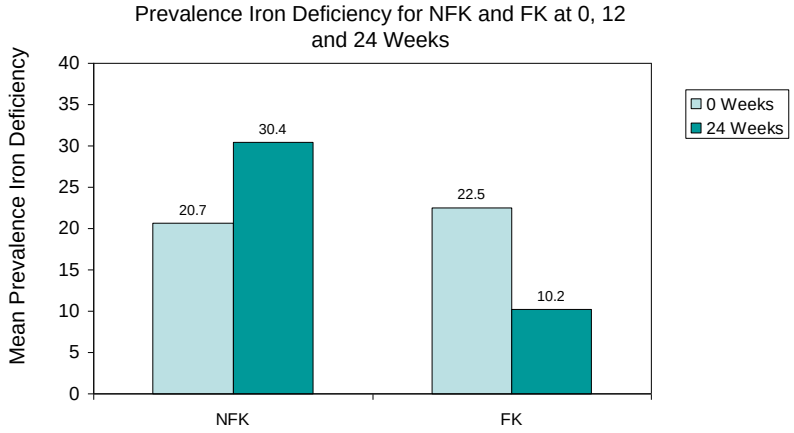


Anaemia



IDA

14mg microencapsulated ferrous fumarate, 500IU's Vitamin A (acetate 250 CWS) and 0.05mg folic acid per 25g serving



Am J Clin Nutr 2007:85;1127-33

Iron Deficiency

Food fortification in India

MNP – Home fortification of CF

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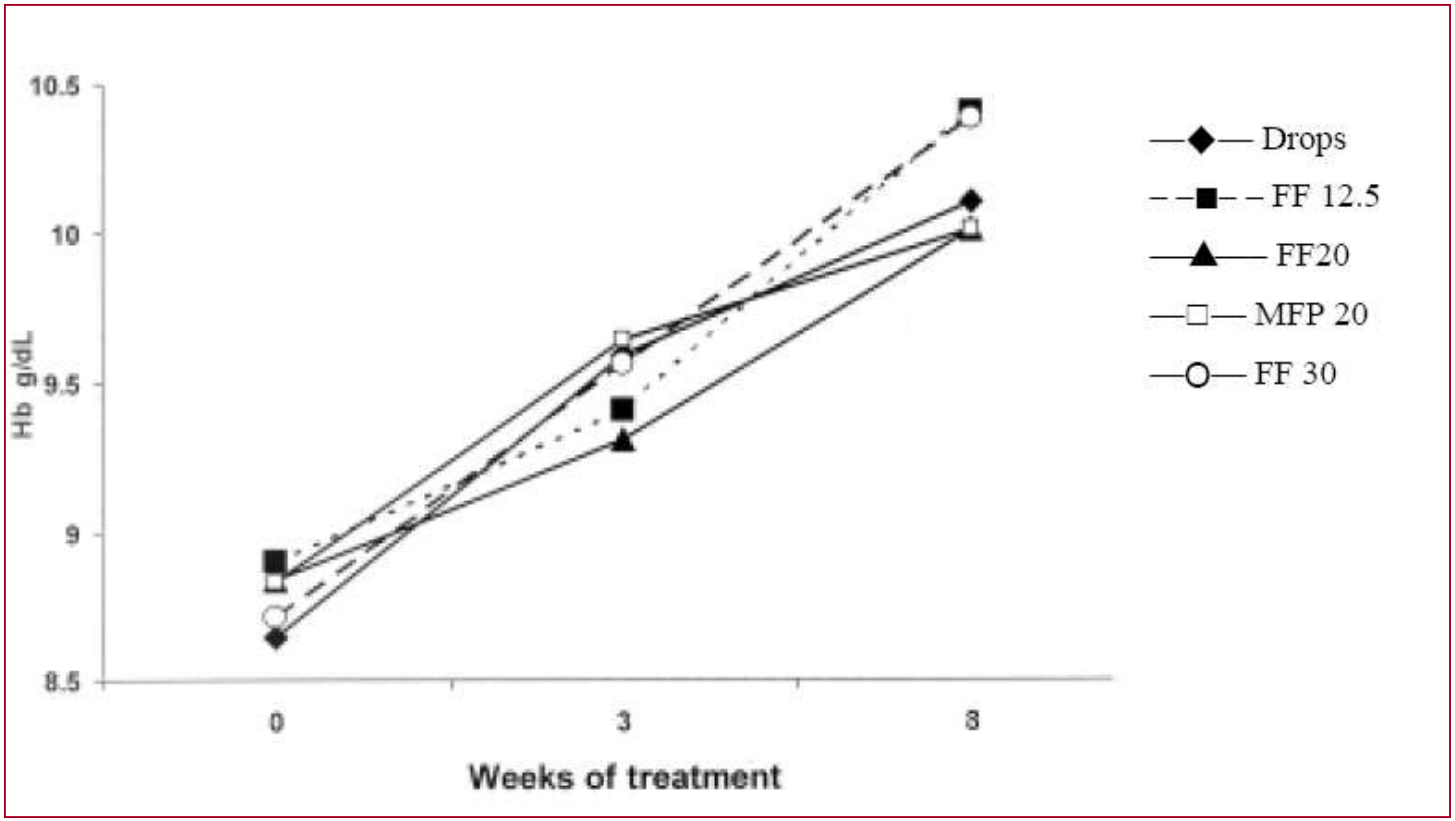

Indian Pediatr 2007:44;91-100

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MNP – Home fortification of CF

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Enhancements to Nutrition Program in Indian Integrated Child Development Services Increased Growth and Energy Intake of Children[1,2]

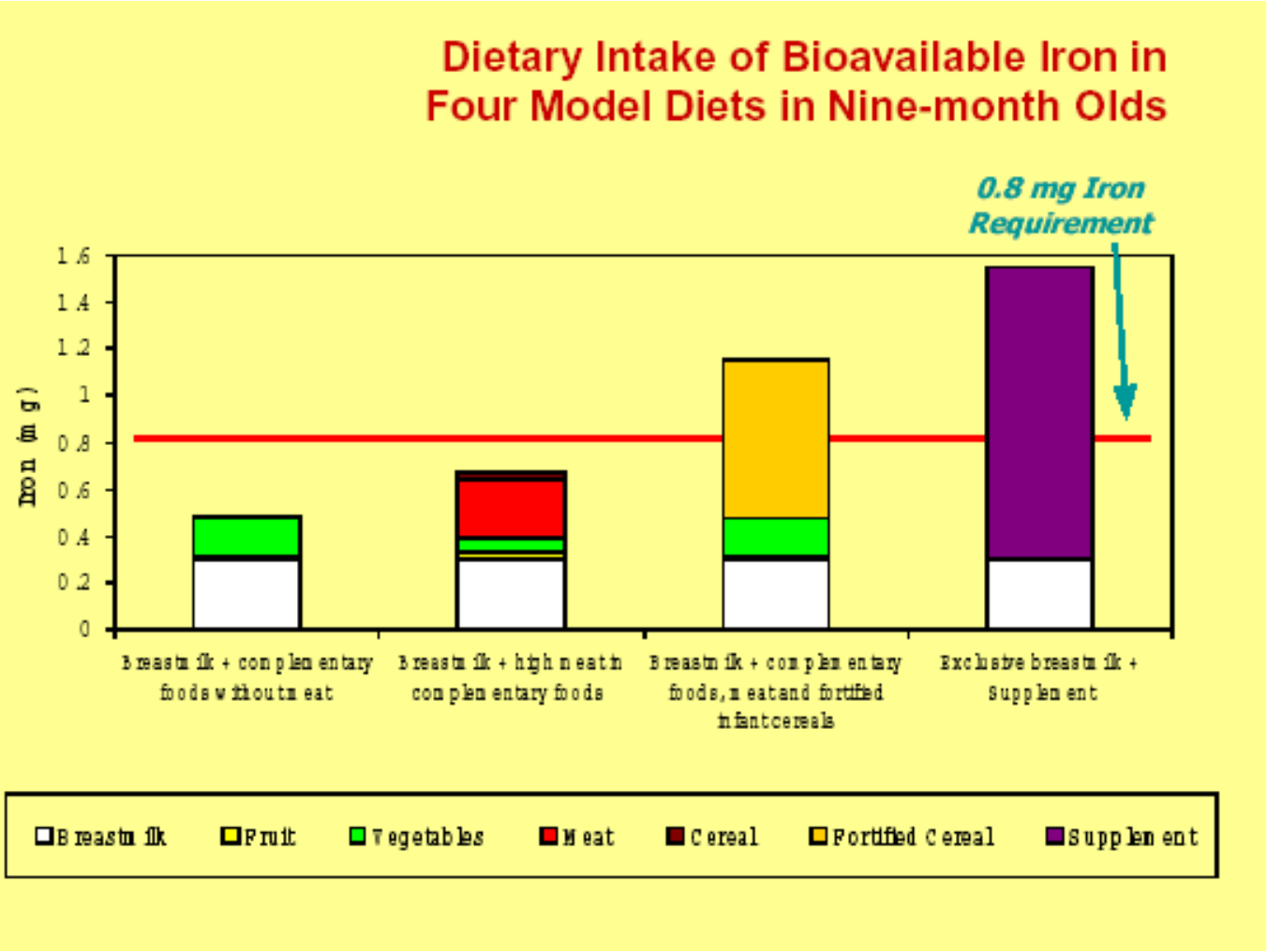
Rasmi Avula,[3]* Edward A. Frongillo,[3]* Mandana Arabi,[4] Sheel Sharma,[5] and Werner Schultink[4]

J. Nutr. doi: 10.3945/jn.109.116954.

1. A quasi experimental longitudinal design was used
2. 15 AWCs with 'enhanced' program and 15 with normal program
3. Multilevel linear regression was used to examine changes over time
4. The enhanced program significantly increased growth in WAZ and HAZ
5. ICDS would be more effective in improving child nutrition if it included these enhancers

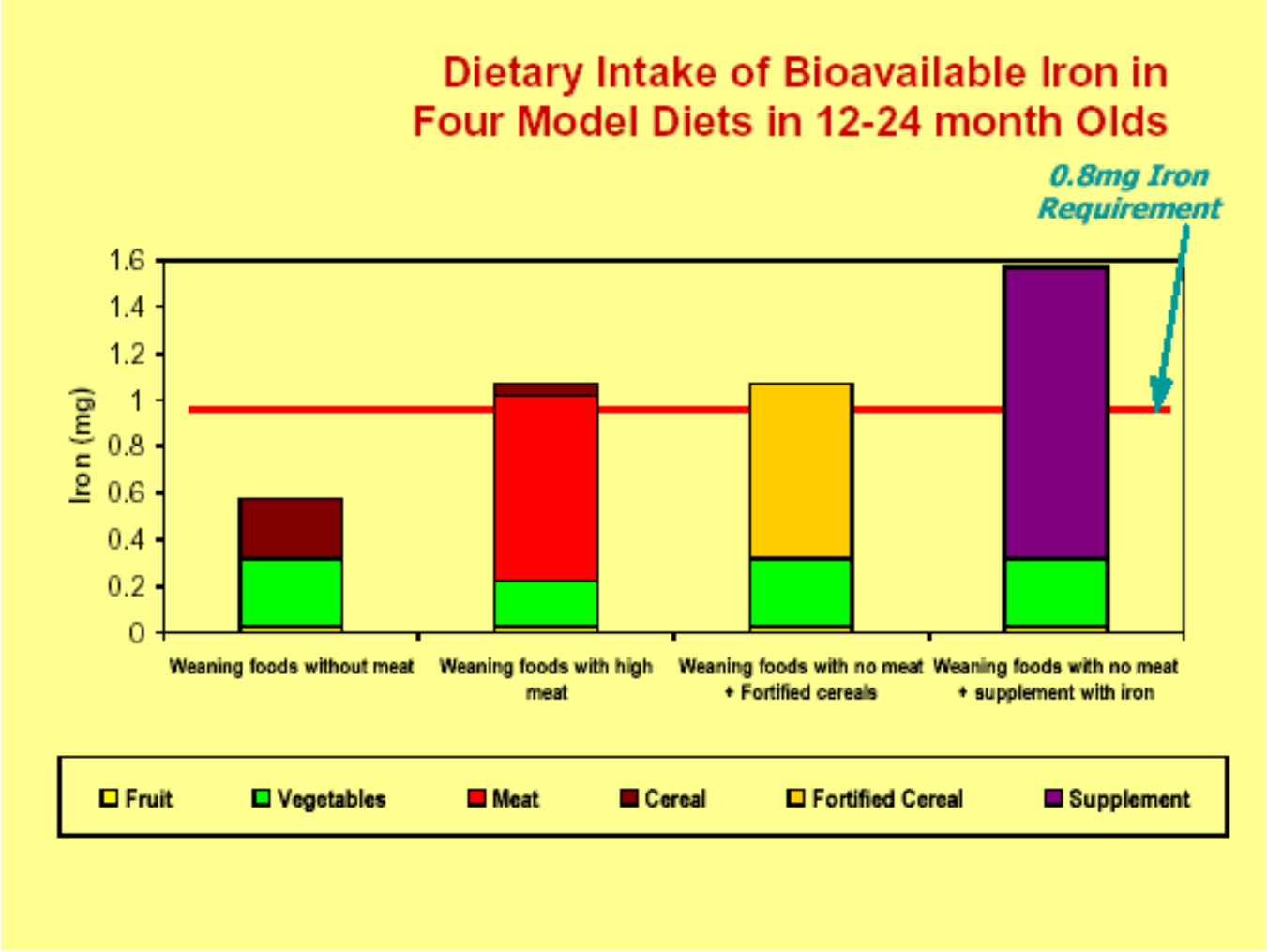
Food fortification in India

MNP – Home fortification of CF



Food fortification in India

MNP – Home fortification of CF



Food fortification in India

Market-driven fortification

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- Biscuits
- Breakfast cereals
- Fruit juices, beverages
- Margarine, butter, milk, other dairy products
- Health/energy drinks
- Several special foods

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Barriers - Consumers

- Nutrition Low Purchase Priority
- Price Sensitivity
- No Perceived Need. *Hidden Hunger*
- Prevention & Future Benefits

The most at risk choose
the least expensive product

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Barriers - Producers

- Little Price or Volume Increase
- Competition and Price Pressure
- Low Profit Margins
- Low Capacity Utilization

It is not the Cost
It is the Competition

Food fortification

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Why should the government take the lead

- Health Mandate: Responsibility to protect population health. Individuals often cannot make good choices when the benefit is preventive or in the future. Health is a Merit Good

- Positive Externalities – when benefits accrue not only to consumers, but to society as a whole, then government's role is to encourage greater reach of such interventions

Food fortification programs
Critical factors for success

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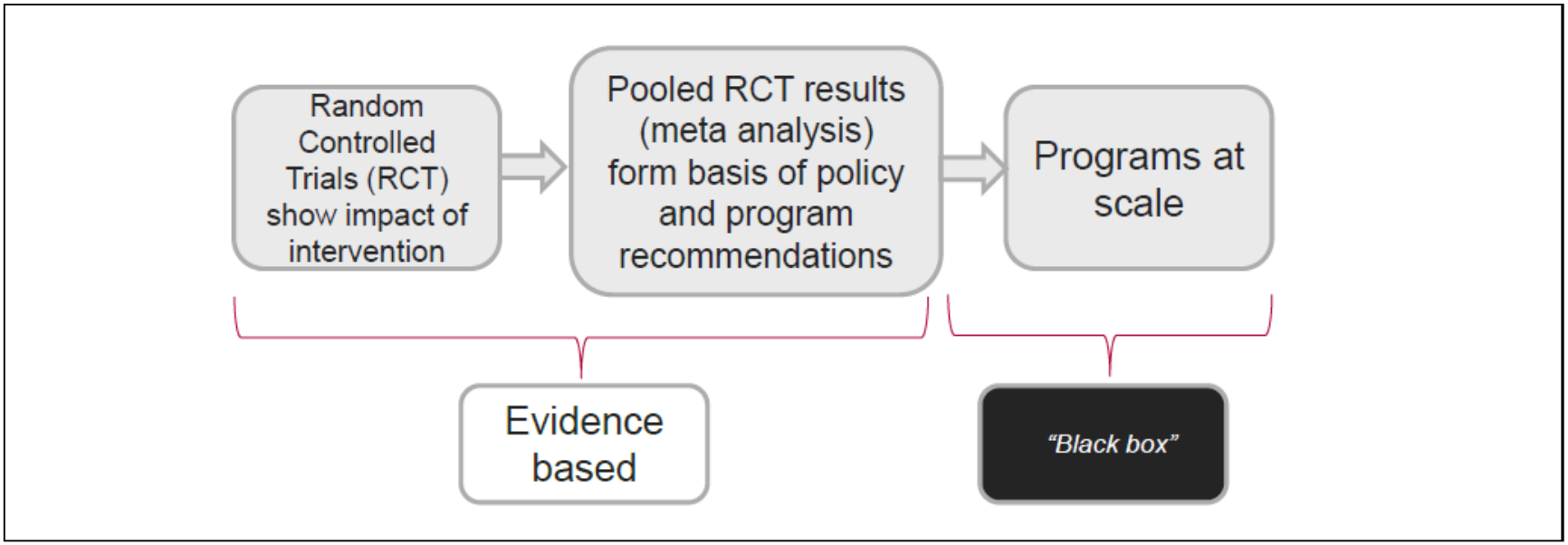
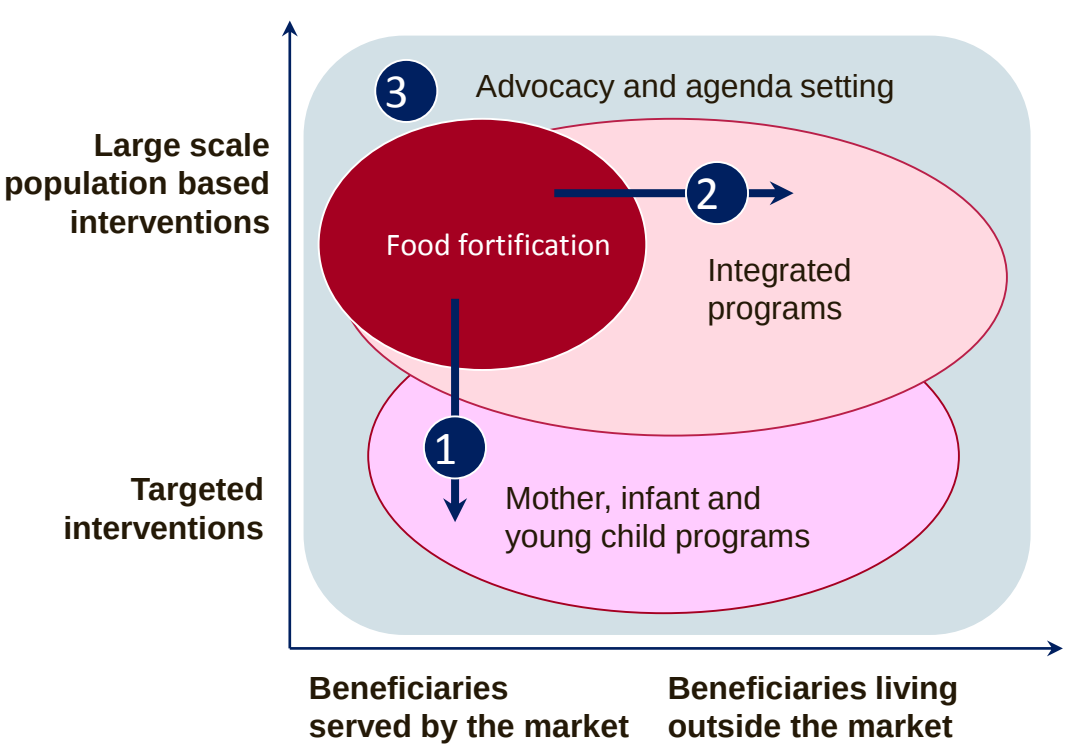


Success depends on knowing what works

Bill Gates, Vice Chair, BMGF

Food Fortification
Critical success factors



1. targeted interventions needed to few physiological groups and during critical periods
2. Convergence with other impactful interventions and sectors is absolutely necessary
3. Agenda setting and advocacy to ensure nutrition being adequately addressed is also critical for success

Integrated approaches needed to ensure most vulnerable populations are reached

Thank you

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