

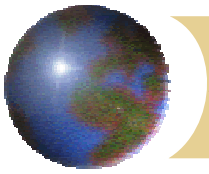
Successes and Opportunities to Eliminate Micronutrient Malnutrition Through Food Fortification

M.G.Venkatesh Mannar,

The Micronutrient Initiative

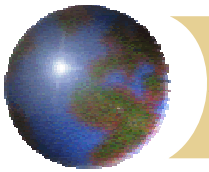
Workshop on Successful Micronutrient Programs

Intl. Congress of Nutrition Vienna 31 Aug 2001

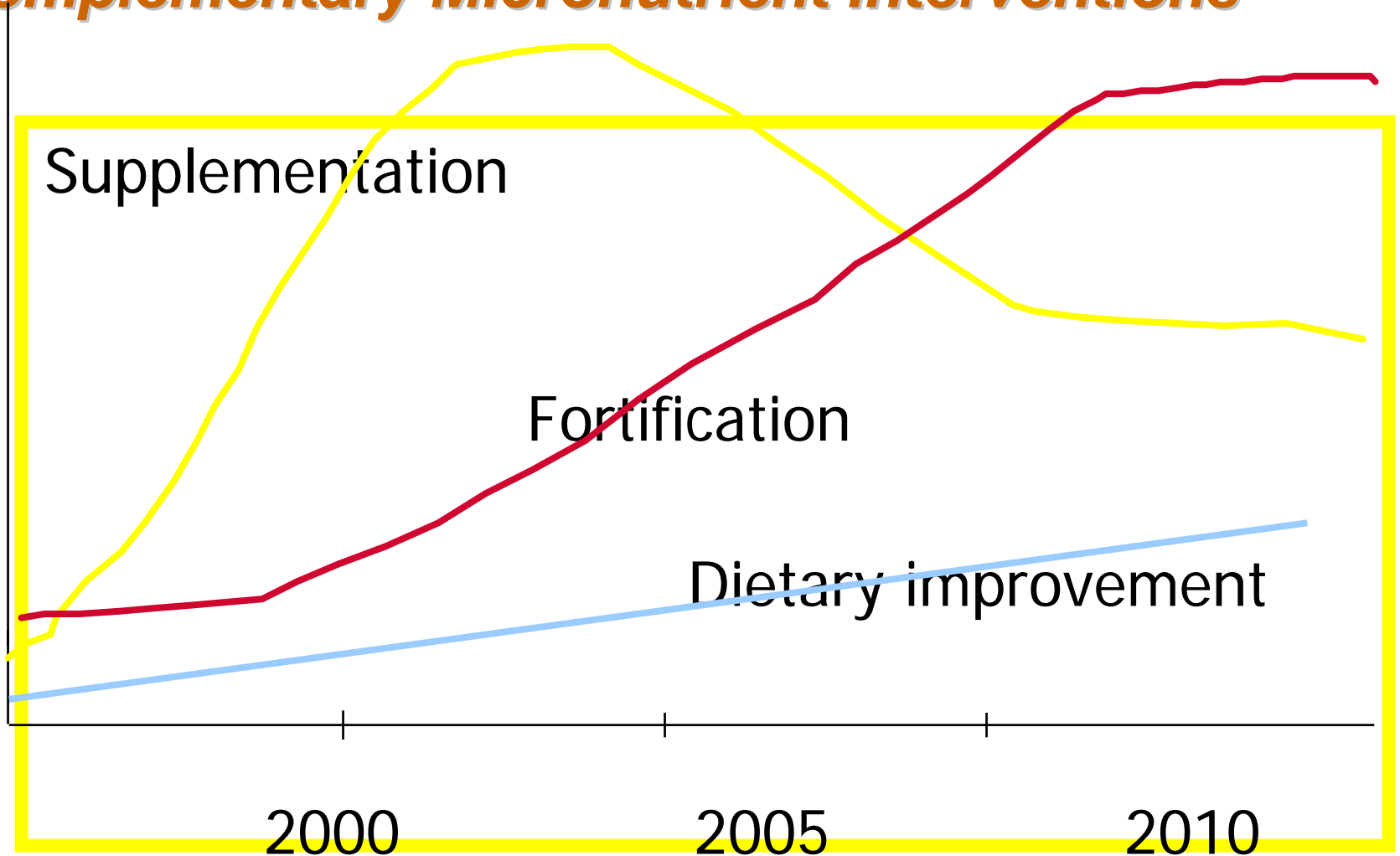


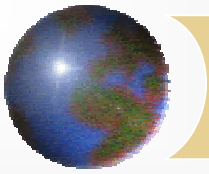
Food Fortification As Part of a Broader Development Strategy

- Part of an overall health and nutrition strategy that includes food-based strategies, supplementation and public health measures leading to overall human development
- Part of an overall food-based strategy that includes:
 - Improved agricultural practices such as plant breeding to improve micronutrient density of crops and expanded production of micronutrient rich foods
 - Improved food processing and storage
 - Consumer education
- Within country-specific cultural, political and market situation

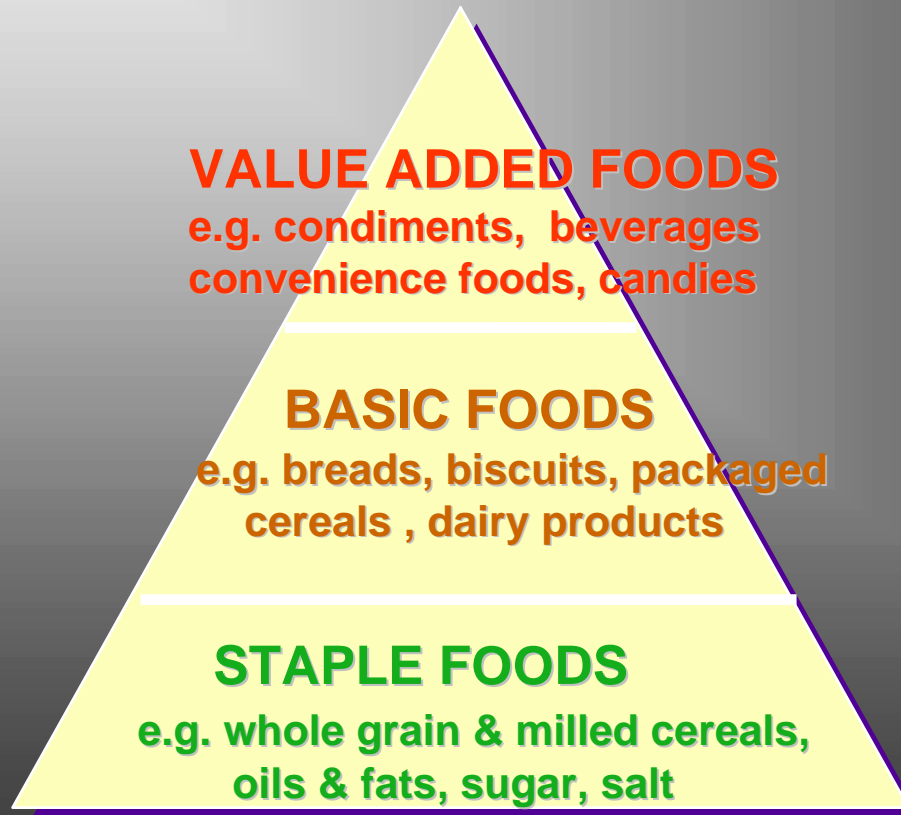


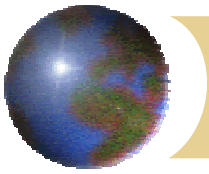
Complementary Micronutrient Interventions





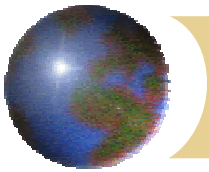
Choice of food vehicles





Strategic Advantages of Food Fortification

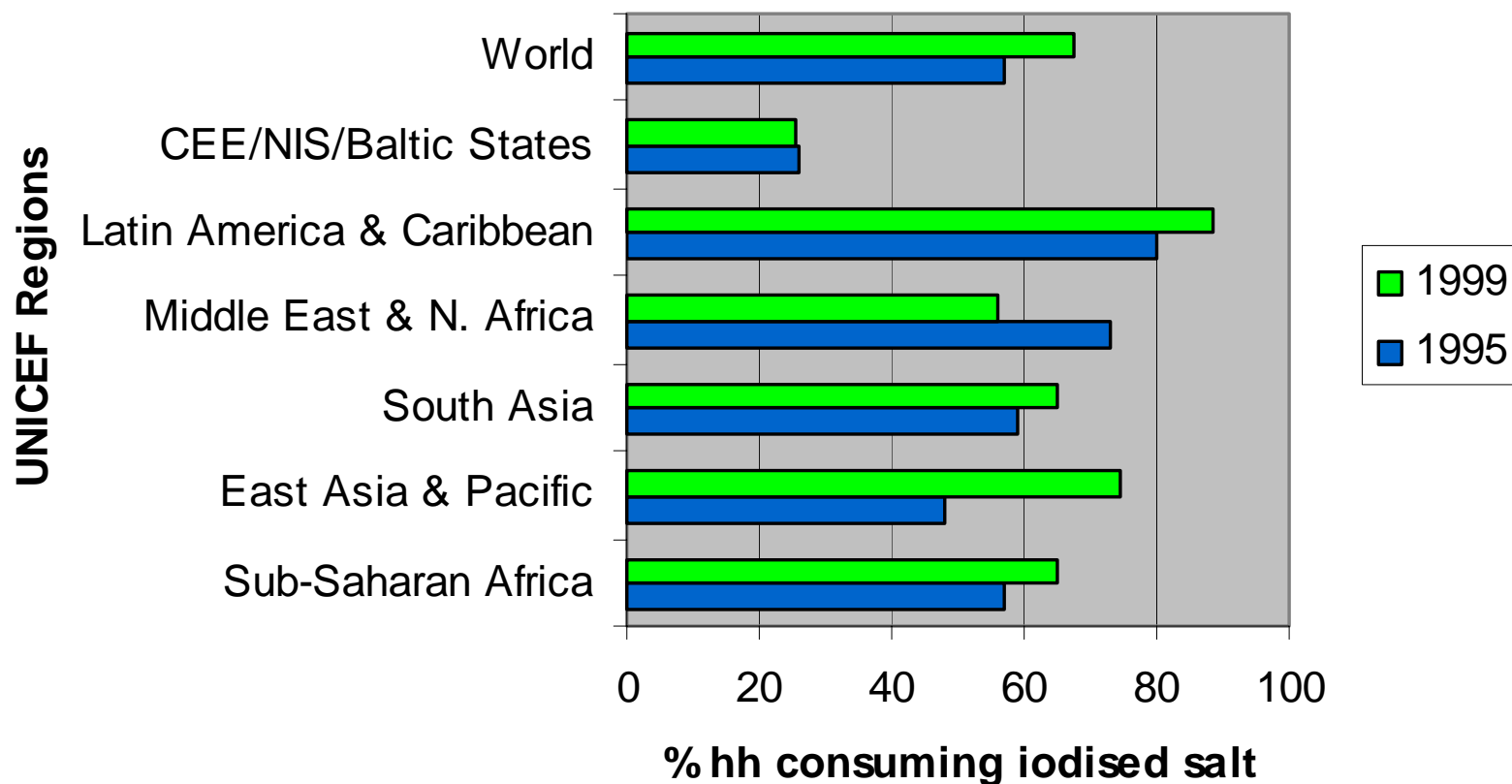
- ⊕ Consistent Delivery Maximum Benefit
- ⊕ Safety in Low Daily Doses
- ⊕ Minimal Behavior Change
- ⊕ Consumer Cost Affordable
- ⊕ Enhances Health & Nutrition Strategies
- ⊕ Transfers Costs of Protecting Health to Sectors otherwise not involved

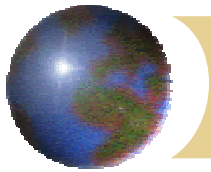


Global Progress in IDD Elimination Through Universal Salt Iodization

- 68% of the world has **access to iodized salt** in more than 87 countries.
- 130 governments have provided at least some **resources** for sustained IDD elimination programs.
- Public and donor **investment** of \$400 million has **leveraged** more than \$ 1.5 billion in private investment in salt refining and iodization.
- The vast majority of those affected by iodine deficiency will **no longer be deficient**.

World-wide Increase in Households Consuming Iodized Salt

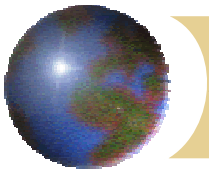




The Salt 2000 Meeting

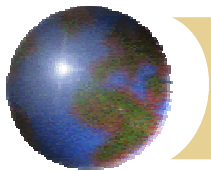
- Consolidated USI achievements thus far
- Strongly engaged salt producers and traders
- Transferred main responsibility for effective iodization to salt industry
- Elevated the IDD elimination goal onto the political agenda
- Expanded the alliance into the future





Partnership for Sustainable Elimination of IDD

- ❖ A Round Table meeting of partners at the Hague meeting in May 2000 (from public/private/civic sectors) reaffirmed the need for a strong partnership to achieve and sustain the goal.
- ❖ An Interim Working Group developed a proposal in Dec 2000 for a more formal collaborative structure with a work plan.
- ❖ Representatives from 16 key international organizations participated in a Summit Meeting in Paris in Jan 2001.
- ❖ A constitutive Board was formed with UNICEF, WHO, ESPA, Salt Institute, Chinese National Salt Industry Corp., Kiwanis International, MI, ICCIDD and PAMM as members. The Board met immediately following the Paris Summit.



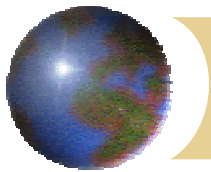
Iron/Folate Fortification:

63 Low Income Countries:

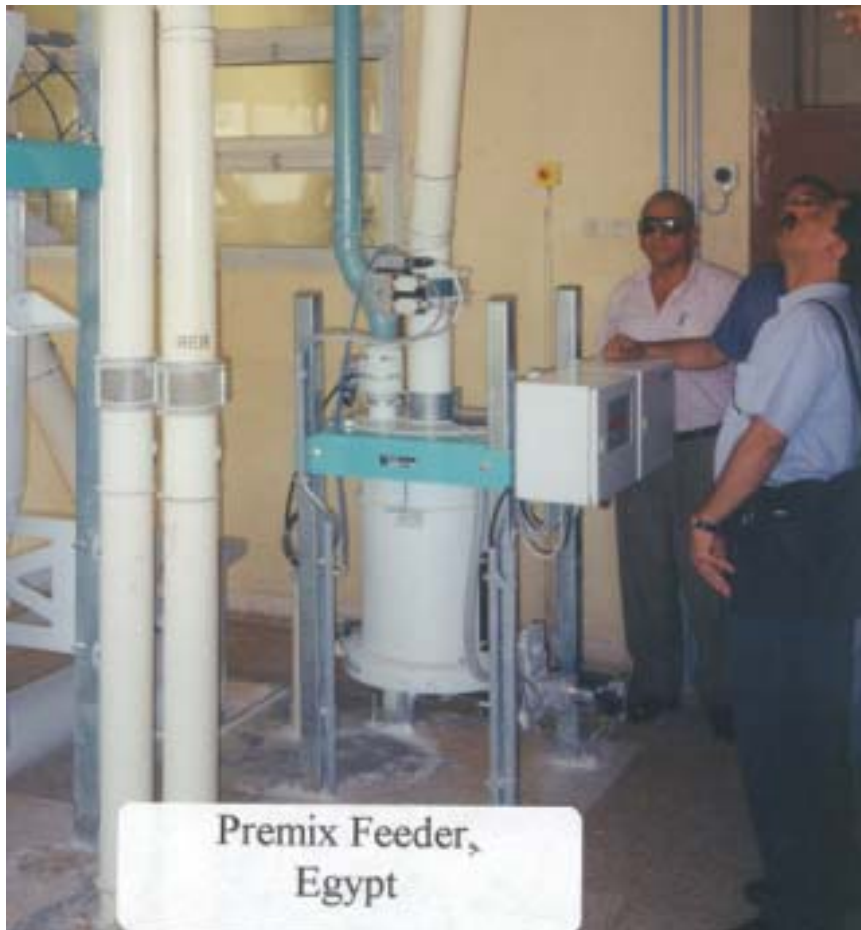
FE @t 30 mg/kg & Folic Acid @ 1.5 mg/kg

IMPACT	Consume g/dy	Add mg/dy	Added Dietary mg/dy	Absorbed @ 5% mg/dy	% Woman's Needs % 1.25 mg/dy
Wheat	129.0	30	3.9	0.19	15.5%
Maize	50.0	30	1.5	0.08	6.0%
TOTAL	179.0		5.4	0.27	21.5%

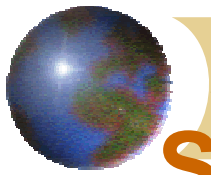
COST	Total Supply MT	Cost/MT \$	Total Cost \$	Annual Cost \$ Per Person
Wheat	113,371,702	\$0.55	\$62,354,436	\$0.03
Maize	43,670,163	\$0.55	\$24,018,590	\$0.01
TOTAL			\$86,373,026	\$0.04



Cereal Flour Fortification

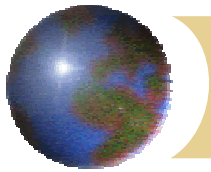


- Fortification of wheat flour with iron, B-complex vitamins (and Vitamin A) is emerging as an important global strategy.
- Under WHO/UNICEF/MI EMRO Project, 6 countries have initiated fortification programs.
- South Africa is in the final stages of launching a national maize flour fortification plan (UNICEF/MI).
- Indonesia has commenced fortification with iron and zinc (USAID/CIDA).



Status Of Wheat Flour Fortification In Latin America And The Carribean

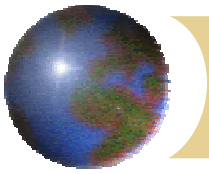
Mandatory in 14 countries	Bolivia, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Panama, Peru (only iron), Tobago, Venezuela
Voluntary in 6 countries	Argentina & Paraguay (being negociated), Brazil, Dom. Rep., Mexico, Paraguay
Implemented in 22 countries	Belize, Bolivia, Brazil (some mills), Chile, Colombia, Ecuador, Mexico (some mills), Paraguay, Peru, Venezuela, all CA countries, and some Carribean islands
Not allowed in 4 countries	Guadeloupe, Guyana, St-Vincent, Surinam



Support Measures for Flour

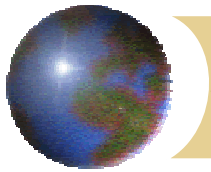
Fortification

- SUSTAIN recently developed specifications for Iron fortificants in flour
- USAID/MOST has produced a 3-part Manual on Guidelines for flour fortification
- WFP and MI are working on the design and testing of a portable unit for milling and fortification of cereal flours in refugee camps in Africa
- WFP and USAID/MOST are working on fortification of all wheat flour supplied through the Vulnerable group Development program in Bangladesh
- A simple model for quality assurance for monitoring fortification (and harmonization of legislation) has been established by INCAP in central America and Honduras has made a special effort to implement it.



Corn flour Fortification in Latin America

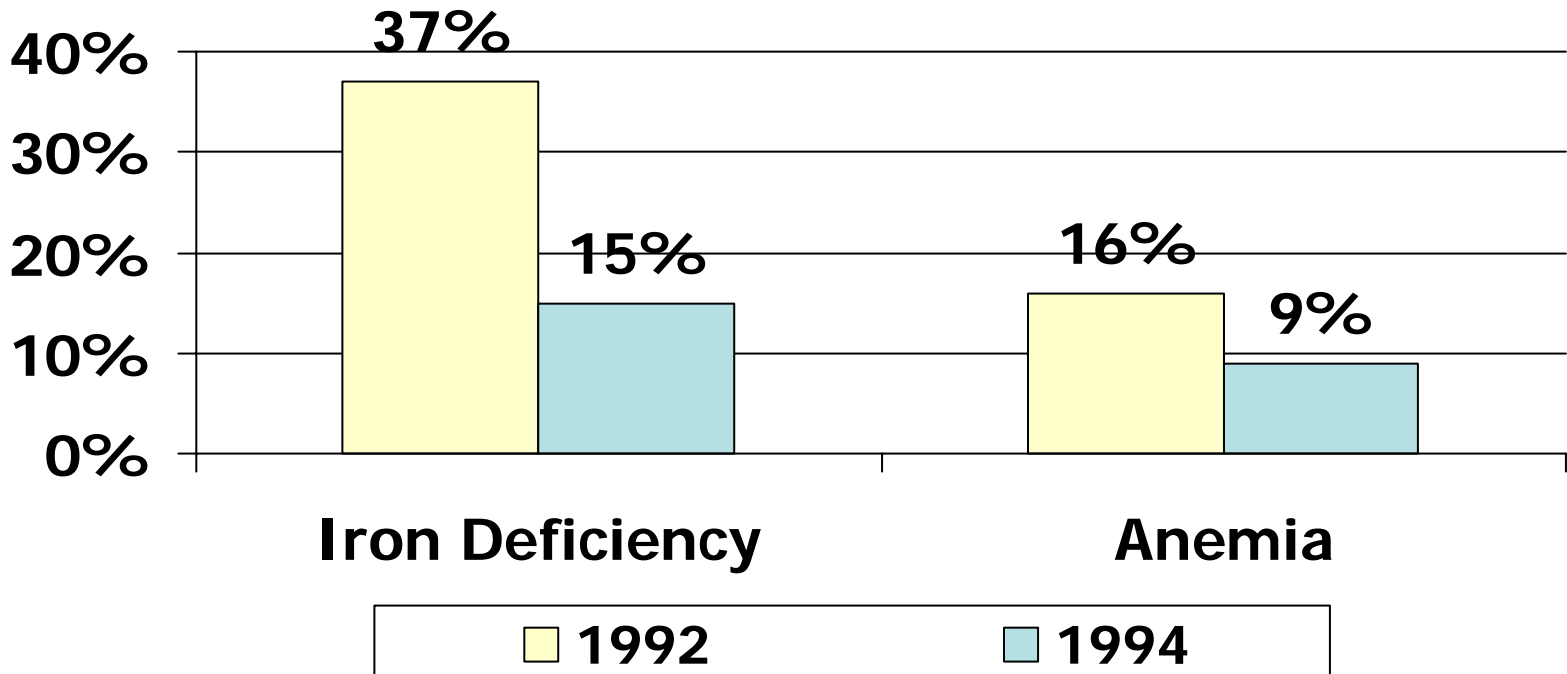
- Venezuela is the only country where it has been legislated and implemented (precooked corn flour).
- Mexico and some Central American countries are working on the fortification of nixtamalized (lime soaked) corn flour with iron and other nutrients:
 - The corn product, tortilla, is consumed by all levels of population
 - Industrialized masa: proper technology (adequate fortificant) not yet finalized
 - Artisanal process: great potential but the delivery of the fortificant, the control and proper use of the premix are the concerns.



Developing Country Impact

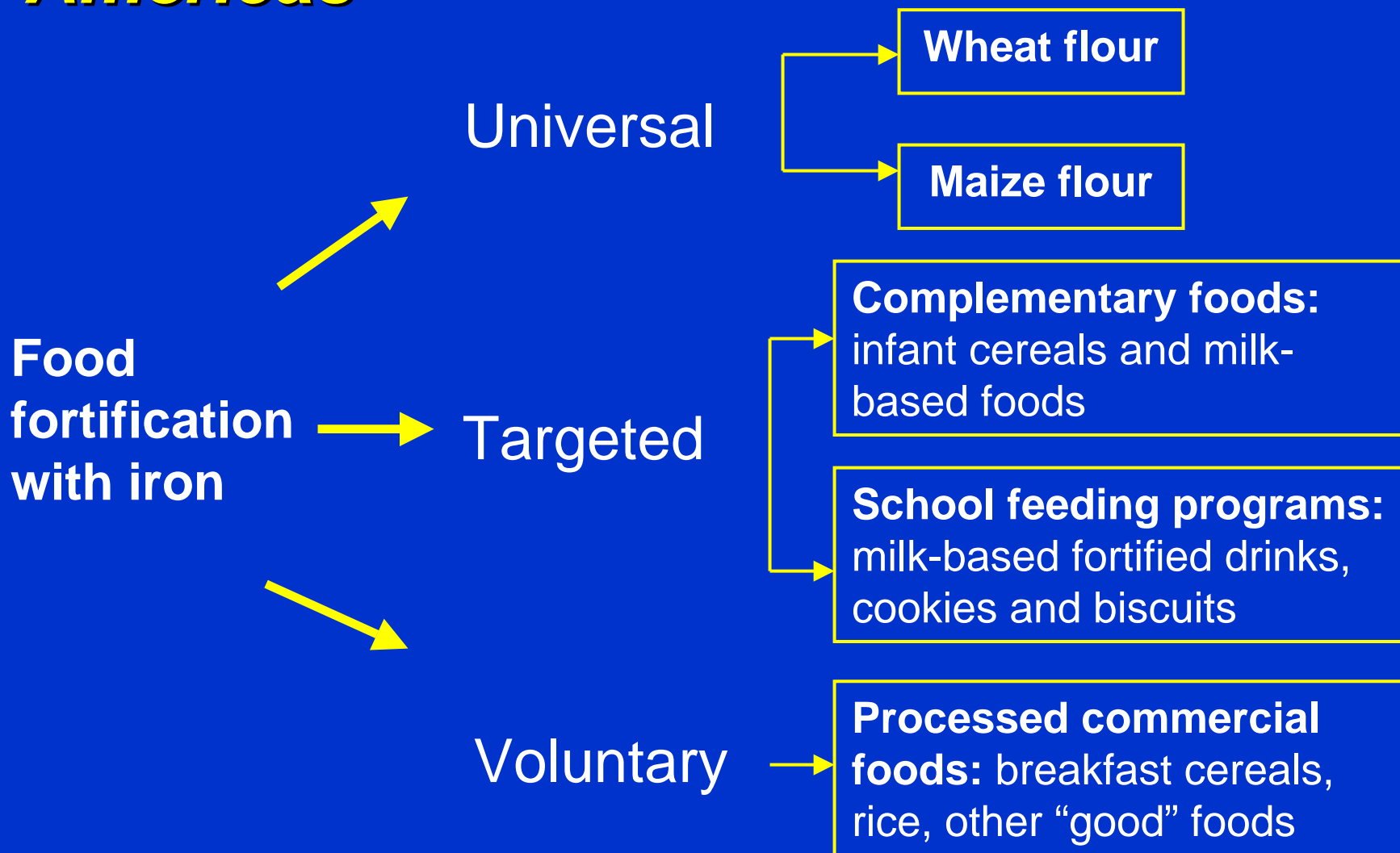
Venezuela WCF & PCF Fortification

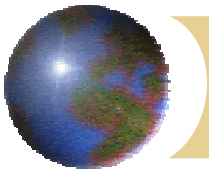
Anemia and IDA: Caracas, Venezuela





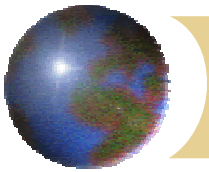
Iron Fortification Strategy in the Americas





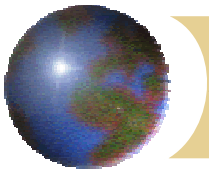
Vitamin A Fortification Costs in Perspective

	Consumption	Annual Cost	Internat Price	Fortification %
	Kg/Yr	Per Person	\$/MT	%/MT
Wheat	47.07	\$0.06	\$220	0.54%
Maize	18.13	\$0.03	\$208	0.73%
Rice	71.48	\$1.07	\$300	5.00%
Sugar	12.807	\$0.12	\$500	1.85%
Vegoil	7.68	\$0.02	\$691	0.47%

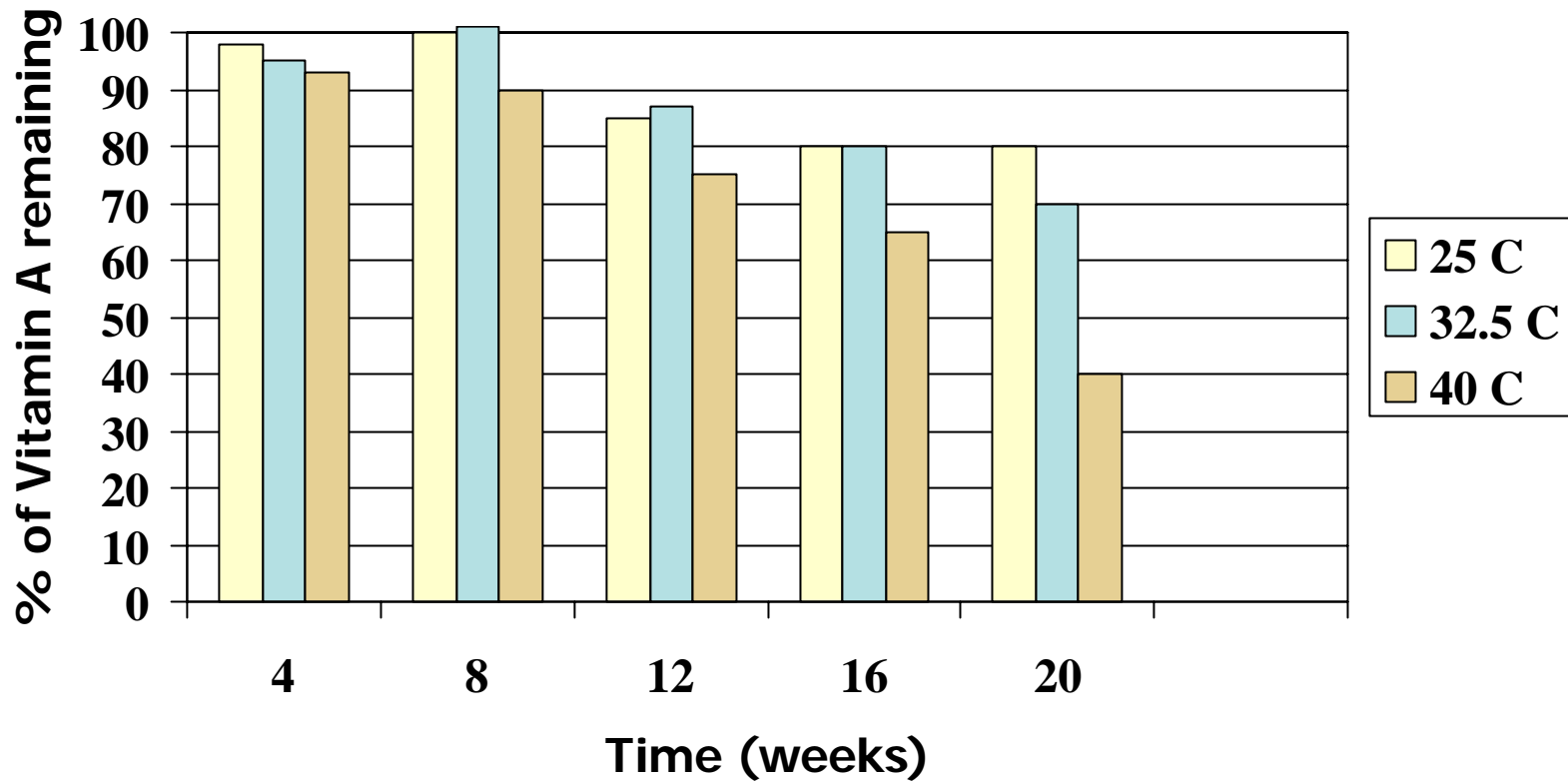


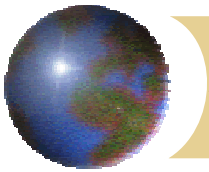
Oil Fortification With Vitamin A

- Stability studies of vitamin A in cooking oils and fats showed excellent retention of Vit A from 78-100% after 24 weeks of storage when protected from light.
- Exposure to light is a major factor affecting vitamin A stability. >50% loss within 4 weeks.
- Temperature and packaging had less significant impact on vitamin A stability.
- Oil fortification programs are currently under development in the Middle East and North Africa (Yemen, morocco and Oman) and south Asia (Pakistan, India).



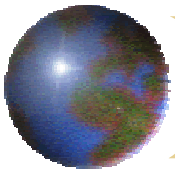
Stability of Vitamin A in Fortified Groundnut Oil (Stored in Dark)



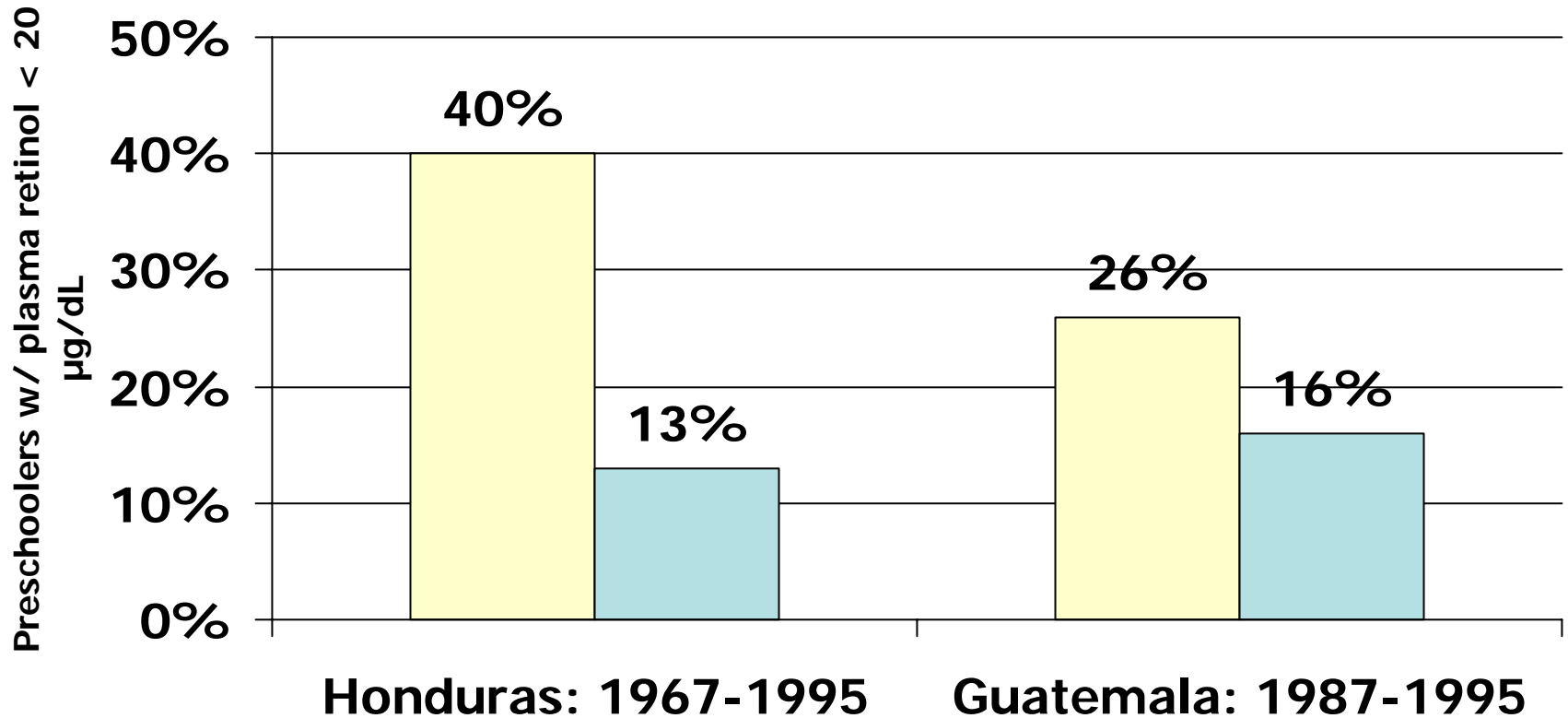


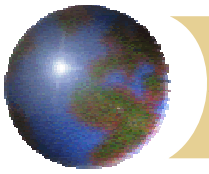
Sugar Fortification

- The Zambia sugar fortification program is continuing to cover the entire country. Kenya, Uganda and Ethiopia are initiating efforts (through USAID/MOST) to fortify sugar.
- MI with UNICEF, MOST and other partners is initiating a regional sugar fortification program in Eastern and Southern Africa.
- Pilot studies for stability and consumer acceptability in India have shown positive results. A Demonstration plant has been established in one mill. Following completion of efficacy studies a decision of mandatory fortification will be taken.
- One mill in Vietnam has commenced fortification.



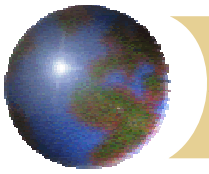
Developing Country Impact Sugar Fortification: Central America





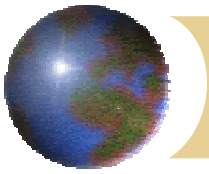
Double/Triple Fortification of Salt

- Technology for double fortification well established
- Triple fortification technology under development
- Feasibility studies completed in four countries:
Nigeria, Kenya, India and Indonesia
- Next steps:
 - Production feasibility
 - Sensory and consumer studies
 - Effectiveness trials
 - Commercial production



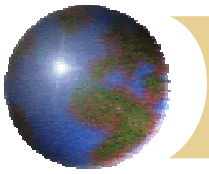
Conclusions - 1

- ✚ There is a huge unmet need for multiple micronutrients in large parts of the developing world.
- ✚ Universal fortification of a range of staple foods could provide significant amounts of micronutrients to millions of deficient people and improve micronutrient status across the board.
- ✚ There is a real opportunity to demonstrate significant impacts within the next five years.



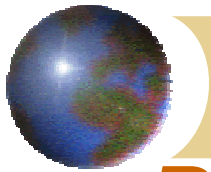
Conclusions - 2

- Projections for 63 low-income countries indicate that fortification could provide significant quantities of key micronutrients to target populations in a cost-effective manner:
 - **Vitamin A:** grain, oil & sugar fortification can deliver 20%-50% of WHO safe level.
 - **Iron:** grain fortification can deliver 6%-50% of median absorbed needs for adult women.



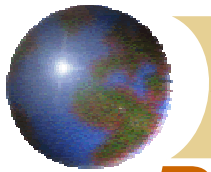
Conclusions - 3

- Over the past decade there has been significant growth in awareness/action by governments and the private sector in the region.
- In many parts of the world there has been growing consolidation of food processing (flour milling, oil and salt refining) that will enable fortification. There is also a steady expansion in consumption of processed foods.
- The timing is right to catalyze action and expand coverage of fortified foods.



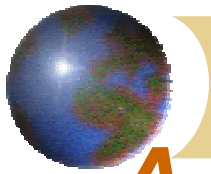
Proposed National Actions to Enable Food Fortification

- ❖ Dovetail into prevailing food production/distribution systems.
- ❖ Link to other interventions/dietary guidelines.
- ❖ Create strong national multi-sectoral coalitions.
- ❖ Create social demand.
- ❖ Establish dialogue with key food processing sectors (strategies/standards/guidelines).
- ❖ Enable regulation & enforcement.

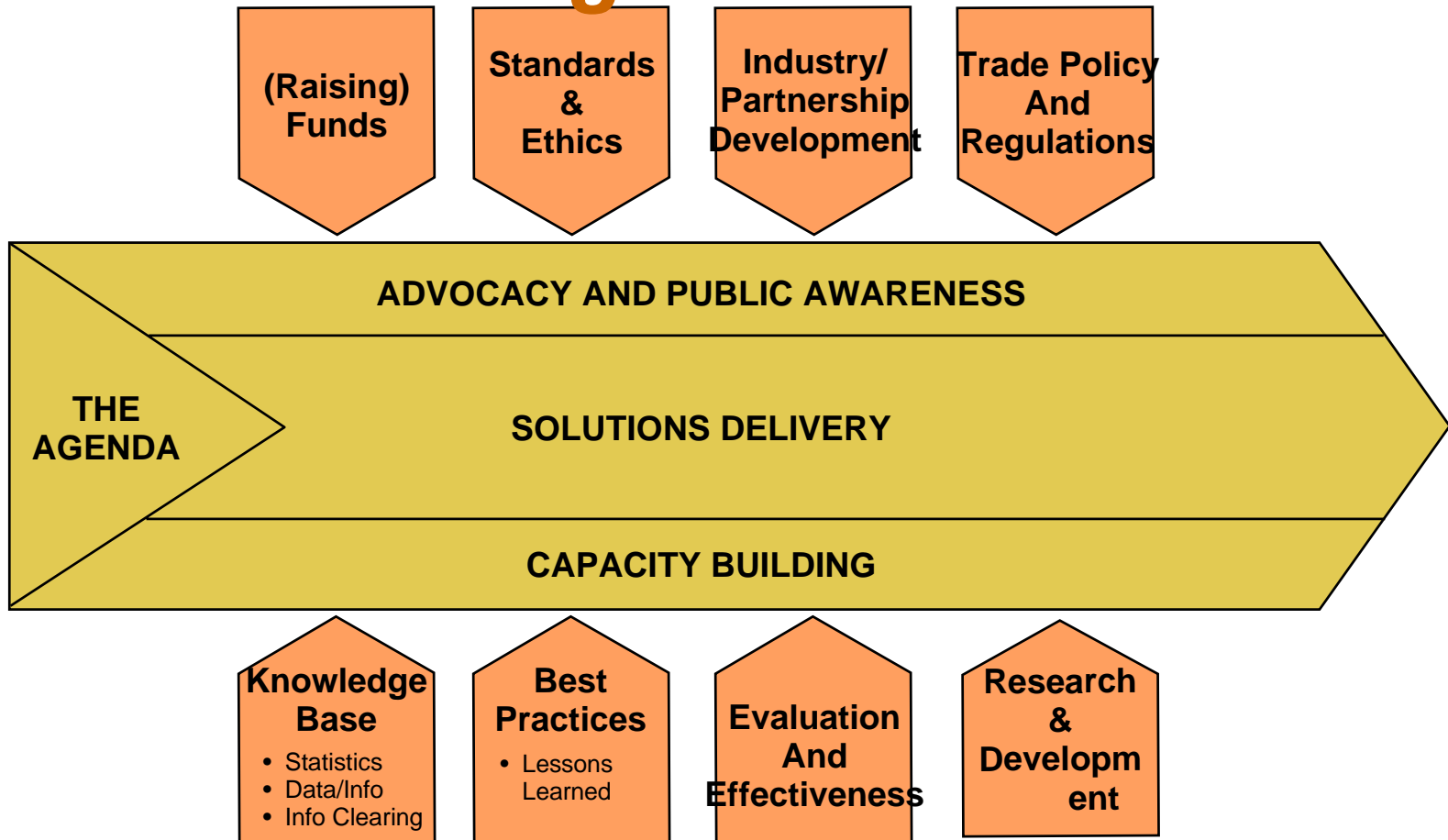


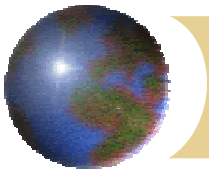
Proposed National Actions to Enable Food Fortification

- ❊ Prepare national investment plans identifying priority actions for both public and private sector.
- ❊ Enable capacity building for assessment, implementation and monitoring of interventions.
- ❊ Update information on deficiency prevalence and coverage of interventions through ongoing health surveys.
- ❊ Establish monitoring and evaluation framework to ensure quality and impact.



A Possible Business Model for National Food Fortification Programs





Proposed Regional Actions

- Generate networks among countries in the region to.
 - Advocate action and strategies through the health sub-committees of regional networks such as SAARC, SADDC, MERCOSUR, ECOWAS, etc).
 - Harmonize standards, regulations and guidelines for fortification of staples through regional codex committees.
 - Insert micronutrient issues in broader health/education/agricultural forums.
 - Establish regional network for training and capacity building and core of specialists.