

Multi-Sectoral Nutrition Strategy

Global Learning and Evidence Exchange



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Photo courtesy of Fintrac Inc.

Food Fortification as a Means to Achieving Nutrition Goals

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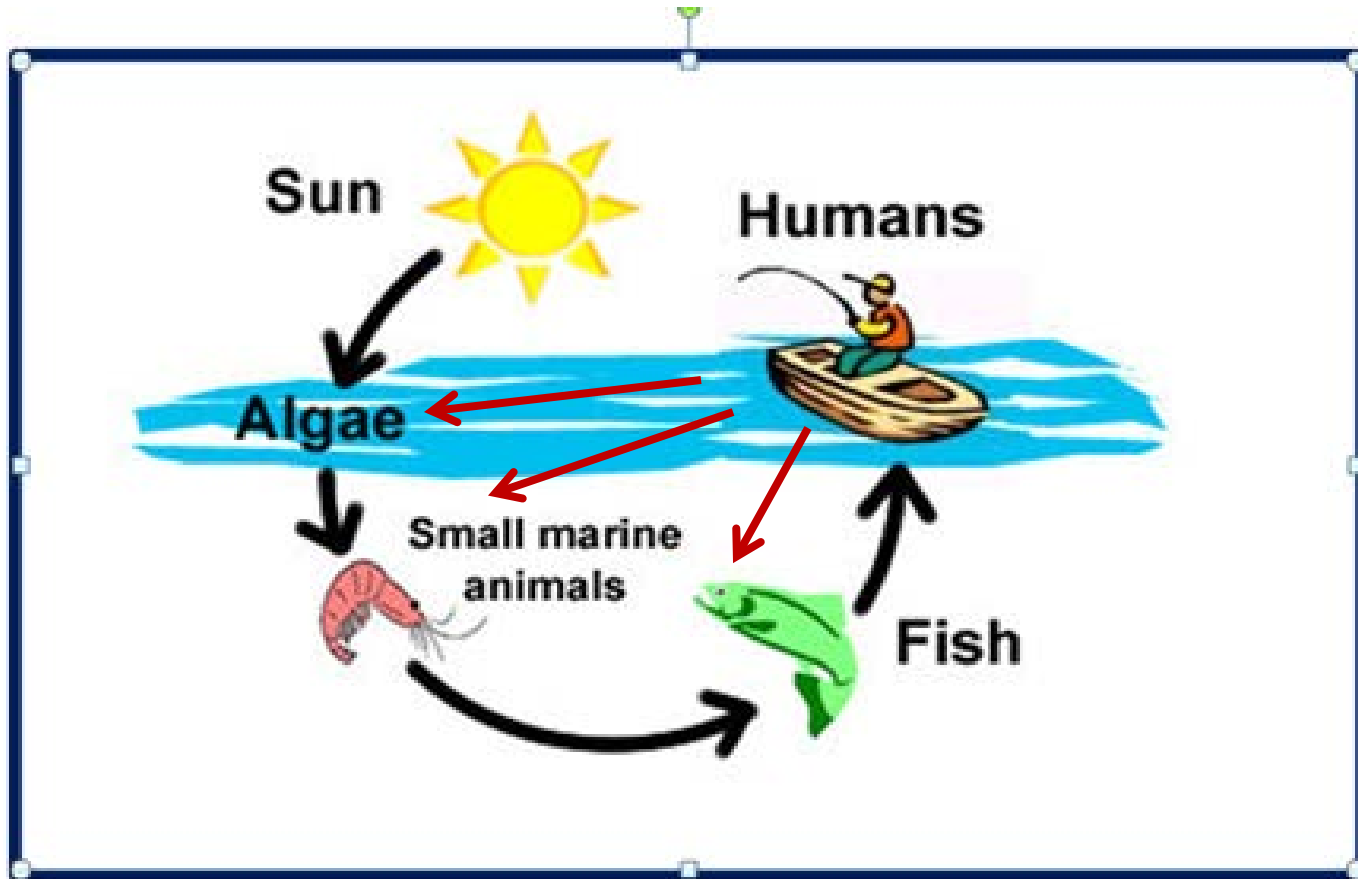


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Introduction: Why, what and how food fortification



Taken from: <http://ashleighrebeccakasie.weebly.com/lesson-7-food-cycles.html>

Nutrient Intakes: Supply of vitamins by different food groups

Vitamins	Milk	Eggs	FMP ¹	Cereals, roots tubers	Pulses nuts seeds	ProVA fruits & vgt.	Other fruits & vgt.	Oil, ref. flours, sugar
Vit. B-1	+	++	+	++	+++	+	++	-
Vit. B-2	+++	++	++	+	+	+	++	-
Niacin (B-3)	+	+	+++	++	++	+	++	-
Vit. B-6	++	++	++	++	++	++	++	-
Folate (B-9)	-	+	+	+	+++++	+	++	-
Vit. B-12	++	++	+	-	-	-	-	-
Vit. C	+	-	-	-	-	+++*	+++*	-
Vit. A	++**	+++	+	-	-	++	(+)	-
Vit. D	++**	++	+	-	-	-	-	-
Vit. E	+**	+	+	+	+	++	++	+ [oil]

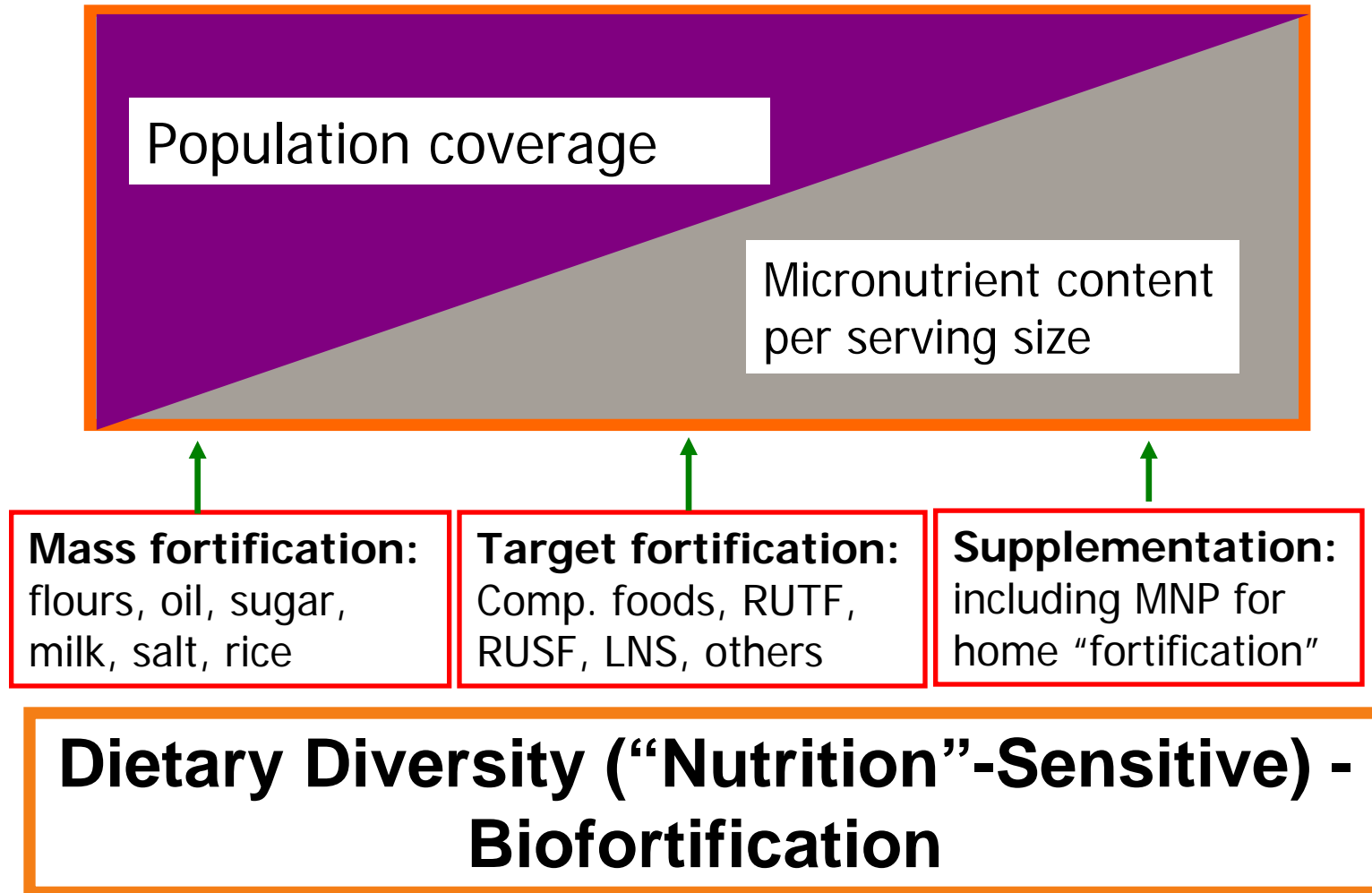
Notes: ¹FMP = Fish, meat, poultry; X = relative density, non-nutrient; + = Relative density of the micronutrient.; () low absorption in humans

Nutrient Intakes: Supply of minerals by different food groups

Minerals/ Others	Milk	Eggs	FMP ¹	Cereals, roots tubers	Pulses nuts seeds	ProVA fruits & vat.	Other fruits & vgt.	Oil, ref. flours, sugar
Iron	-	(+)	+++	(++)	(+++)	(++)	(++)	-
Zinc	-	-	+++	(+)	(++)	(+)	(+)	-
Copper		++	++	-	(++)	(+)	(+)	-
Calcium	+++	+	+	(+)	(++)	-	(+)	-
Iodine	-	-	-	-	-	-	-	-
Fiber	-	-	-	XX	XX	X	XX	-
Phytates	-	-	-	X	XX	-	-	-
Polyphenols	-	-	-	-	XX	-	-	-
Oxalates	-	-	-				XX	-

Notes: ¹FMP = Fish, meat, poultry; X = relative density, non-nutrient; + = Relative density of the micronutrient.; () low absorption in humans

Strategies for micronutrient-delivering

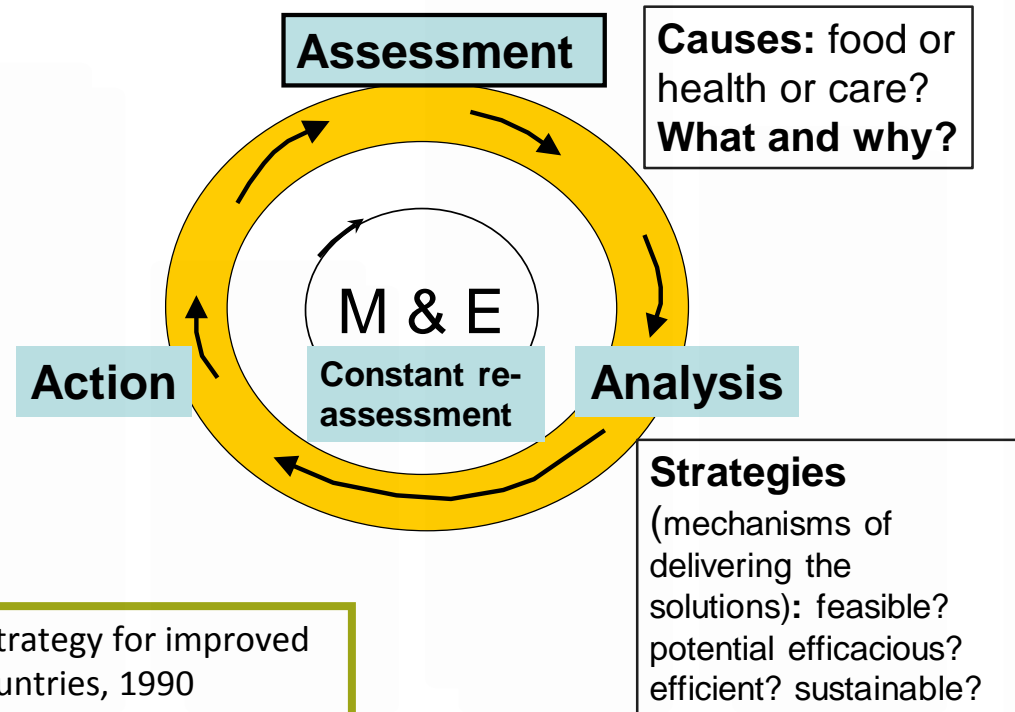


Comparing different micronutrient-delivering strategies

Characteristic	Biofortification	Food Fortification	Supplementation
Impact	Additional quantity and quality of the supplied micronutrients (very little to do with the carrying vehicle).		
Principle	Increase nutrient content through selection and breeding of basic vegetable crops	Incorporation of micronutrients to the edible vehicles during the manufacturing process	Syrups/tablets/powders, of micronutrients consumed with/without foods (home-“fortification”)
PROGRAMMATIC EFFICIENCY (Sustainability)			
Feasible to produce	√	√√	√√√
Easy to deliver	√√√	√√*	√
Accessed by consumers	√√	√√√*	√
Practical to monitor	√	√√*	√√√
Viable <u>total</u> cost.	√√	√√√*	√

* If produced by centralized and reasonable-developed food industries.

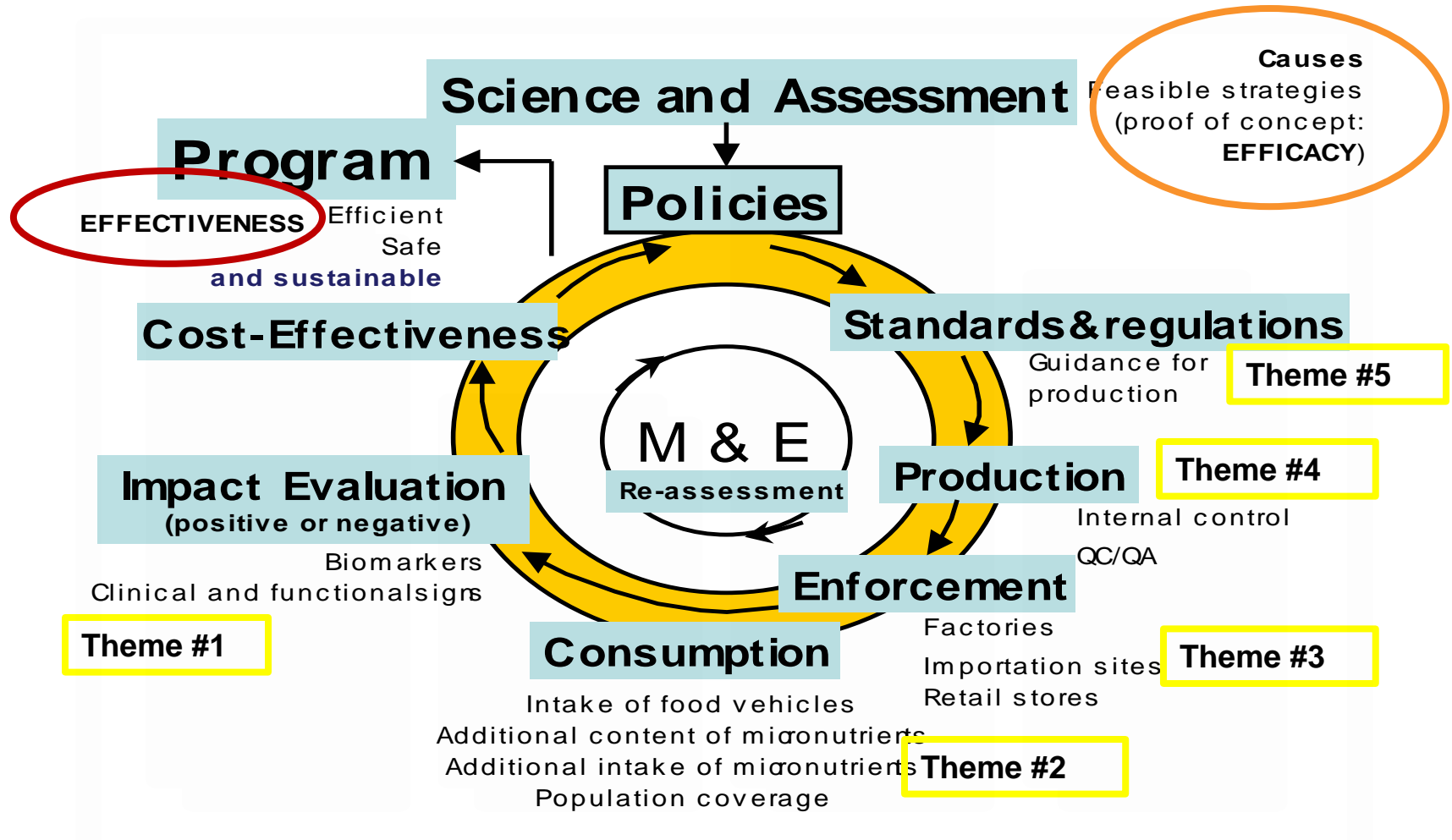
Designing of a program: The triple A approach



Modified from: UNICEF, Strategy for improved nutrition in developing countries, 1990

Before acting, we need to characterize the problems (prevalence, magnitude, severity) and identify the causes, as well as to analyze the acceptance, feasibility and programmatic viability of the potential solutions.

Components of a food fortification program: Delivery Science



The panelists

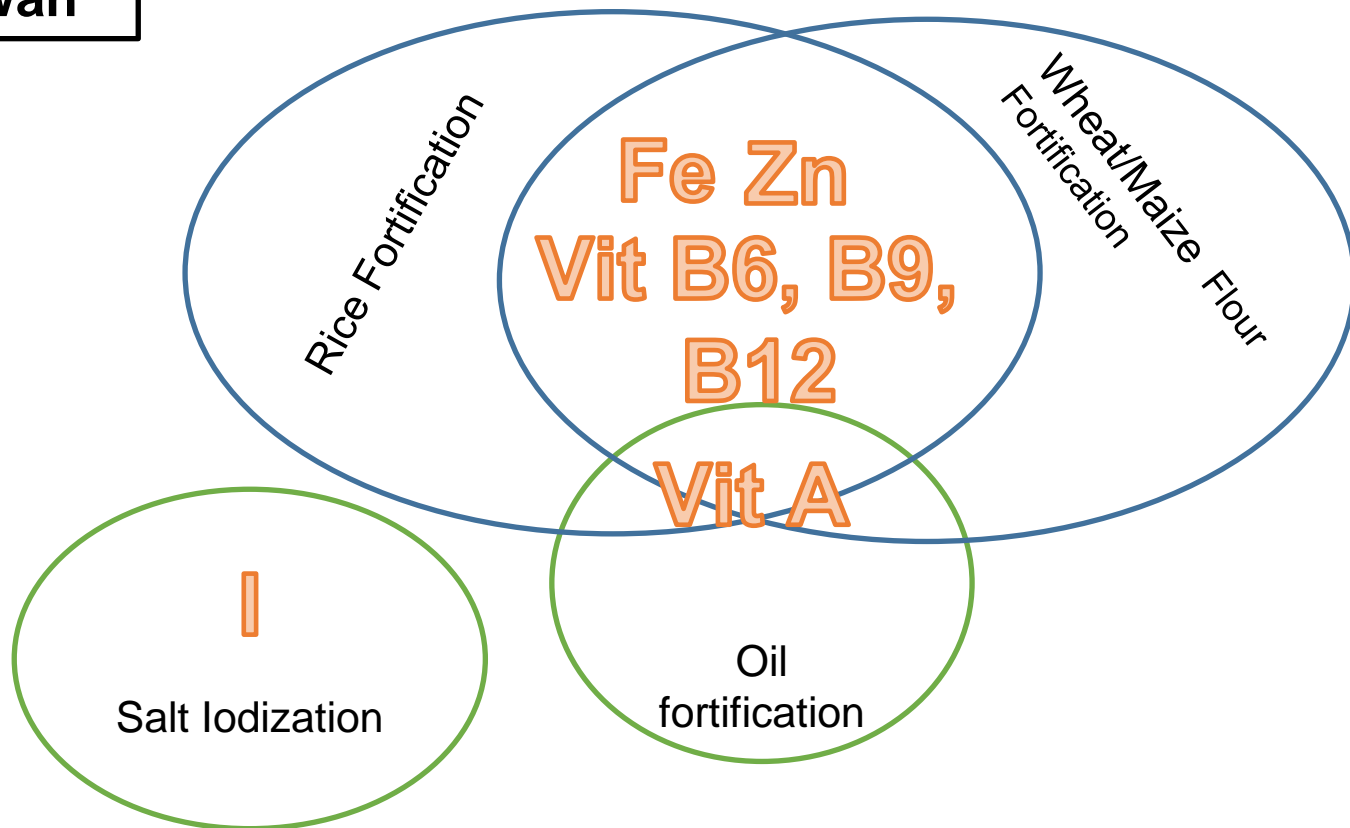
Name	Institution/ Country	Experience	Formation
Rizwan Yusufali	WFP/ South-Asia	-Fortification specialist during 14 years who has worked with GAIN, MI, UNICEF in Africa and Asia (salt, flours, oil, rice)	MSc in Chemical Engineering, U. Toronto
Visith Chavasit	Prof. at INMU/ Thailand	-He was Director of INMU, where he has worked for 25 years. Developing fortified foods: noodles, sauces, salt, rice.	PhD Food Science, Oregon State U.
Dora Panagides	GAIN/ Global, Geneva	-Public Health over 25 years in Africa and Asia. Coordinates CAR, Afghanistan, and Pakistan GAIN/USAID project	MSc in Health Science, JHU
Mutriba Latypova	GAIN, Tajikistan	-Working for more than 15 years in development. (DAI, ME&A, Urban Institute) Manages GAIN project of FF in Tajikistan	MSc Globalization and Int.Policy, U.Bath, UK
Omar Dary	USAID/ Washington DC	-Fortification specialist during 26-38 years in program introduction, enforcement and evaluation in LAC, Africa, Asia, and MENA	PhD Biochemistry, U. California, Riverside

The selected topics

Name	1. Impact Evaluation	2. Consumption Appraisalment	3. Enforcement	4. Production	5. Standards & Regulations
Rizwan Yusufali	(√)			√	
Visith Chavasit		√	√		
Dora Panagides			√	√	
Mutriba Latypova				√	√

1. Impact Evaluation (Assessment): Fortification can deliver several nutrients

Rizwan

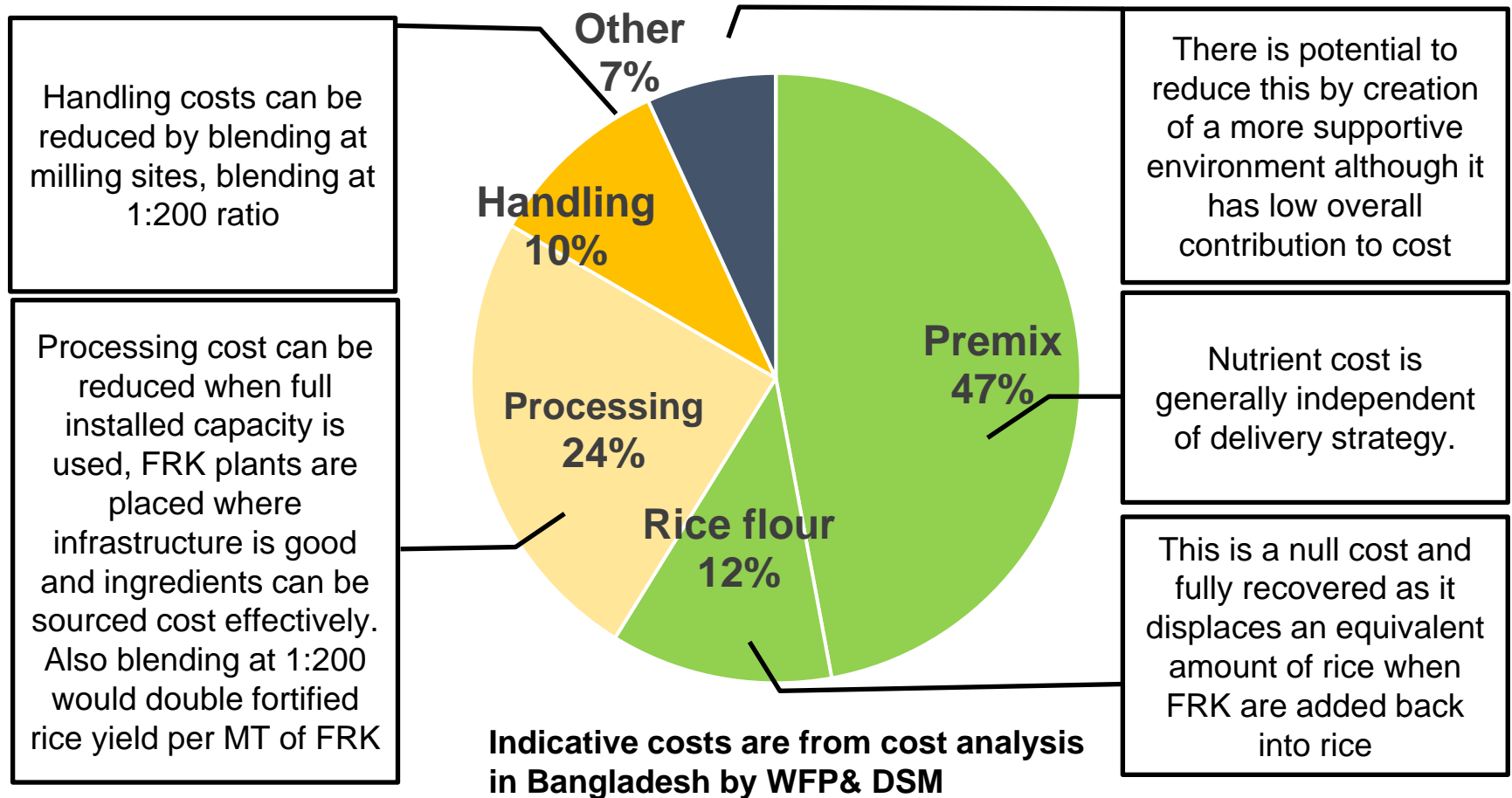


Example of incremental costs for rice fortification excluding programmatic support costs

Component	\$/MT fort. rice	Potential for Optimization	How can costs be optimized further?	25% red. (\$/MT FR)	50% red. (\$/MT FR)
Rice flour	3.00	Null	<ul style="list-style-type: none"> N/A- cost is fully recovered 	3.00	3.00
Premix	12.00	Low -independent of delivery strategy	<ul style="list-style-type: none"> Number of nutrients 	12.00	12.00
Direct cost of extrusion	6.25	Medium potential	<ul style="list-style-type: none"> Production at scale maximum utilization of capacity 	4.69	3.13
Transportation & Handling	2.50	High potential	<ul style="list-style-type: none"> Location of kernel facilities optimization of supply chains consider higher (1:200) blending ratio 	1.88	1.25
Other costs	1.75	Medium potential	<ul style="list-style-type: none"> Economy of scale Supportive environment (low taxes, reduced red tape, effective regulation) 	1.31	0.88
Total	25.50			22.88	20.25

Source: Bangladesh cost analysis, WFP/DSM Partnership project. The cost of milled rice is \$250-600/MT

Opportunities to optimize cost contributions



* Capital and operational costs for extrusion lines are high. It is therefore more cost effective to ship kernels rather than create underutilized FRK production capacity in each country. FRK production cost is lower in countries with good infrastructure, access to lower cost ingredients and/or low importation costs, availability of skilled labor and low utility costs

Comparing different strategies to deliver (micro)nutrients

Item	Supplement MNP - 1 g	LNS's – 20 g	Blended flours 42 g	Fortified staple No rice– 50 g
13 micronutrients*	\$0.0030	\$0.0015	\$0.0027	\$0.0028**
+ Ca and Mg ***	-	\$0.0034	\$0.0050	-
Cost product	\$0.03-0.04	\$0.10-0.14	\$0.14	\$0.025
Energy (kcal)	4	118	180	180
Protein (g)	-	2.6	16.0	4.9
Ess. Fatty acids	NO	YES	YES	NO
Distribution Cost	\$0.03-0.04	\$0.03-0.14	\$0.10-0.20	\$0.00

* Cost in 2013 for the WHO formula of MNP to use in emergencies (i.e. 100% RDA/AI, exc. iron - 86%- zinc -49%) for 1-3 years old children, and without considering cost of selenium and copper. In this case, about 50% of the cost is due to the addition of vitamin E, and vitamin C.

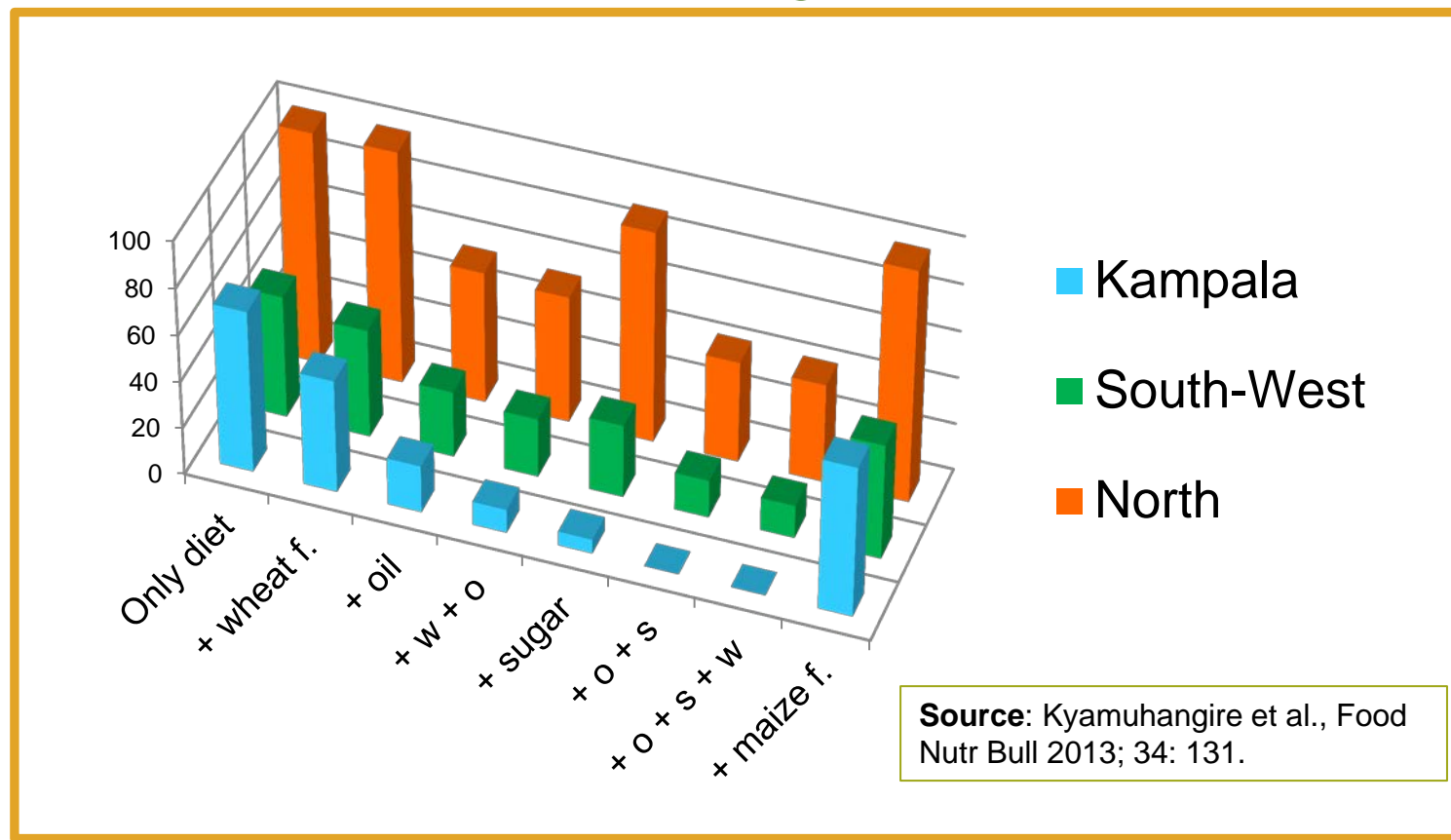
** Although vitamin C would be difficult to be added in most staple foods, and providing sufficient amounts of some micronutrients may be uncertain. *** LNS and blended flours may also contain Phosphorus, Potassium, and vit. K, but their costs were not added here.

2. Consumption appraisalment

- **Visith:** There are “universal” recommendations for deciding about the micronutrient content in fortified foods. What do you think about them?
- What about using recommendations based on average population intakes of the fortification vehicles?
- As most of the fortification vehicles are those products associated to non-communicable diseases, what can we do to avoid the double burden of the disease?
- **All:** Do you have experience assessing intakes, coverages, and quality of fortified foods at households?

Estimating the potential impact of several fortified foods in Uganda

% Children (24-59 months) with intakes below the EAR values for vitamin A in Uganda - 2008



3. Enforcement (a)

- **Dora:** Enforcement is one of the weakest components of the food fortification programs. Could you elaborate why and how the limitations could be overcome?
- Is enforcement important at retail level?
- What if the product is not labeled?

3. Enforcement (b)

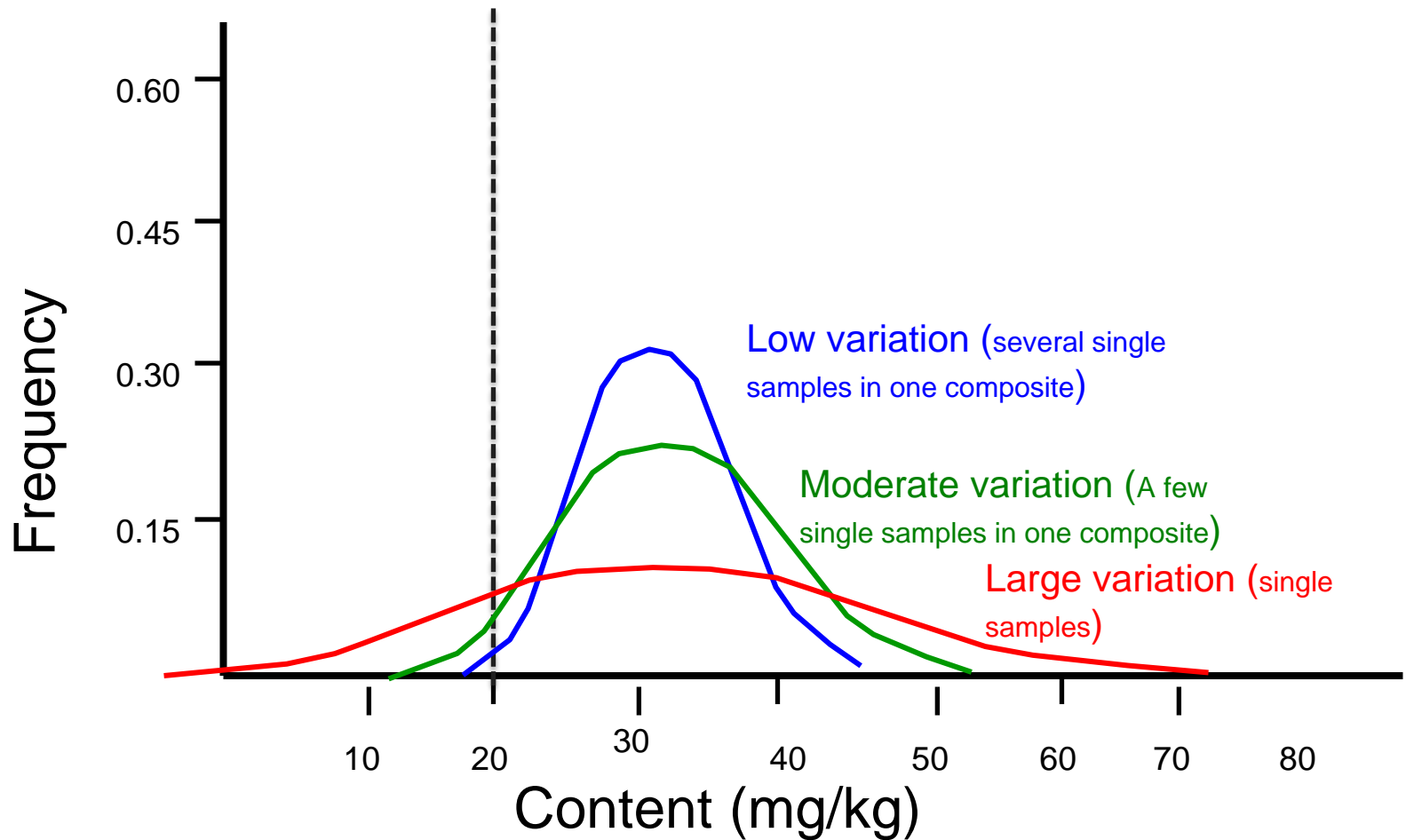
- **Visith:** Could you describe the experience in Southeast Asia in the organization of enforcement?
- What is your advice if the stability of the nutrient is inadequate?
- What type of analytical capabilities (food laboratories) are required for quality control and enforcement of fortified foods? How do you keep the cost low?

Using composite samples to check compliance: Washed salt-Mexico (Reg.: 30 mg \pm 10 mg l/kg)

Parameter	Single	2 combined	4 combined
n	8	8 x 2	8 x 4
Median (mg/kg)	30.1	31.5	30.2
Mean (mg l/kg)	35.0	33.2	30.0
S.D. (mg l/kg)	14.1	7.2	5.5
C.V. (%)	40.3 %	21.7 %	18.4 %
% samples < 20 mg l/kg	14.4 %	3.3 %	3.4 %
% samples < 15 mg l/kg	7.8 %	1.0 %	0.3 %

Source: Unpublished results from Government Food Control (COFEPRIS), México, 2013.

Variation under different scenarios; Average 30 ± 10 mg I/kg



4. Production (a)

- **Mutriba:** Could you share with us the experience of Tajikistan in CAR in implemented wheat flour fortification? Why the process has not been accepted extensively by the producers?
- Where have you found information and material to strengthen the national capabilities to carry out food fortification?

4. Production (b)

- **Dora:** Why GAIN has focused on large and centralized food factories instead of small production facilities?
- Is food fortification industry-driven?
- **Rizwan:** What is WFP planned for the rice mills fortifying rice to carry out quality control of the fortified rice?
- Who is going to pay for the additional cost of the program? How?

5. Standards and Regulations

- **Mutriba:** In your opinion, how much and how the food industry might be involved in the discussion of standards?
- Could you share with us the experience in the CAR for harmonizing standards? What is going to happen with the introduction of economic group leading by Russia?
- How much social communication and marketing is needed for mass food fortification?

Take away messages and new insights learned

- **Mutriba**
- **Dora**
- **Rizwan**
- **Visith**
- **Omar**