SEAMEO-TROPMED Regional Center for Community Nutrition
University of Indonesia

THE COST-TO-NUTRITIONAL BENEFITS OF ALTERNATIVE INTERVENTION STRATEGIES TO IMPROVE THE NUTRIENT INTAKES OF INDONESIAN CHILDREN

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Rationale and Objectives

Mathematical models using linear-programming (LP) have been developed:
- to formulate population-specific FBDG
- to test population-specific FBDG
- to select amongst alternative nutrition intervention strategies

Objective: to illustrate applications of LP through case studies in order to compare the cost-to-nutritional benefits of alternative interventions to select an appropriate strategy to improve nutrient intakes of 9-11mo Indonesian children

Materials and Methods

Study area:

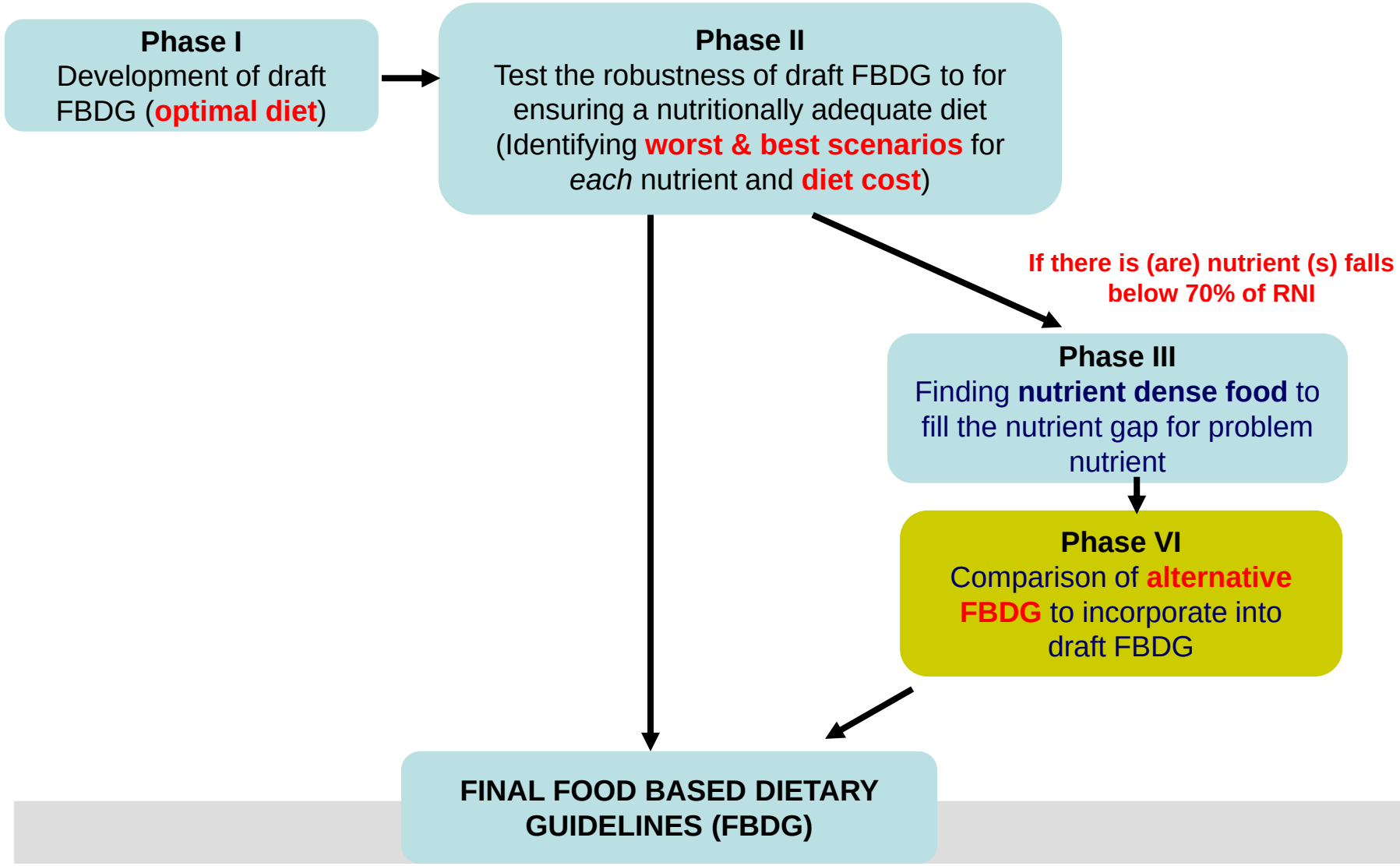
- rural area in East-Lombok, West Nusa Tenggara (n=67 survey)
- peri-urban area in Bogor, West-Java (n=100 survey)

Respondents: mothers of 9-11mo infants

Information collected:

- Food available and cost in local markets
- Food pattern, portion
- Food affordability (‘upper cost constraint’ –money available to buy foods for individual infant): Rp 2,500/day in both areas (USD 0.25/day)

Development of FBDG using LP analysis



…Materials and Methods

Each model was compared with ratios of:

$$\frac{\text{cost of alternative}_i}{\text{average \%RNI of alternative}_i}$$

and

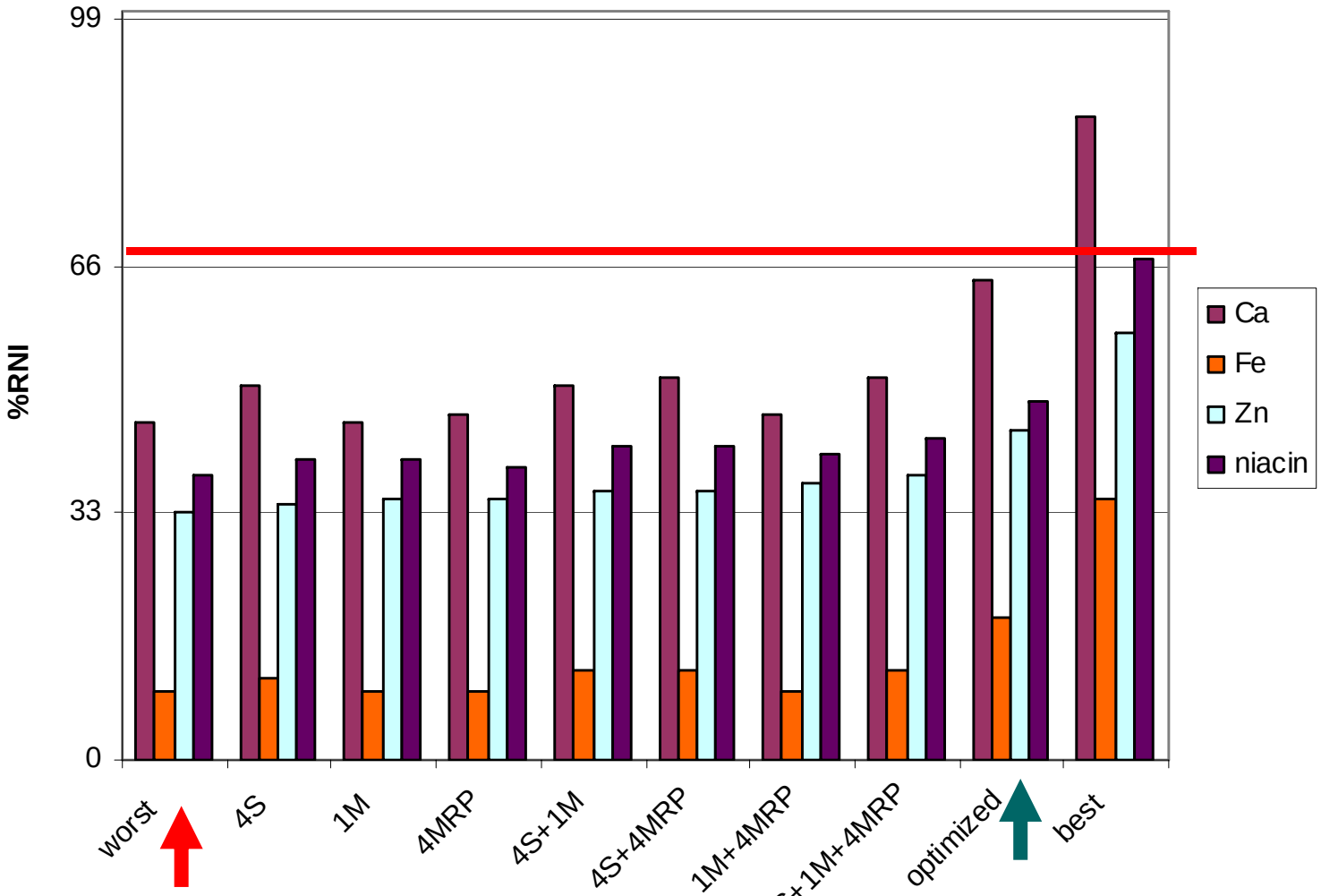
$$\frac{(\text{cost of alternative}_i - \text{cost of worst-case})}{\text{cost of worst-case}}$$

$$(\text{alternative}_i\ \%\text{RNI} - \text{worst-case}\ \%\text{RNI})/\text{worst-case}\ \%\text{RNI}$$

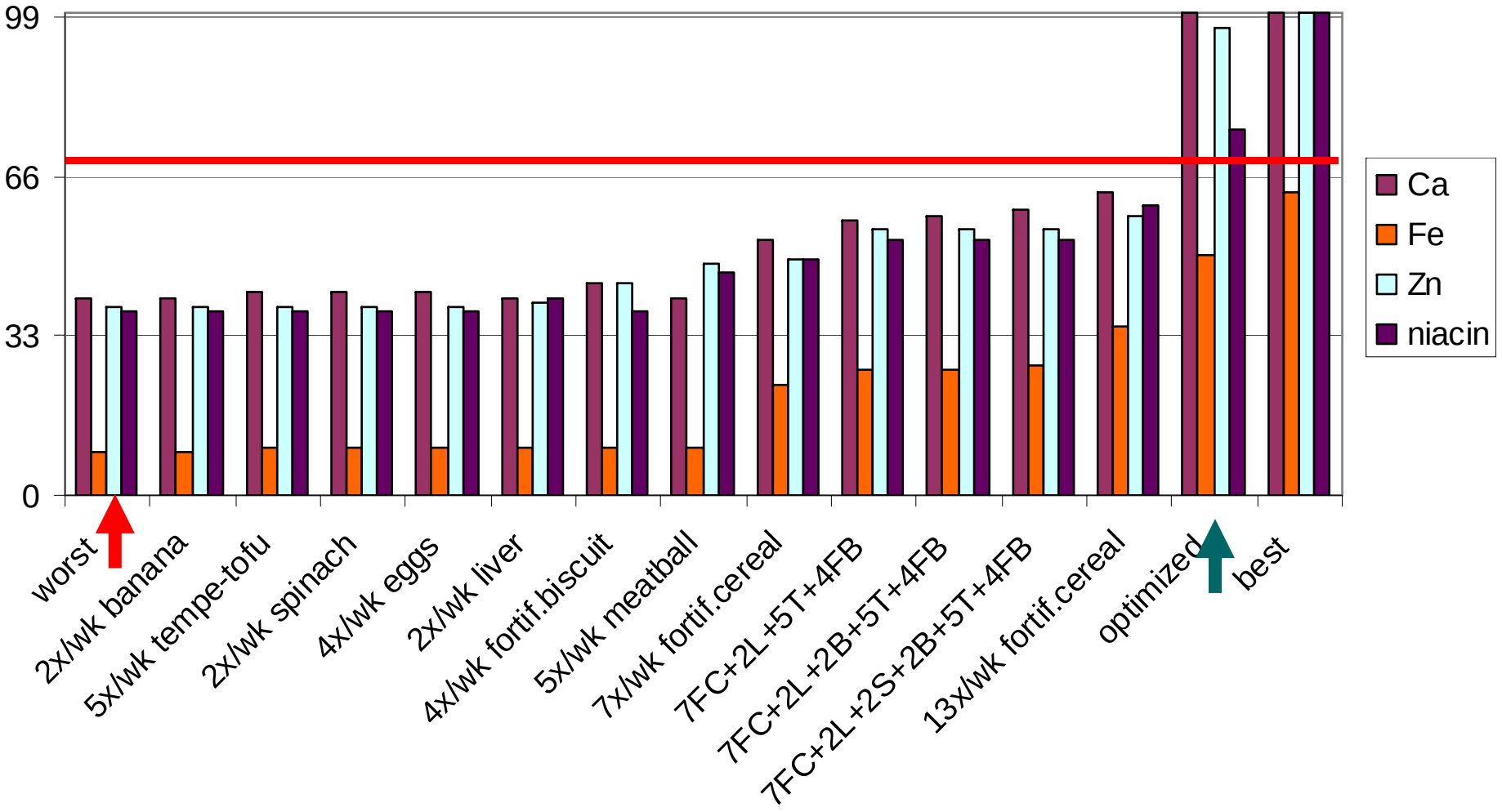
where

%RNI = (%RNIFe + %RNIZn +%RNICa + %RNI niacin) / 4

Result: %RNI of alternative FBDGs in Lombok (rural)



Result: %RNI of alternative FBDGs in Bogor (peri-urban)



Result: Alternative FBDGs in Lombok (rural)

Alternative	Ave RNI	cost	Ratio (cost/RNI)	rank	RATIO (d-cost/d-RNI)	RANK
worst	31.3	304	9.7			
4MRP	32.3	317	9.8		1.3	
1M	32.3	401	12.4		10.0	
1M+4MRP	33.3	415	12.5		5.7	
4S	**33.8**	**326**	**9.7**	**2nd**	**0.9**	**2nd**
4S+1M	**35.0**	**421**	**12.0**		**3.2**	
4S+4MRP	**35.3**	**336**	**9.5**	**1st**	**0.8**	**1st**
4S+1M+4MRP	**36.0**	**433**	**12.0**	**3rd**	**2.8**	**3rd**
optimized	**43.8**	**741**	**16.9**		**3.6**	

MRP=mixed rice porridge, M=meatball, S=spinach

Result: Alternative FBDGs in Bogor (peri-urban)

Alternative	Ave RNI	cost	ratio (cost/RNI)	rank	RATIO (d-cost/d-RNI)	RANK
worst	31.8	899	28.3			
2x/wk banana	31.8	889	28.0			
5x/wk tempe-tofu	32.3	889	27.6		-0.7	
2x/wk spinach	32.3	898	27.8		-0.1	
4x/wk eggs	32.3	922	28.6		1.6	
2x/wk liver	33.0	922	27.9		0.6	
4x/wk fortif.biscuit	**34.0**	**889**	**26.1**	**2nd**	**-0.2**	**1st**
5x/wk meatball	**36.3**	**923**	**25.5**	**1st**	**0.2**	**2nd**
7x/wk fortif.cereal	**43.5**	**1348**	**31.0**		**1.3**	
7FC+2L+5T+4FB	**47.8**	**1366**	**28.6**		**1.0**	
7FC+2L+2B+5T+4FB	**48.0**	**1366**	**28.5**		**1.0**	
7FC+2L+2S+2B+5T+4FB	**48.5**	**1375**	**28.4**	**3rd**	**1.0**	**3rd**
13x/wk fortif.cereal	**54.0**	**1989**	**36.8**		**1.7**	
optimized	**80.8**	**2320**	**28.7**		**1.0**	

FC=fortified cereal, L=chicken liver, T=tempe/tofu, FB=fortified biscuits, B=banana, S=spinach

Conclusions

1. Iron, zinc, calcium and niacin are problem nutrients in complementary feeding of 9-11mo infants in Lombok and Bogor
2. FBDG based on locally available foods led to improved nutrient intakes; however given the food availability and affordability of the population some nutrients will remain as ‘problem nutrients’ even when diets are optimized:
   - Peri-urban*:* iron
   - Rural: iron, zinc, calcium, niacin
3. Fortified foods and nutrient-dense foods (single or in combination as recipe) gave the lowest ratio of cost/%RNI and d-cost/d-RNI. Comparing between peri-urban and rural, alternative which gave the lowest ratio:
   - Peri-urban*:* fortified foods
   - Rural*:* recipes with nutrient-dense foods

Recommendations

1. Fortified foods and recipe(s) with nutrient-dense foods should be promoted in local FBDG for complementary feeding.
2. Fortified foods should be made cheaper and widely accessible.
3. Alternatively for areas where purchasing power is very low, in-home fortification (e.g. sprinkle) should be tested to improve nutrient adequacy while continuing effort to improve dietary diversity and nutrient intake through local foods

THANK YOU

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