Food-based recommendations combined with local nutrient-dense foods, especially fish, would ensure dietary nutrient adequacy in adolescents from urban Bangladesh: Linear programming

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Background

- In Bangladesh, fish plays a central role in the traditional diet of adults, but little is known about the contribution of fish in the diets of urban adolescents from low-wealth households.
- Effective food-based recommendations (FBR) for healthier diets among adolescents are needed to combat overweight, obesity and micronutrient deficiencies in Bangladesh.

Methods

- Three non-consecutive 24-hour recalls collected in the three seasonal rounds during 2015-2016 (n=431) were analysed.
- Linear programming analysis using Optifood software.

Results

- Calcium, and vitamin D were problem nutrients (<100% of RNI) among all target groups (11–14, 15–17 and 18–19 yrs.). Riboflavin, folate, vitamin A were problem nutrients in some of the target groups, as well as iron, in females.

- The final FBR, including consumption of fish 7-10 times per week, and combined with nutrient-dense foods (dried fermented fish, jute leaves, liver and dairy) could ensure nutrient adequacy (>70% of RNI) for all nutrients, including fatty acids ALA, EPA, DHA.

Objectives

- To identify an optimal and realistic set of food-based recommendations (FBR) that would improve dietary nutrient adequacy among adolescents from low-wealth neighborhoods of Dhaka city, Bangladesh
- To evaluate which nutrient-dense foods, particularly fish, can potentially contribute to nutrient adequacy.

Results
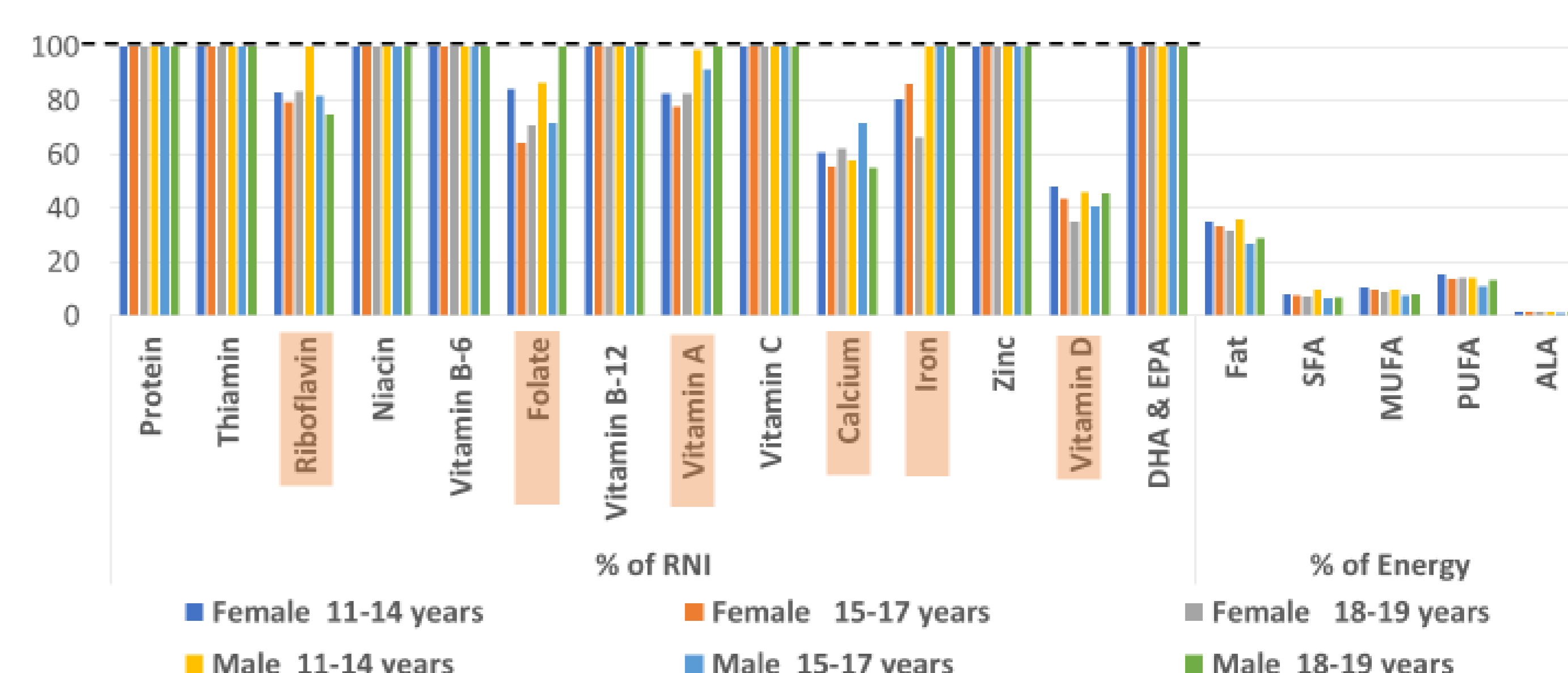
Problem nutrients, defined as % of RNI below 100% in Maximized diet; ------- Values are capped at 100% RNI, recommended nutrient intake; SFA, saturated fatty acids; MUFA, mono-unsaturated fatty acids; PUFA, poly unsaturated fatty acids; ALA, alpha-linolenic acid; DHA, docosahexaenoic acid; EPA, Eicosapentaenoic acid

Figure 1. Problem nutrients in the diets of adolescents (n = 431, aged 11–19 years) from low-wealth neighborhoods in Dhaka city, Bangladesh, by sex and age group

Table 1. Final set of food-based recommendations (FBR) (# of servings/ week) for adolescents (n = 431, aged 11–19 years) from low-wealth neighborhoods in Dhaka city, Bangladesh, by sex and age group

FOOD GROUPS	11-14 y	15-17 y	18-19 y	11-14 y	15-17 y	18-19 y
Sub-food group (food item)*			# of servings / week			
ADDED FATS	12	12	12	12	9	12
MEAT, FISH & EGGS						
Eggs	7	7	7	7	5	5
Organ meats (Chicken liver)	(1)	(1)	(1)		(1)	(2)
Poultry		1		3		
Red meats	2	2	2		2	
Small, fatty fish	2				2	2
Small non-fatty fish (Mola fish)	6	5		(1)	(1)	
Large, fatty fish (Hilsa fish)	2 (1)	4 (1)	5	(1)	(1)	5
Large non-fatty fish				7	5	
Dry & fermented fish			2			
(Fermented fish)[a]	(72 g)	(80 g)	(72 g)	(72 g)	(64 g)	(64 g)
LEGUMES, NUTS & SEEDS	9	9	9	9	9	9
DAIRY PRODUCTS (Fluid or powder milk)	5	5	5	5	5	(5)

FOOD GROUPS	11-14 y	15-17 y	18-19 y	11-14 y	15-17 y	18-19 y
Sub-food group (food item)*			# of servings / week			
GRAINS & PRODUCTS						
Whole grains & products	5	7	5	7	7	5
FRUITS						
Other fruits (Banana)				(3)		
Vitamin A-rich	2	2	2	2	2	2
Vitamin C-rich	5	7	5	7	5	5
VEGETABLES	26					23
Other vegetables			16	19	14	
Vitamin A-rich dark green leafy vegetables (Jute leaves)	5 (2)	5 (2)	7 (3)	5	7	5 (2)
Vitamin A-rich other vegetables (Pumpkin)	(2)		2	2	2	
Vitamin C-rich vegetables		6				5

[a]Values for fermented fish is the serving size (g) per week
*Recommended food item within the (sub-) food group.

Conclusions

- Improving the quality of adolescent' diet that ensure nutrient adequacy can be achieved through resulting FBR, which include increased consumption of local nutrient-dense foods, such as jute leaves, milk, and liver, as well as variety of fish, especially dried fermented fish.
- Stakeholders' consultations are needed to assess whether these FBR are feasible.

Acknowledgements