Review

Food based dietary guidelines (FBDGs) development and promotion in Thailand

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Dietary guidelines based on 5 food groups was used as a main nutrition education tool until 1996 when food based dietary guidelines (FBDGs) were promoted after 2 years of formulation and development. These FBDGs for the general population were designed to promote desirable and culturally acceptable eating behavior. The nine qualitative guidelines of Thai FBDGs include: 1. eat a variety of foods from each of the five food groups and maintain proper weight, 2. eat adequate rice, or alternate carbohydrate, 3. eat plenty of vegetables and fruits regularly, 4. eat fish, lean meats, eggs, legumes and pulses regularly, 5. drink sufficient amount of milk every day, 6. take moderate amounts of fat, 7. avoid excessive intake of sweet and salty foods, 8. eat clean and uncontaminated foods, and 9. avoid or reduce consumption of alcoholic beverages. In 1998, the quantitative part of Thai FBDGs or food guide model was established as "Nutrition Flag" after rigorous test for understanding and acceptability among consumers. Promotion and dissemination of the Thai FBDGs have been carried out at national and community levels through basic health, agricultural and educational services and training activities, as well as periodic campaigning via multiple communication channels and media. Recently in 2009, the FBDGs for infant and preschool children were introduced to replace the previous infant and young child feeding guidelines. There has been no formal evaluation on the impact of promotion of the Thai FBDGs but some periodic testing of knowledge and practices have shown positive results.

Key Words: Thai food based dietary guidelines, development, nutrition flag, eating behavior, general population

INTRODUCTION

The rising health problems are a consequence of the demographic, dietary and nutrition transition, as well as, the globalization and urbanization (World Health Organization (WHO).[1,2] Obesity increases a person's risk to noncommunicable diseases in both developed and developing countries. Moreover, in developing countries, under nutrition problems, such as low birth weight, micronutrient deficiency still persists. In 1996, the Food and Agricultural Organization (FAO) and WHO published the guidelines for preparing and implementing the Food Based Dietary Guidelines (FBDGs) as a tool for nutrition education and communication aiming at desirable eating behaviors for nutritional well-being and prevention of both under and over nutrition.[3]

FBDGs provide guidelines for food consumption for the general population and if desired could be develop for specific population groups such as infants and young children, and the elderly. Basic data and information needed for formulation and development of FBDGs include food, nutrition, health problems and issues; food culture, habit and consumption; basic health and education services including the infrastructure and current practices in food and nutrition education. Research to support before, during and after the development and dissemination of FBDGs is also essential since scientific evidences have been the core of the FBDGs principle. This paper will share experience and process in the development and use of FBDGs for nutrition education and health promotion in Thailand.

Process in the development of FBDGs

Thai-FBDGs working committee consisted of senior nutritionists from the Ministry of Public Health (MOPH), academicians from the Institute of Nutrition, Mahidol University (INMU), dietitians, communication specialists and physicians and was set-up in 1994. There were 2 phases for developing the Thai FBDG. Phase I, developed the guidelines (qualitative part) and followed by Phase II, the food guide model (quanlitative part).

Phase 1: Qualitative component: development of 9 dietary guidelines

Thai-FBDGs working committee met regularly to develop the dietary guidelines through a process of a small working groups, meeting of the committee for consensus.[4,5] Since the dietary guidelines are the guiding principles for food and nutrition education and communication,

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Table 1. Nine Thai dietary guidelines and details

Dietary guideline	Details
1. Eat a daily variety of foods from each the five food groups and maintain proper weight	This is based on the premise that no single food supplies all the nutrients required by the body in adequate amounts. Hence, the need for eating a variety of foods from each basic five food groups to obtain all the essential nutrients is emphasized. The major food groups indicating their functional importance are classified under this FBDGs in 6 groups which is detail in the below section under food guide development. Body weight, indicator for health status can be best maintained by eating the right kind and appropriate amount of foods, and adequate exercise regularly. The ill effects of underweight are thinness, weakness, poor resistance and lack of alertness, while overweight poses several health risks such as diabetes, hypertension and cancer. Body mass index (BMI) can be suitably used to assess body weight in both children and adults. The normal range of BMI for adults is indicated to be 18.5-22.9 kg/m^2.
2. Eat adequate rice, or alternate carbohydrate	Rice is the stable and tradition food for Thais and this guideline recommends to consume unpolished or brown rice. A variety of alternative carbohydrate e.g., rice noodles, fermented rice noodles, wheat noodles provides energy to the Thai diet. In addition to be a good dietary source of energy, rice provides protein, especially when taken in substantial amount as in the Thai diet, fiber, minerals, and vitamins. When eaten in appropriate amount and combination with a variety of other foods, it gives complementary benefits to the diet.
3. Eat plenty of vegetables and fruits regularly	Vegetables and fruits are good sources of micronutrients such as vitamin A, vitamin C, and non-nutrients such as dietary fiber and phyto-nutrients. Vegetables and fruits are low in energy content and provide several nutritional benefits that exert potentially protective effect against the development of some non-communicable diseases including some type of cancers. The wide availability of a variety of vegetables and fruits in Thailand should therefore be suitably used to advantage by all.
4. Eat fish, lean meats, eggs, legumes and pulses regularly	A regular consumption of fish, lean meat, eggs, legumes and pulses is recommended. Meat group provides good quality protein in sufficient amounts for growth, immune function and body maintenance. Fishes, a good source of omega 3 are popularly available in Thailand. Eggs may be taken by children every day, while adults can take 3-4 eggs weekly. Lean meat should be consumed regularly while as fatty meat should be avoided. A variety of legumes and pulses are recommended for alternative source of low cost protein.
5. Drink sufficient amount of milk every day	Milk is a rich source of protein, calcium, phosphorus and vitamin B-2. For children, milk intake along with adequate exercise is recommended to provide benefits for bone growth and maintenance. Some Thais having lactose maldigestion and intolerance with symptoms of gastro-intestinal discomfort after drink milk should start drinking small amount of milk or drink milk after meal or eating alternative sources of calcium such as small fish with bone or fish meal.
6. Take moderate amounts of fat	Due to increasing consumption of fat presently showed among Thais, fat intake is to be reduced, providing no more than 30% of total energy per day. High consumption of fat is likely to lead to obesity related to non-communicable diseases. Consumption of saturated fat is to be limited, which includes restriction of high fat meat, egg yolk, organ meat, squid, and oyster.
7. Avoid excessive intake of sweet and salty foods	Thai people have a strong preference for spicy and salty food. An excess of those spicy and salty foods can be harmful to health. Fish sauce also contains high sodium that can cause hypertension. In addition, fruit based Thai desserts are generally sweetened with additional sugar. This guideline, therefore recommend to avoid excessive intake of sweet and salty foods.
8. Eat clean and uncontaminated foods	Selection of food which is freshly prepared, well cooked or obtained from reputed stores with the Thai FDA logo, having natural odor, flavor, and color is strongly suggested.
9. Avoid or reduce consumption of alcoholic beverages	Consumption of alcoholic beverages is to be reduced, as the ill effects of excessive alcohol intake on nutritional status and health are well documented.

the committees reviewed current knowledge in nutrition related to healthy eating and based on the Thai contexts. They also ensured that the content of messages developed was consistent and scientifically correct. The first edition of 9 dietary guidelines was present in 1996 in the form of a booklet, for easy use by health service providers, academician and the Thai people. Table 1 showsthose dietary guidelines and details.

Phase 2: Quantitative component: development of the Thai food guide

The 9 dietary guidelines had been the basis for preparing the quantitative FBDGs or food guide which was carried out over a period of two years.[6] These steps of development included;

Identifying nutritional goals

An initial step in the development of the Thai food guide was to set a nutritional goal. Three energy levels, 1600, 2000, and 2400 kcal were set based on the Recommended Dietary Allowances and Recommended Dietary Intakes for healthy Thais.[7,8] This range of recommended energy covered the varying energy needs of both males and females from 6 years of age and above (Table 2). Selected nutritional goals for other nutrients were aimed at promoting a healthy diet for the prevention of both under-and over-nutrition. The range of the amounts of macronutrients were set based on energy distribution at three energy levels and the amount was set at least 70% and above of the RDI for micronutrients.

Defining of food groups and assignment of unit and quantity per unit

The original Thai five food groups' concept was based on nutrient contribution in each food group. This had been changed to 6 groups in the Thai-FBDGs to better help consumers to select healthy diets. Those groups are cereal, meat, vegetable, fruit, milk, and fat, oil and sweet.

The decision for units and tools to communicate with consumers was an important step. Commonly using household utensil found in the kitchen instead of standard measuring was a practical and appropriate estimation for Thais. Household unit for each food group was identified as measured portion size of food. Typically food portions commonly consumed in a day were obtained from a sample of 20 households. Each individual food portion was weighted serially and the average weight was calculated to obtain the standard amount of portion size of each food group (Table 3).

Table 2. Nutritional goals for Thai Food Based Dietary Guidelines

Nutrient		RDA (Energy level, kcal)			RDI	Goal
		1600	2000	2400		
1.Protein	(g)	40-60	50-75	60-90	50	Energy distribution
2.Fat	(g)	36-53	44-67	53-80	65	Prot: Fat: CHO
3.Carbohydrate	(g)	240-260	300-325	365-390	300	10-15: 20-30: 60-65
4.Sugar	(g)	40	50	60	-	40
5.Cholesterol	(mg)	-	-	-	300	300
6.Dietary fiber	(g)	-	-	-	25[1]	25 g for adult and calculation
					17[1]	DF = age+ 5g for children age 6-12 years old[9]
		RDA (Subjects)			RDI	
		7-9 yrs	women	men		
7.Vitamin A	(RE)	500	600	700	800	500-800
8.Vitamin B1	(mg)	1.2	1.1	1.5	1.5	1.1-1.5
9.Vitamin B2	(mg)	1.4	1.3	1.7	1.7	1.3-1.7
10.Vitamin C	(mg)	45	60	60	60	45-60
11.Iron	(mg)	10	15	10	15	10-15
12.Calcium	(mg)	800	800	800	800	800

Table 3. Household units and amount per portion of various food groups

Group	Household unit	Amount of portion (g)	Counts as a portion	
Cereal and products	Rice serving spoon	60	1 rice serving spoon of cooked rice, noodles	(60 g) (35 g)
			½ rice serving spoon of cooked sticky rice	(30 g)
			1 slide of white bread	
Meat and products	Table-spoon	15	1 table-spoon of meat, fish and organ	(15 g)
			2 table-spoon of soybean curd and dry beans	(30 g) (25 g)
			½ of egg	
Vegetable	Rice serving spoon	40	1 rice serving spoon of cooked vegetable	(40 g)
Fruit	Portion	Depend on type of fruit, e.g., 2 medium sized orange, 10 pieces of ripe papaya	1 small banana	(40 g)
			2 medium sized oranges	(136 g)
			6 pieces of pineapples	(108 g)
Milk	Cup	200	1 cup of whole milk, low fat milk, yoghurt	(200 ml)
Fat, sugar and salt	Teaspoon	4-5		

Table 4. Nutritive value of a basic diet pattern for Thai Food Based Dietary Guidelines[1]

Food	Weight (g)	Energy (kcal)	Protein (g)	Fat (g)	CHO (g)	Cholesterol (mg)	DF (g)	Vitamin				Mineral	
								A (RE)	B-1 (mg)	B-2 (mg)	C (mg)	Fe (mg)	Ca (mg)
Cereal													
Cooked rice, noodles	60	83	1.4	0.65	17.9	0	0.46	0	0.02	0.01	0	0.85	3.9
Cooked sticky rice	35	80	1.6	0.11	18.2	0	0.28	0	0.01	0.04	0	0.42	6.3
Bread	30	98	3.7	0.9	18.8	0	0.16	0	0.06	0.05	0	0.59	6.7
Meat and products													
Meat, fish, poultry	15	26	2.7	1.7	0	9	-	12.6[2]	0.06	0.03	-	0.15	2.4
Soybean curd, nut	30	25	2.4	1.5	1.1	-	0.42	1.5	0.03	0.05	-	0.50	12
Egg	25	41	3.2	2.9	0.2	107	-	32.5[3]	0.03	0.09	-	0.86	15.3
Vegetable													
Vegetable	40	11	0.9	0	1.9	0	0.9	36[4]	0.08	0.04	2.8[5]	0.4	22
Fruit													
Fruit	120	67	0.98	0.12	15.4	-	2.26	73.5	0.06	0.07	57.6	0.65	18.5
Milk													
Milk	200	134	4	7.4	9.8	20	-	76	0.08	0.32	2	0.10	236
Low fat milk	200	96	7.4	2.6	11	12	-	24	0.10	0.34	1	0.12	253
Fat													
Oil	5	45	-	5	-	-	-	-	-	-	-	-	-

[1]Calculation based on raw weight, using Handbook of Dietary Evaluation: Thara Viriyapanich, et al. Institute of Nutrition, Mahidol University, Thailand, 1995.
[2]Vitamin A decreased 9.25% after cooking
[3]Vitamin A decreased 27% after cooking
[4]Calculated both decrement and increment of beta-carotene after cooking
[5]Calucated only raw vegetables

Table 5. Daily food list for varying energy levels from the diet

Food group	Unit	Energy level (kcal)[1]		
		1600	2000	2400
Cereal	Rice serving spoon	8	10	12
Meat	Table-spoon	6	9	12
Vegetable	Rice serving spoon	4(6)	5	6
Fruit	Portion	3(4)	4	5
Milk	Glass	2(1)	1	1
Fat and oil	Tea spoon	5	7	9
Added sugar	Tea spoon	4	6	8

[1]1600 kcal is suitably advised for children, sedentary women, and older adults;
2000 kcal is suitably advised for teenagers, young adults, and office working men 2400 kcal is suitably advised for those who need more energy such as laborers, farmers, athletes etc.
Portion numbers in the parenthesis are recommended for adults

Determining nutrients of each food group

In order to establish nutrient profiles for each food group and sub-group, five set of secondary data on food consumption patterns of healthy people were used (unpublished data from the Institute of Nutrition, Mahidol University-INMU). The secondary data were analyzed to determine portion sizes of each food in different populations and the percentage of different types of foods in these food groups. The results showed the actual situation of each food portion size before the recommendation was established. This secondary data was also used to calculate energy and nutrient contributions from each group, using the Thai Food Composition database. Some loss of certain vitamins due to cooking was also considered.

The nutritive values table, indicated as Table 2, were used to set the recommended number of food portions per day at each energy level. Table 4 showed the nutritive values of a basic diet pattern for Thais. Each sub-group of each group was considered as a representation of common food that are habitually consumed. An available cooking effect of vitamin A was complied for meat and vegetable groups. Vitamin C loss was taken into account, only for the vegetable group.

Determining the numbers of portion of foods in different energy levels

Table 5 shows the number of portion for each food group per day at three energy levels. All nutrient contents in each energy level that were recommended by the numbers of portion should reach 70% of the set goal. It was anticipated that these number of portions based on serving units would be helpful for education and communication with

the general population e.g., one rice serving spoon of cooked vegetable, one table-spoon of chicken. Multiple food list plans were also suggested for each three energy levels providing several food combinations using a variety of foods, and food groups.

Nutrition Flag

Two food guide models have been initially selected from several designs which were a "folding fan" and a "hanging flag". These shapes graphically highlight the various food groups in proportions based on their relative food contribution per day. A variety of food items in each food group were selected based on nutritional quality and availability. Salt, fat, oil and sugar were presented in a descending order from the lowest layer of the models.

To be effectively communicate and be understood by consumers, these two food guide models were tested with 1,000 members of the general population in Bangkok. The subjects were randomly selected based on gender, age (18 years to 60 years) and educational level (primary to Bachelors' degree or higher). The questionnaire and method for testing were developed and validated by the experts at INMU.

The most important criterion for selection of the food models tested was that the food guide could be able to communicate the messages by itself. The proportion of areas in each food group should convey information of how many portion sizes of food consumers should eat per day. More than 50% of the subjects understood the proportion of food groups in a hanging flag model more than the proportion of food in a folding fan model. The acceptability of the models, color, figures used, and fonts were tested for final revision. Finally, based on these tests, the Thai-FBDGs working committee chose the hanging flag model as a national Thai food guide and named it the Nutrition Flag (Figure 1).

Promotion of the FBDGs

Right after the development of 9 dietary guidelines of the FBDGs, a campaign was launched by the Prime Minister in 1996 with subsequent promotion through health service infrastructure; such as hospitals, health centers, clinics, as well as through schools and with regular dissemination to the public through the mass media, including newspaper, radio and television. Subsequently two years later, in 1998, once the qualitative food guide of FBDGs or the Nutrition Flag had been selected, the launching campaign was carried out by the Deputy Prime Minister. Similar to promotion efforts as mentioned above, but with more intensity has been carried out until today. Most hospitals, health centers, child care centers, primary and secondary schools have displayed the FBDGs both in terms of the 9 dietary guidelines and the Nutrition Flag. The FBDGs promotion packages and other communication kits had been developed by the Nutrition Division, Ministry of Public Health (MOPH) and were widely distributed and used nationally, particularly in schools and health service facilities. Training to support the uses of FBDGs has been also carried out by the MOPH. However, there have no systematic evaluation of the impact of FBDGs on nutrition and health status; but from periodic monitoring and evaluation, the public and particularly school children have been aware of the FBDGs.[10] Recently, after two years of work by a committee, the FBDGs for infant and

Figure 1. Thai food guide model called "Nutrition Flag" – a quantitative part of food-based dietary guidelines[5]

young children have been published in 2009 with the aim of providing the new version of feeding guidelines for these population groups.

Discussion and conclusion

FBDGs have been considered as one of the most important tools for nutrition education, communication for promotion of desirable of eating habits, nutrition well-being and good health. This tool could also be used for setting up food and nutritional policy and strategy in health, education and agriculture as FBDGs will create demand for healthy diets which will lead to the supply of appropriate nutritious and safe food in various setting. This paper described the process for development and dissemination of FBDGs, both in terms of the food guidelines and the food guide. The working process required team work from various disciplines searching for scientific evidence and actual research to suit with the national and local context, such as the nutrition and health situation; food availability, access, consumption, culture and habits; health services, education and mass communication system.

The Thai FBDGs composed of the 9 guidelines and the Nutrition Flag have been promoted together since 1998, and have helped to raise awareness and improvement of eating behaviors of consumers. To be effective, FBDGs should be used as education and communication tools at in heath service facility, schools and the community, as an integral part of development and other support activities such as: food production, supply and services, promotion of physical activity along with periodic nutritional assessment of the target intervention population. For the general public, promotion should be carried out to create awareness through mass media. Exploration to use electronic means in the current information technological era for effective education and communication leading to behavioral modification should be a subject of further research. There are also needs to build in monitoring and evaluation process for FBDGs to document the FBDGs contribution to the outcome and impact on nutrition well-being. The monitoring and evaluation will also provide In addition to the FBDGs for the general population, there is a need for the development and use of FBDGs for specific population groups, such as infants and young children, the elderly and populations with specific food preference like vegetarians.

AUTHOR DISCLOSURE

The authors declare that they have no competing interests.

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泰國的食物基礎飲食指南(FBDGs)的發展及推廣

五大類食物為基礎的飲食指南長久以來被當作營養教育的主要工具，但經過 2 年的構想及發展，在 1996 年推動食物基礎飲食指南(FBDGs)。針對一般大眾的 FBDGs，其設計理念為推廣合宜且文化上可接受的飲食行為。泰國 FBDGs 包含 9 項概念性指南：1. 從五大類食物選取多樣性食物並維持適當體重，2. 食用適量的米或是另類的多醣食物，3. 經常食用足量的蔬菜與水果，4. 經常食用魚類、瘦肉、蛋、及豆類，5. 每天飲用足量的牛奶，6. 攝取適量的油脂，7. 避免攝取過量含糖或鹹的食物，8. 食用乾淨無汙染的食物，9. 避免或減少攝取酒精性飲料。經過對消費者進行理解度及接受性的嚴格測試後，在 1998 年建立泰國 FBDGs 的量化部分或食物指南模型，以“營養之旗”呈現。泰國 FBDGs 的推廣及宣傳已經在全國及社區層級進行，經由基礎衛生、農業及教育的系統和訓練活動，並且透過多重傳播管道和媒體舉辦定期性宣導活動。近期在 2009 年，嬰兒及學齡前的 FBDGs 被提出，替代之前的嬰幼兒餵食指南。目前尚未對泰國 FBDGs 的推廣影響做正式評估，但是一些定期性對知識及行為的測試則顯示正向結果。

關鍵字：泰國食物基礎飲食指南、發展、營養之旗、飲食行為、大眾