

## Review Article

# Development of nutrition education tool: healthy eating index in Thailand

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A healthful diet can reduce major risk factors for chronic diseases. To assess the dietary status of Thais and monitor changes in food consumption patterns, the Healthy Eating Index for Thais (THEI) is developed, an important tool for meeting the nutrition goals and determining people's overall diet quality. This index measures how well the diets of Thai people conform to the recommendations of the Food Guide Thailand Nutrition Flag. The THEI consists of 11 components, each representing different aspects of a healthful diet: Components 1-5 measure the degree to which a person's diet conforms to serving recommendations for the five major food groups of Thailand Nutrition Flag; Components 6, 7 and 8 measure total fat, saturated fat and added sugar consumption, respectively; Components 9 and 10 measure total cholesterol and sodium intake; and Component 11 examines variety in a person's diet. Each of the 11 components has a score ranging from 0 to 10, for a total score of 110. The dietary intake data from selected working adults were collected to derive the THEI scores. The average THEI score indicated that the diets of most people needed improvement and some individuals were more likely than others to consume a poor diet. This suggests a continued role for nutrition education and promotion efforts should result in a significant improvement of people's overall diet quality. In conclusion, the THEI is an useful index for describing overall diet quality for Thais and serves as a basic tool for providing nutrition education and promotion.

**Key Words:** noncommunicable disease, healthy eating index for Thais, diet quality, nutrition education

## INTRODUCTION

Diet and nutrition are important factors in the promotion and maintenance of good health. Their role as determinants of chronic noncommunicable diseases (obesity, type 2 diabetes, hypertension, dyslipidemia, coronary heart disease, and stroke) is well established.<sup>1,2</sup> In Thailand, the prevalence of obesity, dyslipidemia, diabetes and coronary heart disease in Thai adults increased significantly.<sup>3,4,5,6,7</sup> The primary causes of chronic disease are changing in food consumption pattern of Thai population. Thai staples, which are rich in complex carbohydrate, are being replaced by diets containing a higher proportion of fats and animal meat which can be critically harmful for health.<sup>4</sup> The approach of evaluating total diet quality will improve people's dietary patterns, and methods for assessing diet quality should be simple and inexpensive to be practical and can also serve as a nutrition education tool for health promotion and disease prevention.

## DEVELOPMENT OF THE HEALTHY EATING INDEX FOR THAIS

An instrument to assess overall diet quality and monitor changes in food consumption patterns named the Healthy Eating Index for Thais (THEI) was developed. The THEI was modified from the Healthy Eating Index developed by USDA Center of Nutrition Policy and Promotion.<sup>8</sup> The THEI is an important tool for meeting the nutrition goals and is a single summary measure of the overall quality of

people's diets (adequacy, moderation, and variety). This index measures how well the diets of Thai people conform to the recommendations of the Dietary Guidelines<sup>9</sup> and the Food Guide Thailand Nutrition Flag<sup>10</sup> (Figure 1).

The THEI consists of 11 components, each representing different aspects of a healthful diet:

- **Components 1-5** measure the degree to which a person's diet conforms to serving recommendations for the five major food groups of Thailand Nutrition Flag: rice and starch (rice, bread, cereal and pasta), vegetables, fruits, milk (milk, yogurt, and cheese), and meat (meat, poultry, fish, dry beans, eggs, and nuts).
- **Components 6, 7 and 8** measure total fat, saturated fat and added sugar consumption, respectively, as a percentage of total food energy intake;
- **Components 9 and 10** measure total cholesterol and sodium intake; and
- **Component 11** examines variety in a person's diet.

The components of the THEI and scoring system of the THEI are shown in table 1. The criteria for scoring system

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was based on the recommended amount in Thailand nutrition flag, Thai recommendation daily intakes (Thai RDI), Dietary reference intake for Thais (DRI) as well as scientific evidence of diets and chronic diseases. Each component of the Index has a maximum score of 10 and a minimum score of zero. Intermediate scores were computed proportionately. The maximum overall score for the 11 components combined is 110. High component scores indicate intakes close to recommended ranges or amounts; low component scores indicate less compliance with recommended ranges or amounts.

Total THEI scores are categorized into 3 levels from a poor diet to a good diet. The principle of classification based on the concept of Dietary Recommended Allowances. An THEI score over 66 implies a “good” diet, an HEI score between 55 and 66 implies a diet that “needs improvement,” and an HEI score less than 55 implies a “poor” diet.

### VALIDATION OF THE THEI

The validation of the developed THEI was accomplished by 2 procedures: 1) content validity of developed index by five experts in the field of nutrition and dietetics; 2) The criterion validity was evaluated by determining agreement between total THEI scores, each component score with selected nutrients and selected anthropometric parameters using Kappa analysis.

The dietary intake data (three-day food records) for determining THEI scores were collected from 121 working adults aged 25-60 years. The results demonstrated the agreement between THEI score and nutrients intake ranged from poor to good depending on adequacy level of nutrient intake. Total THEI score had fair to moderate agreement with total fat, saturated fat, cholesterol, sodium intake and added sugar intake ( $k = 0.3-0.5$ ,  $p < 0.01$ ). This significant agreement indicated that THEI score can reflect fat intake, saturated fat intake, cholesterol intake, sodium intake and sugar intake. Low intake of fat, saturated fat, cholesterol, sodium, and sugar have been associated with decreased risk of overweight and obesity, cardiovascular disease and hypertension.<sup>1,2</sup>

Because of total THEI score can be influenced by each component score within index. The agreement between each component score within THEI and nutrients were also evaluated which can indicate the effectiveness of this index. In each component score, each individual score had moderate to substantial agreement with each individual intake such as cholesterol, added sugar, saturated fat, variety of food and sodium, ( $k = 0.54-0.78$ ,  $p < 0.01$ ). In addition, fat and vegetable scores had fair agreement with total fat intake and fiber intake ( $k = 0.31-0.39$ ,  $p < 0.01$ ). These significant agreements may indicate that each component in THEI can reflect many nutrients above.

The dietary intake data from selected working adults showed that average total THEI score of participants was only 48.6 which is categorized as “need improvement”. Sixty-nine percent of the participants had a score below 55 which are categorized as “poor diet”, twenty-two percent of the participants had a score between 55-66 which are categorized as “need improvement” and only 8.3% of the participants had a score over 66 which are categorized as “good diet”. The results indicate that the diets of most



**Figure 1.** Thailand Nutrition Flag “Healthy Eating for Thais”. The “Nutrition Flag” represents a way to consume food that will enable Thai people to have adequate diets and “healthy eating” to promote good health among Thais which will serve the purpose of the nine. Nutrition Division, Department of Health, Ministry of Public Health 2001<sup>10</sup>

people needed improvement and some individuals were more likely than others to consume a poor diet. This suggests a continued role for nutrition education and promotion efforts should result in a significant improvement of people’s overall diet quality.

### APPLICATION OF THE THEI

The THEI is an useful tool to measure dietary quality for Thais that is simple, inexpensive and is practical to use. It can be used to assess and monitor changes in food consumption patterns as well as a basic tool for healthy professionals to provide nutrition education and health promotion activity for Thais. Researchers may use the THEI as a measure of diet quality in study related to diet and chronic disease that may be especially useful when biochemistry are not available.

Especially, dietitians can apply the THEI to use in clinical practice setting to monitor patients’ compliance with the dietary recommendations and also provide dietary counseling to improve patient’s dietary patterns.

At present time, the THEI is being designed as an online self-help dietary assessment tool on the website named <http://www.thaihealthyating.org>. It provides information on client diet quality, related nutrition messages and links to nutrient information and food labelling. Client can choose to use the THEI dietary assessment tool as he/she wishes at any time. After providing a day’s dietary information, client will receive a “score” on the overall quality of his/her diet status for that day. It also tells client how much total fat, saturated fat, cholesterol, sodium and added sugar he/she has in his/her diet. Each score gives client an idea of the quality of his/her diet status: for one day or for up to 14 days. A score over several days gives a better picture of client eating habits over time. This also measures how well the Thai diet complies with the recommendations of the Dietary Guidelines for Thais and The Food Guide Thailand Nutrition Flag.

This is a nutrition online joint project between Institute of Nutrition, Mahidol University and Srinakarinviroj

**Table 1.** Components of the Thai Healthy Eating Index (THEI) and Scoring System

	Score ranges <sup>1</sup>	Criteria for maximum score of 10	Criteria for minimum score of 0
1. Rice-Starch consumption	0 to 10	8-12 rice-serving spoons <sup>2</sup>	0 and 14-18 rice-serving spoons
2. Vegetable consumption	0 to 10	4-6 rice-serving spoons <sup>2</sup>	0
3. Fruit consumption	0 to 10	3-5 portions <sup>2</sup>	0
4. Milk consumption	0 to 10	1-2 glasses <sup>2</sup>	0
5. Meat consumption	0 to 10	6-12 tablespoons	0 and 12-18 tablespoons
6. Total fat intake	0 to 10	≤ 20% of total calories	≥ 35 % of total calories
7. Saturated fat intake	0 to 10	≤ 10% of total calories	≥ 15% of total calories
8. Added sugar intake	0 to 10	< 6% of total calories	> 10% of total calories
9. Cholesterol intake	0 to 10	≤ 300 mg/day	≥ 400 mg /day
10. Sodium intake	0 to 10	≤ 2400 mg/day	≥ 3300 mg /day
11. Variety of food	0 to 10	≥ 30 types/day	≤ 20 types/day

<sup>1</sup> People with consumption or intakes between the maximum and minimum ranges or amounts were assigned scores proportionately.

<sup>2</sup> Number of servings depends on recommended number of Thailand Nutrition Flag servings per day.

University to develop a multimedia website education tool for both health care professionals especially physicians, as a role model, and general population. This will enable them to assess their own nutritional and dietary status and also plan their own meals. The nutrition online project is on the process of developing an internet-based distance learning model which encourages discussions among the learners and the staff to gain more nutrition knowledge into daily life. In addition, information system for healthy eating which include database system for healthy food and drink and also self-evaluating and planning system in healthy eating is being developed.

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#### AUTHOR DISCLOSURES

Sunard Taechangam, Utumporn Pinitchun and Chanida Pachotikarn, no conflicts of interest.

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