

博士（栄養学）学位論文要約

Development of a Self-Reported
Dietary Assessment Score for Urban Thai Children

タイ都市部の子供のための自己申告による
食事の評価指標の開発

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SUMMARY

With continuing economic growth over the past few decades similar to that in many other low-to-middle-income countries, Thailand is facing an increase in the prevalence of over-nutrition in children, while the prevalence of under-nutrition in children remains a public health challenge. The major risk factor for these problems is poor dietary habits: consumption of less healthy food such as vegetables and of more unhealthy foods such as sugar-sweetened beverages (SSB). Therefore it is important to evaluate the dietary intake that contributes to health outcomes. Regarding the country's constraints including a small number of nutritionists, less costly and quicker tools to measure the association between diet and health outcome is needed. The primary aim of this study is to propose a new self-reported short dietary assessment tool for school-aged children which can easily be used by non-dietetic health professionals. Three studies were conducted to achieve this objective. This work was conducted within primary schools located in the Bangkok Metropolitan Region, Thailand from 2015-2016. The protocol of the study was approved by the Department of Health, Ministry of Public Health.

STUDY 1. The study aimed to identify the dietary intake of urban Thai children that can contribute to BMI-for-age z-scores (BAZ). To do this, a new food group classification was initially proposed with a focus on the food types currently consumed during different eating occasions: main meals and between meals. Dietary intake of 263 children aged 10-12 from six schools was assessed through three non-consecutive 24-hour recall interviews. Foods were categorized into 13 groups, including the newly classified "street-side snacks," based on Thailand's dietary guidelines and food environment context. After adjusting for sex and misreporting, overweight/obese children had a higher energy and macronutrient intake

and consumed more cereal grains, meat or fish, flavored milk, and sugar-sweetened beverages during main meals, and consumed more street-side snacks and less confectioneries during between meals than non-obese children. The between-meal fruits and unflavored milk consumption did not differ between overweight/obese children and non-obese children. The consumption of street-side snacks had the highest beta coefficient ($\beta = 0.094$, 95% CI 0.001 – 0.006) on BAZ among the food types in the model, adjusted further for energy intakes. The result suggested that consumption of street-side snacks was found to be the single most important obesity-related food item.

STUDY2. The use of 24-hour recalls or any other full dietary assessment are rather burdensome to both participants and researchers, especially in school settings; a substitutable and easy-to-use dietary assessment tool is preferable. Therefore, this study aimed to develop a food frequency-based dietary score, later named the Food-Based Dietary score (FBDS), and to examine the ability of this score to evaluate dietary intake in school-aged children. The FBDS was designed to capture two components of six recommended foods based on Thailand's dietary guidelines, and four not-recommended foods including street-side snack. Scoring system has been proposed and initially tested relative validity separately as 1) a sum score of recommended foods (score ranges 0 to 60), 2) a sum score of not-recommended food (score ranges -20 to 20) and 3) a total sum score of both recommended and not-recommended foods (score ranges -20 to 80). High scores in each component indicate a favorable eating pattern. Three non-consecutive 24-recalls were used as a reference by which comparison with the FBDS was made. A total of 172 children from three schools contributed 24-hour recalls and completed food-frequency information of ten foods. By adjusting for sex and energy misreporting, a higher total score provided a significant association with higher intakes of vitamins B₁ and B₂,

calcium, carbohydrate (percentage of energy), protein (percentage of energy), and a close to significant association with higher intakes of fiber, iron, and vitamin A. The correlation between the score and dietary intake was found to be most acceptable when analyzed as 'total score'. According to the results, the FBDS as the total score was used to examine the ability of the FBDS to predict the effect of diet quality on nutritional status and the associations of the FBDS with several diet-related lifestyle factors in the next study.

STUDY 3. 737 children from four schools and their caregivers completed the questionnaire (valid response rate 90.2%). The FBDS quartile score was used to estimate the odds ratio of either being overweight/obese or being stunted assessed by height-for-age z-scores. A lower FBDS was observed to be an indicator of poor nutritional status. In particular, scoring in the 3rd quartile of the FBDS was found to be related to a low risk of being stunted (OR 0.42, 95% CI 0.21 – 0.83), while no relationship was found between the FBDS and presence of overweight/obesity. Furthermore, the FBDS as the continuous score was used in the linear regression model adjusted for sex, household income and family structure, to examine the cross-sectional association of the FBDS with children's health-related lifestyle predictors. As expected, the higher score was also associated with several favorable lifestyle factors. In particular, children with the highest scores had high physical activity levels, spent less time using a computer, consumed more food items that were cooked at home, were more likely to have regular breakfast, did not watch TV during meals, had daily family meals, and were non-picky eaters. Moreover, children whose caregivers reported that they often participated in physical activity, were less permissive about snacking on treats, often cook, often taught cooking and had children helping with meal preparation, and consumed vegetables daily were more likely to have a higher score.

Overall, a higher FBDS is effective at reflecting a higher intake of some micronutrients, higher energy from carbohydrate, and protein (but not fat), higher consumption of vegetables, and lower consumption of packaged snacks and SSB. It was also found that several healthy lifestyle factors are related to the higher score of FBDS. Additionally, a lower score on the FBDS is related to under-nutrition rather than over-nutrition. These findings indicate that the higher the FBDS, the better the nutritional status. In conclusion, this self-reported dietary assessment tool-the FBDS is confirmed to be useful for rapidly and easily ranking dietary quality. The FBDS is expected to be an effective tool for enhancing nutrition education or self-monitoring for children in Thailand.