# Dietary Behaviors and Nutritional Status of Adolescents in a Remote Rural Area of Thailand

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***Introduction:*** *Nutritional status among adolescents is an important health indicator. The up-to-date information about nutritional status and food consumption pattern in the remote rural area is required for the effective public health intervention in the rural area of the country. The present study aimed to demonstrate the prevalence of malnutrition, eating behavior and nutritional knowledge among secondary school students in a remote rural area in Thailand.*
***Material and Method:*** *Body weight and height data were collected from 298 secondary school students for nutritional status calculation using the Institute of Nutrition Research, Mahidol University, INMU-Thaigrowth program. Eating behavior and nutritional knowledge were observed by self-administrated questionnaires.*
***Results:*** *The prevalence low height-for-age (<-2SD) 6.1% and it was 0.7% for low weight-for -height (<-2SD). Fruits (69%) and vegetables (79.4%) consumptions were in the high level. The authors found that the students always consumed commercial snacks especially salted chips more often than regular Thai dessert (74.0% VS 52.3%). The inappropriate behavior found in the present study included always drinking caffeine beverage (43.5%), always drinking alcoholic beverage (6.5%) and always consuming instant noodles (64.4%).*
***Conclusion:*** *The prevalence of malnutrition was low among this population. The studied population had a fair knowledge about nutrition. The authoes found that regular consumption of highly commercialized snack products especially salted chips and instant noodles were ata high level in this remote rural area of Thailand. The pattern of nutritional problems in Thailand may have changed in which a public health program for children in rural areas of the country should recognize this transition.*

***Keywords:*** *Nutritional status, Adolescents, Dietary behaviors, Rural area, Thailand*

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Nutritional status is one of the most important indicators for the health of the population. During the past two decades, the population in Thailand has changed constantly in terms of socio-economic development, lifestyles and dietary practices towards Westernization particularly in urban areas[1, 2]. Food consumption behavior among adolescents is believed to continue into adulthood. Additionally,during this ado-

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lescent period the population begins to make their independent food choices[3]. Since the majority of the population in Thailand is in rural areas, information regarding dietary patterns and nutritional status among adolescents in this population, therefore is essential for further nutritional public health intervention. Ban Nayao village is located in an eastern province of Thailand and has been established to be a teaching community of Phramongkutklao College of Medicine. The village is more than 60 Kilometers from the nearest town.

The aims of this investigation were to study the nutritional status, food consumption behaviors, as well as nutritional knowledge among adolescents in a remote rural area of Ban Nayao Village, Thailand.

**Material and Method**

A cross-sectional study was conducted among 298 students in Ban Nayao Secondary School, after informed consent processes in February 2003. Volunteers body weights and heights were obtained using standardized instruments. The information was then analyzed for the nutritional status using INMU-Thaigrowth Program, developed by the Institute of Nutritional Research, Mahidol University. The computer program used the data distribution of Thai children from a Ministry of Public Health survey in 1995 as the reference data. Standardized self-administrated questionnaires for demographic data, food consumption frequency during the past 3 months and nutritional knowledge were used. Food items of the questionnaire were developed based on Food-Based Dietary Guideline for Thai[4]. All data are presented as

**Table 1.** Demographic data and nutritional knowledge of Secondary Students in Ban Nayao, Chachoengsao Province, Thailand, 2003 (N=298)

| Characteristics | N | % |
|---|---|---|
| Gender (298) | | |
| Male | 134 | 45.0 |
| Female | 164 | 55.0 |
| Family Income (Baht/month) (277) | | |
| 1-4999 | 208 | 69.8 |
| 5000-9999 | 42 | 14.1 |
| 10000-14999 | 10 | 3.4 |
| 15000-20000 | 9 | 3.0 |
| > 20000 | 8 | 2.7 |
| Father's Occupation (231) | | |
| Farmer | 112 | 37.6 |
| Laborer | 103 | 34.6 |
| Government employee | 3 | 1.0 |
| Merchant | 13 | 4.4 |
| Education Grade (298) | | |
| M 1 | 131 | 44.0 |
| M 2 | 74 | 24.8 |
| M 3 | 93 | 31.2 |
| Nutritional Knowledge (298) | | |
| Satisfied: Excellent | 1 | 0.3 |
| Satisfied: Good | 77 | 25.8 |
| Satisfied: Fair | 154 | 51.7 |
| Unsatisfied | 66 | 22.1 |

**Table 2**. Nutritional status, height for age and weight for height, by sex compared with the standardized national nutrition status for Thai population

| Nutritional Status | Male (%) | Female (%) | Total (%) |
|---|---|---|---|
| Height for Age | | | |
| > +2SD | 0 | 3 (1.8) | 3 (1.0) |
| > +1.5SD - +2SD | 4 (3.1) | 7 (4.3) | 11 (3.7) |
| -1.5SD - +1.5SD | 103 (78.6) | 137 (83.5) | 240 (81.4) |
| -2SD - <-1.5SD | 10 (7.6) | 13 (7.9) | 23 (7.8) |
| < -2SD | 14 (10.7) | 4 (2.4) | 18 (6.1) |
| Total | 131 (100) | 164 (100) | 295 (100) |
| Weight for Height | | | |
| > +3SD | 2 (1.5) | 2 (1.2) | 4 (1.4) |
| < +2SD - +3SD | 2 (1.5) | 4 (2.4) | 6 (2.0) |
| > +1.5SD - +2SD | 1 (0.8) | 2 (1.2) | 3 (1.0) |
| -1.5SD - +1.5SD | 119 (90.8) | 150 (91.5) | 269 (91.2) |
| -2SD - < -1.5SD | 6 (4.6) | 5 (3.0) | 11 (3.7) |
| < - 2SD | 1 (0.8) | 1 (0.6) | 2 (0.7) |
| Total | 131 (100) | 164 (100) | 295 (100) |

frequency and percentage. Data analyses were performed using SPSS version 11.5. The study protocol was approved by the Royal Thai Army Medical Department Ethical Review Committee.

**Results**

The demographic data is shown in Table 1. The students age ranged from 12-15 years old. Most of the students fathers were farmers and laborers. These parents generally had a low income and education level. There were 4 levels, i.e, excellent, good, fair and poor of nutritional knowledge. More than 26% of the students had a nutritional knowledge of good or excellent .

Nutritional status of the students by gender is shown in Table 2. In terms of height-for-age, 81.4% of the students were in the normal range (-1.5SD - +1.5SD). Additionally, 6.1% of the students were below-2SD of the standard Thai population while only 1% was above +2SD of the standard population. Among male adolescents, the authors also found that 10.7% of them were below -2SD. In terms of weight-for-height, 91.2% of the students were in the normal range (-1.5SD - +1.5SD). Moreover, 3.4% of the students were above +2SD of the standard population and 0.7% of the students were below the -2SD level.

There were 15.8% of the population who skipped breakfast and 8.1% had a meal before sleeping. Additionally 55.4% of the study population consumed raw meat products. Food consumption behaviors among the students are shown in Table 3. The prevalence of usually drinking milk behaviors were 26.4%, 38.1% and 55.5% for UHT cow milk, flavored milk and yogurt milk, respectively. Regular fruit and vegetable consumption was prevalent in the rural population. Salted flavored chips that usually contain monosodium glutamate were popular in this population (always consumption; 74.0%), which was higher than traditional Thai desserts (always consumption; 52.3%). The results showed that 43.8% and 63.3% of the students regularly drank sweetened fruit juice and carbonated soda beverage, respectively during the past 3 months. While there were 43.5% and 6.5% of the students who preferred drinking caffeine and alcoholic beverages, respectively.

The students regularly received protein sources from eggs (56.2%), fresh water fish (51.6%), beef or pork meat (45.2%), poultry meat (31.7%), seafood (31.3%) and nuts (19.2%). In addition, the authors found that the students usually consumed meatballs at a relatively high level at 62.1%. The authors also found that 64.4% of the adolescents in this remote rural area consumed instant noodles regularly.

**Discussion**

There was a low prevalence of malnutrition either over or under-nutrition in this adolescent population residing in a remote rural area of Thailand. From height-for-age data which reflects long term nutritional conditions the authors found that 6.1% of these adolescents were lower than the -2SD level of the standard population especially among male adolescents in which more than 10% had low height-for-age (<-2SD of the standard population). The finding suggested that there might be an increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices in this remote rural area in the past. However, from the weight-for-height data which reflected the recent nutritional level of the population, the authors found that both genders of these adolescents had low prevalence of low weight-for-height. This result reflected the improvement of nutritional condition in this area recently. Over-weight was still not a problem of this population since only 3.4% of them were higher than +2SD level of the standard population. The problem of over-nutrition in the future would depend on the concurrent dietary behavior in this community.

Almost 16% of the studied population reported that they always skipped their breakfast which was relatively lower than other reports from another part of the country in which the rate of skipping breakfast was 42.6%[5]. There were several reports showing the important of breakfast on cognitive function of young people[6-8].

The data in the present study showed that the habit of milk drinking everyday was not low in this remote area of Thailand. Yogurt and flavored milk were popular among the studied population even though it seemed to have less nutrient content compared to natural milk. Only 34.5% of the students drank soybean milk that has more nutrients and is easy to self prepare. Therefore, the promotion campaign of milk drinking in this adolescent group is still relevant for this population. For other beverages, students in the present study preferred drinking flavored, colored, or sweetened fruit juice everyday. In addition, 8.2% and 6.5% of the children preferred drinking caffeine and alcoholic beverages that seemed not to have any benefit and could lead to risky behavior among alcoholic drinkers.

The present study found that students tended to have vegetable and fruit everyday. This could be

**Table 3.** Dietary behaviors and prevalences of under-nutrition and over nutrition among Secondary School Students in Ban Nayao, Thailand

| Eating Behaviors | Weight for Height < -1.5 SD (%) | Weight for Height > +1.5SD (%) | Total (%) |
|---|---|---|---|
| Milk | | | |
| UHT cow milk | | | |
| Always | 3 (4.1) | 2 (2.7) | 74 (26.4) |
| None / sometimes | 10 (4.9) | 11 (5.3) | 206 (73.6) |
| Flavored Milk | | | |
| Always | 4 (3.7) | 8 (7.5) | 107 (38.1) |
| None / sometimes | 9 (5.2) | 5 (2.9) | 174 (61.9) |
| Yogurt Milk | | | |
| Always | 9 (5.8) | 6 (3.9) | 156 (55.5) |
| None / sometimes | 4 (3.2) | 7 (5.6) | 125 (44.5) |
| Soy Milk | | | |
| Always | 5 (5.2) | 6 (6.2) | 97 (34.5) |
| None / sometimes | 8 (4.4) | 7 (3.8) | 184 (65.5) |
| Fruits & Vegetables | | | |
| Fruits | | | |
| Always | 9 (4.6) | 8 (4.1) | 194 (69.0) |
| None / sometimes | 4 (4.6) | 5 (5.8) | 87 (31.0) |
| Vegetables | | | |
| Always | 10 (4.5) | 11 (4.9) | 223 (79.4) |
| None / sometimes | 3 (5.2) | 2 (3.5) | 58 (20.6) |
| Snacks | | | |
| Fried Thai dessert | | | |
| Always | 9 (6.1) | 8 (5.4) | 147 (52.3) |
| None / sometimes | 4 (3.0) | 5 (3.7) | 134 (47.7) |
| Chips | | | |
| Always | 12 (5.8) | 11 (5.3) | 208 (74.0) |
| None / sometimes | 4 (5.5) | 2 (2.7) | 73 (26.0) |
| Beverage | | | |
| Sweetened fruit juice | | | |
| Always | 4 (3.3) | 7 (5.7) | 123 (43.8) |
| None / sometimes | 9 (5.7) | 6 (3.8) | 158 (56.2) |
| Chocolate with condensed sweeten milk | | | |
| Always | 2 (1.7) | 8 (6.7) | 120 (42.7) |
| None / sometimes | 11 (6.8) | 5 (3.1) | 161 (57.3) |
| Soda | | | |
| Always | 10 (5.6) | 9 (5.1) | 178 (63.3) |
| None / sometimes | 3 (2.9) | 4 (3.9) | 103 (36.7) |
| Alcohol | | | |
| Always | 0 (0.0) | 1 (5.6) | 18 (6.4) |
| None / sometimes | 13 (4.9) | 12 (4.6) | 263 (93.6) |
| Meat & Meat Product | | | |
| Beef or Pork | | | |
| Always | 8 (6.3) | 9 (7.1) | 127 (45.2) |
| None / sometimes | 5 (3.3) | 4 (2.6) | 154 (54.8) |
| Poultry | | | |
| Always | 5 (5.6) | 6 (6.7) | 89 (31.7) |
| None / sometimes | 8 (4.2) | 7 (3.7) | 192 (68.3) |
| Sea food | | | |
| Always | 4 (4.6) | 4 (4.6) | 88 (31.3) |
| None / sometimes | 9 (4.7) | 9 (4.7) | 193 (68.7) |

| Eating Behaviors | Weight for Height < -1.5 SD (%) | Weight for Height > +1.5SD (%) | Total (%) |
|---|---|---|---|
| Fresh water fishes | | | |
| Always | 6 (4.1) | 6 (4.1) | 145 (51.6) |
| None / sometimes | 7 (5.2) | 7 (5.2) | 136 (48.4) |
| Meatballs | | | |
| Always | 11 (6.3) | 11 (6.3) | 174 (62.1) |
| None / sometimes | 2 (1.9) | 2 (1.9) | 106 (37.9) |
| Others | | | |
| Preserved food | | | |
| Always | 5 (5.9) | 6 (7.1) | 85 (30.2) |
| None / sometimes | 8 (4.1) | 7 (3.6) | 196 (69.8) |
| Instant noodles | | | |
| Always | 12 (6.6) | 10 (5.5) | 181 (64.4) |
| None / sometimes | 1 (1.0) | 3 (3.0) | 100 (35.6) |
| Nuts | | | |
| Always | 4 (7.4) | 1 (1.9) | 54 (19.2) |
| None / sometimes | 9 (4.0) | 12 (5.3) | 227 (80.8) |
| Eggs | | | |
| Always | 9 (5.7) | 8 (5.1) | 158 (56.2) |
| None / sometimes | 4 (3.3) | 5 (4.1) | 123 (43.8) |

due to the native northeastern food habit that vegetables are always included in their meals. For protein sources, eggs, fish and meat shared a higher proportion than poultry meat, while seafood shared the lower proportion that may be due to the geographic constraint. Various kinds of meatballs (pork, chicken, fish or beef) were one of the other most popular protein sources for students (62.1%) which should be due to the low cost of this snack. These protein sources should be further studied for their nutrients or compositions to show whether they were suitable for students or not.

For some instant foods, about 65% of the children preferred eating instant noodles everyday, and only 28.3% of other sources of nutrients (vegetable or meat) were included before eating (data not shown). Normally instant noodles are usually the food for special circumstances e.g. camping or traveling but nowadays they have become more and more a regular carbohydrate source of the Thai population even in remote areas. There was a high proportion of the students who consumed commercial salted chips which usually contains monosodium glutamate. Through their strong advertising and marketing, this products then has high market share for snacks among adolescents not only in urban areas but has also extended to remote rural areas already. The popularity in this community was even higher than the Thai desserts. This investigation found that 45.2 % of students had raw meat; this increases the chance of microbial and helminthes contamination. Health education to change the behavior of eating uncooked meat should be of greater concern

The number of students having fair nutritional knowledge was about 51.7% and having poor nutritional knowledge was about 22.2%. This could be the reason for all the improper eating habits in this population. The present study showed that 23.1% of the students that had on under-nutrition problem also had poor nutritional knowledge. It should be suggested that health education on nutrition should be encouraged among this young population who are starting to make their own food chioce which could lead to more appropriate eating behavior in the long term.

**Conclusion**

The prevalence of malnutrition was low among the studied population as they had a fair knowledge about nutrition. The authors found that regular consumption of highly commercialized snack products especially salted chips and instant noodles were at a high level in this remote rural area of Thailand. The pattern of nutritional problems in Thailand may have been changed in which public health programs for children in rural areas of the country should recognize the transition.

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## *พฤติกรรมการบริโภคและภาวะโภชนาการของวัยรุ่นไทยในชุมชนชนบท*

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***บทนำ:*** *ภาวะโภชนาการเป็นตัวบ่งชี้ที่สำคัญอย่างหนึ่งของสุขภาพในเด็กวัยรุ่น ข้อมูลที่ทันสมัยเกี่ยวกับภาวะโภชนาการและรูปแบบการบริโภคอาหารในชนบทห่างไกลยังคงเป็นที่ต้องการสำหรับการเข้าไปมีบทบาทด้านสาธารณสุขที่มีประสิทธิภาพในชุมชน วัตถุประสงค์ของการศึกษานี้เพื่อแสดงความชุกของภาวะทุพโภชนาการ พฤติกรรมการบริโภคอาหาร และความรู้ด้านโภชนาการของนักเรียนโรงเรียนมัธยมในชนบทห่างไกลของประเทศไทย*

***วัสดุและวิธีการ:*** *เก็บข้อมูลนักเรียนชั้นมัธยมศึกษาจำนวน 298 คน โดยการชั่งน้ำหนักตัวและวัดส่วนสูงเพื่อนำมาวิเคราะห์ภาวะโภชนาการโดยใช้โปรแกรมประเมินภาวะการเจริญเติบโตของเด็กไทยของสถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล (Institute of Nutrition Research, Mahidol University; INMU-Thaigrowth) เก็บข้อมูลเกี่ยวกับพฤติกรรมการบริโภคและความรู้ด้านโภชนาการด้วยแบบสอบถามที่ให้เด็กทำด้วยตนเอง*

***ผลการศึกษา:*** *ความชุกของเด็กที่มีความสูงต่ำกว่าเกณฑ์ (ส่วนสูงตามเกณฑ์อายุ) (< -2SD) มีค่าเท่ากับ 6.1% และพบว่ามีเด็ก 0.7% ที่มีน้ำหนักต่ำกว่าเกณฑ์ (น้ำหนักตามเกณฑ์ส่วนสูง) (< -2SD) การบริโภคผัก (79.4%) และผลไม้ (69%) อยู่ในระดับสูง พบว่าเด็กนักเรียนนิยมบริโภคขนมขบเคี้ยวโดยเฉพาะขนมทอดกรอบมากกว่าขนมหวานไทย (74% กับ 52.3%) ในการศึกษานี้พบว่าเด็กมีพฤติกรรมการบริโภคที่ไม่เหมาะสม ซึ่งประกอบด้วย การดื่มเครื่องดื่มที่มีส่วนผสมของคาเฟอีนเป็นประจำ (43.5%) การดื่มเครื่องดื่มที่มีส่วนผสมของแอลกอฮอล์เป็นประจำ (6.5%) และการบริโภคบะหมี่กึ่งสำเร็จรูปเป็นประจำ (64.4%)*

***สรุป:*** *ภาวะทุพโภชนาการในประชากรที่ศึกษามีความชุกต่ำ และพบว่าประชากรกลุ่มดังกล่าวมีความรู้ด้านโภชนาการในระดับพอใช้ กลุ่มผู้วิจัยพบว่าในประชากรศึกษามีการบริโภคขนมขบเคี้ยวสูงโดยเฉพาะขนมทอดกรอบ และพบว่ามีการบริโภคบะหมี่กึ่งสำเร็จรูปสูง ด้วยสภาพปัญหาด้านโภชนาการในประเทศไทยเปลี่ยนแปลงไป ดังนั้นการจัดการด้านสาธารณสุขสำหรับเด็กในชุมชนชนบทจึงควรต้องรู้และตระหนักถึง*