COMPARISON OF NUTRITIONAL KNOWLEDGE, ATTITUDE TOWARDS FOOD, FOOD INTAKE AND NUTRITIONAL STATUS BETWEEN PRE-ADOLESCENTS IN URBAN AND RURAL LAMPANG PROVINCE

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ABSTRACT

This cross-sectional study with a descriptive comparative design aimed to compare nutritional knowledge, attitude towards food, food intake, and nutritional status of pre-adolescents in urban and rural areas of Lampang province. The sample included 200 students in elementary schools in Lampang province. There were 100 urban and 100 rural area students. Multistage random sampling was used. Data were collected from February to March, 2005, by using structured and semi-structured interviews with a questionnaire and forms which included questions on personal characteristics, nutritional knowledge, and attitude towards food and food intake. Data were analyzed using percentage, mean, standard deviation, independent t-test and Chi-square test. The INMU-ThaiGrowth 2002 program was used to assess nutritional status.

Results revealed that when comparing pre-adolescents in urban and rural areas, there were significant differences in the total nutritional knowledge (mean $\pm$ SD=9.6 ± 2.7 vs 10.7 ± 3.5, t=-2.438, p= .016) and knowledge on healthy food behavior (mean $\pm$ SD =5.8 ± 1.8 vs 6.4 ± 2.0, t= -2.446, p= .015). In addition, there was a significant difference in perception of benefits and consequences of food behavior between the pre-adolescents in urban and rural areas (mean $\pm$ SD=5.6 ± 1.4 vs 4.9 ± 1.8, t=3.371, p=.001). Moreover, comparing pre-adolescents in urban and rural areas, there were significant differences in vegetable (mean $\pm$ SD=5.0 ± 3.3 vs 4.1 ± 2.5,t =2.264, p=.026), fruit (mean $\pm$ SD=5.4 ± 2.1 vs 4.1 ± 2.3,t=4.162,p=.000), milk (mean $\pm$ SD=2.6 ± 1.3 vs 1.6 ± 0.8 t=6.101,p=.000), oil (mean $\pm$ SD=0.9 ± 1.1 vs 0.3 ± 0.3,t=6.252,p=.000), snack (mean $\pm$ SD=1.5 ± 0.9 vs 1.2 ± 0.9,t=2.311,p= .022), and bakery product intake (mean $\pm$ SD=2.8 ± 1.9 vs 1.4 ± 0.9,t=6.868,p=.000).There was a significant difference in nutritional status (height for age) between these two groups (χ^2 =9.172, p=.010).

Findings indicated the need for community health nurses to provide information on nutrition, particularly to students in urban areas. Moreover, nurses should collaborate with a school or a community by providing nutrition programs to enhance knowledge, attitude, and healthy food behavior using the Thailand Nutrition Flag. Monitoring nutritional status in pre-adolescents, particularly in rural areas is advised and advice addressing the importance of the undernutrition problems, as well as approaches to the solutions should be provided to pre-adolescents and their families in order to achieve healthy nutrition.

KEY WORDS: NUTRITIONAL KNOWLEDGE/ ATTITUDE TOWARDS FOOD/ FOOD INTAKE/ NUTRITIONAL STATUS/PRE-ADOLESCENTS/ URBAN/RURAL

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การศึกษาเปรียบเทียบความรู้ทางโภชนาการ ทัศนคติต่ออาหาร การบริโภคอาหาร และ ภาวะโภชนาการ ระหว่างเด็กวัยเรียนในเขตเมืองและนอกเมืองจังหวัดลำปาง (COMPARISON OF NUTRITIONAL KNOWLEDGE, ATTITUDE TOWARDS FOOD, FOOD INTAKE AND NUTRITIONAL STATUS BETWEEN PRE-ADOLESCENTS IN URBAN AND RURAL LAMPANG PROVINCE)

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บทคัดย่อ

การวิจัยครั้งนี้เป็นการศึกษาภาคตัดขวางแบบบรรยาย เพื่อเปรียบเทียบความรู้ทางโภชนาการ ทัศนคติต่ออาหาร การบริโภคอาหาร และ ภาวะโภชนาการ ของเด็กวัยเรียนในเขตเมืองและนอกเขตเมืองจังหวัดลำปาง กลุ่มตัวอย่างเป็นเด็กนักเรียนที่กำลังศึกษาในระดับชั้นประถมศึกษาปีที่ 5-6 ในเขตเมืองจำนวน 100 คนและ นอกเขตเมือง จำนวน 100 คนในจังหวัดลำปาง คัดเลือกกลุ่มตัวอย่างแบบหลายขั้น เก็บข้อมูลตั้งแต่เดือนกุมภาพันธ์ถึงมีนาคม2547 โดยใช้แบบสอบถามและแบบสัมภาษณ์ ซึ่งประกอบด้วยข้อมูลส่วนบุคคล ความรู้ทางโภชนาการ ทัศนคติต่ออาหาร และการบริโภคอาหาร ค่าสัมประสิทธิ์แห่งความเที่ยง (KR-20) ของความรู้ทางโภชนาการ ทัศนคติต่ออาหาร เท่ากับ .94 และ .83 ตามลำดับ และค่าสัมประสิทธิ์ความเที่ยงโดยวิธีทดสอบซ้ำของการบริโภคอาหารเท่ากับ .81 วิเคราะห์ข้อมูลทางสถิติด้วยสถิติร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน การทดสอบที การทดสอบไคสแควร์ และใช้โปรแกรมคำนวณภาวะโภชนาการของสถาบันวิจัยโภชนาการ มหาวิทยาลัยมหิดล

ผลการศึกษาพบว่า 1) ความรู้ทางโภชนาการโดยรวมและความรู้เกี่ยวกับพฤติกรรมการบริโภคอาหารสุขภาพของเด็กวัยเรียนในเขตเมือง (*9.6±2.7 และ *5.8±1.8) แตกต่างจากเด็กนอกเขตเมือง (*10.7±3.5 และ*6.4 ± 2.0) อย่างมีนัยสำคัญทางสถิติที่.016 และ.015 ตามลำดับ 2) ทัศนคติในการรับรู้ประโยชน์และโทษของการบริโภคอาหารของเด็กในเขตเมือง (*5.6±1.4) แตกต่างจากเด็กนอกเขตเมือง (*4.9±1.8) อย่างมีนัยสำคัญทางสถิติที่.001 3) การบริโภคอาหารในกลุ่มผัก, ผลไม้, นม, ไขมัน,ขนมกรุบกรอบและขนมอบของเด็กในเขตเมืองแตกต่างจากเด็กนอกเขตเมืองอย่างมีนัยสำคัญทางสถิติที่ .026 ,.000,.000,.000,.022,.000 ตามลำดับ 4) เมื่อใช้ตัวชี้วัดส่วนสูงตามเกณฑ์อายุพบว่าภาวะโภชนาการของเด็กในเขตเมืองแตกต่างจากเด็กนอกเขตเมืองอย่างมีนัยสำคัญทางสถิติที่.010

ผลการวิจัยชี้ให้เห็นถึงความสำคัญที่พยาบาลอนามัยชุมชนควรให้ข้อมูลทางโภชนาการกับเด็กวัยเรียนในเขตเมืองมากขึ้นโดยร่วมมือกับโรงเรียนหรือชุมชน ในการส่งเสริมความรู้ทางโภชนาการ ทัศนคติต่ออาหาร และพฤติกรรมการบริโภคอาหารโดยใช้ธงโภชนาการ นอกจากนี้ควรมีการติดตามภาวะโภชนาการของเด็กวัยเรียนโดยเฉพาะในเขตนอกเมืองและให้คำแนะนำแก่เด็กและครอบครัว โดยเน้นให้เห็นความสำคัญของปัญหาโภชนาการต่ำกว่าเกณฑ์และแนวปฏิบัติ เพื่อให้เด็กมีภาวะโภชนาการที่ดี

(* ค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐาน)

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CHAPTER I

INTRODUCTION

Background and rationale

Food is a major factor that provides energy for growth and development. In addition, it helps the body to increase the efficiency of daily activities. Human body system is not balance if there is a nutritional problem. In other words, nutrients help our body system to maintain energy for daily activity. Therefore, nutritional problem is a major cause of most diseases. Lack of essential foods containing nutrient results in susceptibility to nutritional and health problem. Having nutritious food leads to improving physical and mental health. The dietary intake and energy should be balanced to meet energy requirement. The energy requirements are different depending on age, sex, occupation and level of activity. Malnutrition is a nutritional problem caused by both nutritional deficiency and overnutrition that negatively affect physical and mental health as well as quality of life.

It is known that children are an important human resource. The children need adequate quantity and quality of healthy food to meet the nutrient requirement for their physical and mental growth and development as well as health. Problems on food and nutrition are truly global issue and central to concerns regarding the health and well being of children throughout the world. These problems give negative effect on the children's academic performance and achievement. Currently, in Thailand some children encounter nutritional problems due to poor food behavior, resulting in undernutrition. Undernutrition causes a numbers of health problems and nutritional problems, especially Protein Energy Malnutrition (PEM), Iodine Deficiency Disorder (IDD) and Iron Deficiency Anemia (IDA). These problems delay the growth and development, particularly in young children living in poor community. These children suffer from undernutrition such as kwashiorkor, marasmus, and growth retardation, leading to an increase in health care cost and burden to family and larger society.

In addition to malnutrition, overweight and obesity are increasing the health problems for young children. UNICEF at the East Asia & Pacific Regional Office stated that Thailand is now enduring a new chapter of nutrition-related health treats associated with a modernization. According to the Ministry of Public Health (Department of Health, Ministry of Public Health, B.E.2542), young children have overweight and obesity because of a lack of variety of food that they should have in their ages. Moreover, our traditional food consumption is rapidly influenced by westernization meanwhile there is an increase in production and consumption of fast food and processed food such as instant noodle. These foods are mostly low in nutrition and high in fat with carbohydrate contents, which provide high calories and low fiber. These may cause overweight and obesity and lead to a serious problem when the children become adult since it is difficult to lose weight when there is an increase in size and numbers of fat cell. Thus, being on diet can decrease only the size of cells, not the numbers of the cells. When these children grow up, they may have health problems such as diabetes, stroke, hypercholesterolemia, and bone and joint disease (Thumcharoen, 1986). Furthermore, the overweight children are frequently threatened by other children which may make them loss their self-image and feel anxious to interact with others. Therefore, consequences of overweight and obesity include not only physical but also psychosocial problems.

Currently, nutritional problem is a major public health problem in Thailand. In the past, Thailand had experienced protein energy malnutrition in school children. During the year 1997-2002, at the national level, the percentage of the first, second, and third degree malnutrition in school children decreased from 12.20% to 11.46% (Department of Health, Ministry of Public Health, B.E.2547). In addition, the prevalence of goiter in school children decreased from 3.30% to 1.70% (Department of health, Ministry of Public Health, BE.2547), and the prevalence of Iron Deficiency Anemia in school children, during the year 1997-2000 decreased from 12.60% to 5.97% (Department of health, Ministry of Public Health , B.E. 2547). However, the percentage of obesity increased from 9.5% in 1990 to 12.3% in 2001. A goal of the ninth National Economic and Social Development Plan is to reduce overweight or obesity in school children to be less than 10% (Department of Health, Ministry of

Public Health, B.E. 2547). Since food consumption pattern is currently changing from not having enough food to consuming too much food, the Ministry of Public Health focuses on increasing public awareness through organizing a campaign to empower the people toward good health and providing education to the public in various forms.

It is reported that factors influencing food intake of children in the final years of elementary school include the children themselves, their families, their schools, their friends, the medias, and their illnesses (Nakraung, 1998). At this age, the children have developed thoughts and attitudes much further than those in the middle years of elementary school. They therefore can learn inductively from facts, thinking abstractly and reasonably, analyzing problems, concluding, proposing and making a plan. These children depend less on other people and start solving their own problems.

The social development of children begins at school age by learning how to live with people outside their family. In pre-adolescence, this develops further in joining a group of friends within the same age. The pre-adolescents begin to trust their friends more than their parents and fear of not being accepted by their friends the most. Friends exert tremendous influence on them, making them closely follow whatever their friend performs.

Lampang Province is in the north of Thailand. It is a small province located next to Chiang Mai, the center of northern region with civilization and high technology. Comparing both provinces, Lampang still has much rural area than Chiang Mai. Interestingly, data on nutritional status of students who is in grade 1-6 in the year 2003-2004 shows that percentage of obesity increases from 3.08% to 5.56% (Lampang Provincial Public Health Office, B.E.2546). The data indicate an increasing trend of health and social problems, which may associate with a change in food behavior affected by many socioeconomic factors. With different socioeconomic condition between urban and rural Lampang Province, there is no recent study conducted to compare knowledge, attitude, food intake, and nutritional status between students in these two areas. The researcher is therefore interested in conducting a study comparing nutritional knowledge, attitude towards food, food intake and nutritional status of pre-adolescents in urban and rural Lampang Province.

Conceptual Framework

Knowledge, attitude, and practice (KAP) are concepts underpinning conceptual framework of the present study. The conceptual framework consists of 4 components: 1) nutritional knowledge, 2) attitude towards food, 3) food intake, and 4) nutritional status

According to the conceptual framework, knowledge is defined as an awareness or perceptions of reality acquired through learning or investigating process (Chinn & Jacobs, 1987), which means what is known from learning, studying, experience, rule, person, place, information, and situation. Knowledge takes time and is not a complicated process. There are 6 levels of knowledge including: 1) recall, which means the first step of memory about method, process, and structure that can be used to describe definition, detail and truth, 2) comprehension or understanding, which means practice or skill of interpretations, translation, and extrapolation, 3) skill resulting from understanding and application for practice or problem solving, 4) analysis including procedure of breaking down components of problem, situation, rule, and structure, 5) synthesis or ability to rebuild a conclusion, 6) evaluation or ability to assess and make decision using given rule and standard (Bloom et al,1975; Merrian-Webster's Collegiate Dictionary,1995; Suwan, 1979). In this study, nutritional knowledge refers to cognitive domain regarding awareness of food and nutrition, including 1) knowledge on nutrient and nutritional food, and 2) knowledge on healthy food behavior.

Attitude is a relatively constant feeling, predisposition, or beliefs toward an object, a person, or a situation (Green et al., 1980). Attitude represents a person's feeling of agreement or disagreement towards some stimulus objects (Ajzen & Fishbein, 1980). Attitude includes 3 components: 1) cognitive component that means a part of idea and understanding towards stimuli, 2) affective component that means a part of emotion or feeling that can be positive or negative, and 3) behavioral component that represents a part of practice or behavior resulting from stimuli (Suwan, 1979). Attitude is influenced by beliefs such as food belief regarding food consumption (Ajzen & Fishbein, 1980). Beliefs in a certain diet may differ in different conditions. For example, a healthy person in a healthy state may believe in one good food but this food may not be good in an illness condition (Sammasud, 1996). In this

study, attitude towards food consists of the perception of benefits and consequences of food behavior, and belief in food and food value. Kantamit (1995) reported that there was statistically significant difference in attitude towards food and in food belief and food value between elementary school students in urban and rural areas of the central region. However, there was no significant difference in perception of benefits and consequences of food behavior between students in urban and in rural areas (Kantamit, 1995).

Practice is an action made with a purpose or a goal (Green et al., 1980). Practice may be influenced by previous experience and observation. It is a part of cognitive component and intention that takes time and many steps to decision making (Suwan, 1979). In this study, food intake represents practice. Food intake includes taking of these following food groups: 1) rice-starchy food, 2) vegetables, 3) fruits, 4) milk, 5) meat, and 6) oil, sugar, and salt.

Nutritional status is an individual's body condition that may result from food behavior and food intake (Burton & Foster, 1988). It is a health indicator associated with food intake. In this study, anthropometric measurements, including weight for age, height for age, and weight for height, are used as indicators of nutritional status. Food intake and nutritional status are affected by multiple factors including nutritional knowledge, and attitude towards food. Many researchers studied the relationship between these factors and nutritional status among children. In addition, previous studies reported that nutritional knowledge, attitude towards food and food intake are associated with nutritional status (Kantamit, 1995).

According to KAP, there are associations of knowledge, attitude, and practice. In addition, knowledge affects attitude and influences on practice measured by behavioral patterns, both concrete and abstract behaviors (Kaewkangwan, 1991). Previous studies report that there are similarity and differences in nutritional knowledge between pre-adolescents in both urban and rural areas (Kantamit, 1995; Kearney et al., 2000). In addition, practice is influenced by attitude. A previous study reports that health attitude is significantly correlated with health practices (Sirithap, 1987).

Geographical conditions include topographical, climatic, cultural, social, economic, and educational characteristics and development (UNESCO, 1996).

Geographical differences between urban and rural areas may differ in social and economic development. In general, there is more economic development in urban compared with rural areas. In Thailand, school buildings in urban are larger with more teachers and less number of students per teacher than those in rural areas (Sudaprasert, 1981). These factors may result in unequal opportunity for education attainment and lead to differences in knowledge, attitude, food intake, and nutritional status among the students in these two areas. A comparative study was conducted among children in urban and rural areas and found that their nutritional knowledge is similar (Prasittimate, 1998). However, a study showed that children in rural areas have more negative attitude towards food than those in urban areas and children with low level of education have more negative attitude towards food than those with high level of education (Kantamit, 1995). A recent study comparing food intake between children in urban and rural areas in Ubonrajchathanee province shows that there is no significant difference. Furthermore, it is reported that most children eat less than five food groups (Bootsri, 1995). In a later years, Klanklin et al. (2001) studied dietary patterns and nutritive value of food intakes of 6-12 year old children in Watmagok Community, Rajathewi District, Bangkok. They found that overweight children have breakfast and lunch at higher amount but have dinner at lower amount when compared to those with normal and underweight.

Research Questions

1. What are nutritional knowledge, attitude towards food, food intake, and nutritional status between pre-adolescents in urban and rural areas of Lampang Province?

2. Are nutritional knowledge, attitude towards food, food intake and nutritional status different between pre-adolescents in urban and rural areas of Lampang Province?

Objectives

1. To describe nutritional knowledge, attitude towards food, food intake and nutritional status between pre-adolescents in urban and rural areas of Lampang Province.

2. To compare nutritional knowledge, attitude towards food, food intake and nutritional status between pre-adolescents in urban and rural areas of Lampang Province.

Hypotheses

1. Nutritional knowledge between pre-adolescents in urban and rural areas of Lampang Province is different.

2. Attitude towards food between pre-adolescents in urban and rural areas of Lampang Province is different.

3. Food intake between pre-adolescents in urban and rural areas of Lampang Province is different.

4. Nutritional status between pre-adolescents in urban and rural areas of Lampang Province is different.

Delimitation of the study

This study was conducted to compare nutritional knowledge, attitude towards food, food intake, and nutritional status between the 5^{th}-6^{th} grade students in urban and rural areas of Lampang Province from February to April 2005.

Expected research outcome

1. For nursing practice, the present study can provide basic information on nutritional status of pre-adolescents in urban and rural areas of Lampang Province so that nurses can utilize the information in planning and promoting nutritious food for this population.

2. For nursing education, findings from the study can be used for enhancing nutritional education and knowledge for pre-adolescents.

3. For nursing research, results of the study suggest what aspects on nutrition should be explored for more detail.

Definition of terms

Personal characteristics refer to social and economic factors affecting food intake and nutritional status.

Gender: refers to sex identified as male or female.

Age: refers to the time in years between year of birth and year at the data collection.

Religion: refers to respects of people such as Buddhist, Christian, and Muslim.

Father and mother's education: refers to highest education level for each parent as specified by the Ministry of Education and divided into five levels including no education, elementary school, secondary school, diploma, bachelor degree and others.

Father's and mother's occupation: refers to types of major occupation for each parent. It is divided into 6 types including employee, private business, farmer, government enterprise, government employee, and housewife.

Family income: refers to the average monthly income of pre-adolescent's parents.

Number of kinsfolk: refers to number of all sisters and brothers of pre-adolescents including themselves.

Number of family member: refers to number of all persons residing in the same house as pre-adolescents.

Daily allowance: refers to amount of money that parents paid to pre-adolescents for their use in buying food when they were gone to school.

Nutritional knowledge refers to cognitive domain regarding awareness of food and nutrition measured by knowledge score including two aspects: 1) knowledge on nutrient and nutritional food (advantage and disadvantage of food, and consequences of nutrient deficiency); and 2) knowledge on healthy food behavior (selection of nutritious food and special food for specific diseases, and reducing non-nutritious food). Higher score indicates higher nutritional knowledge.

Attitude towards food means the perception regarding food measured by attitude score including two aspects: 1) perception of benefits and consequences of food

behavior; and 2) belief in food and food value. Higher score indicates good attitude towards food.

Food intake refers to volume of food consumption according to minimal requirement set by Thailand Nutrition Flag, measured by frequency and quantity of healthy food list (rice-starchy food, vegetables, fruits, milk, and meat) and unhealthy food list (oil, sugar and salt, desserts and snacks, beverages and other junk food). Quantity and frequency reported by pre-adolescents were calculated as household unit and compared to the average criteria of Thailand Nutrition Flag developed by the Ministry of Public Health. The quantity consumed that is less or more than the requirement represents inappropriate intake (Department of Health, Ministry of Public Health, and BE.2543).

Nutritional status means state of the health in pre-adolescents that is influenced by the food intake and use of nutrients. Nutritional status includes growth status obtained by measuring weight and height. The obtained weight and height are then converted into weight-for-age, height-for-age and weight-for-height and classified into levels of nutritional status demonstrating in graph of standard growth graph for male and female at the age of 5-18 years (Department of Health, Ministry of Public Health, B.E. 2542).

Urban area means the municipal areas that are located in the central of Lampang, which is Amphur Muang.

Rural area means the non-municipal areas that are more than 100-Kilometer radius of the municipal area, which are Amphur Wang Neua and Amphur Mae Prik.

CHAPTER II

LITERATURE REVIEW

This descriptive comparative research attempted to compare nutritional knowledge, attitude towards food, food intake and nutritional status between pre-adolescents in urban and rural areas of Lampang province. The researcher reviewed related literature as follows.

1) Pre-Adolescence Development
2) Nutritional Status and Nutritional Assessment of Pre-Adolescents
3) Food intake

1. Pre-Adolescence Development

Physical development

Most of pre-adolescents are 10-13 years old. Girls often begin their pre-adolescence process earlier than boys. In girls, breast budding, the first sex maturity of pre-adolescence starts on the average age of 10. Some girls start their sex maturity as early as 8 and others do not start until 13. The peak growth period in height, weight, muscle mass and the temper in girls occurs about one year after pre-adolescence process has begun. Menstruation usually starts about two years after the onset of pre-adolescence; on average, the first menses occur just before girls turn to 13. Boys enter pre-adolescence about one year later than girls. The first sex maturities are enlargement of testicles and thinning and reddening of the scrotum, which happens at an average age of 11 but may occur anytime between 9 to 14 years. For boys, the peak growth period occurs about two years after the beginning of pre-adolescence. Pre-adolescence is made up of a clear sequence of stages, affecting the skeletal, muscular, and reproductive system and nearly all other systems. There are some changes in bone

structure and body shape to enter teenage stage. Pre-adolescents are active in strong physical condition. The figure of girls clearly differs from that of boys. Boys have broader shoulders and smaller hips while girls have broader hips, slimmer legs and narrower shoulders. Although boys and girls are generally similar in height during middle pre-adolescence, they still have big changes at the beginning of pre-adolescence particularly in junior high school. Girls are often taller than their male classmates, but within a year or two, boys catch up and usually surpass their female classmates. About 25 percent of human growth in height occurs during pre-adolescence (Binns, 1989)

Emotional Development

Most of pre-adolescents have emotional conflicts in their ages. They also possess the subjective thinking as perceived but are deprived of long-term planning. It fluctuates upon their activities and situation in the surroundings. Jealousy of their younger brothers and sisters still remain and they sometimes express it in form of aggression. This might be because they are afraid of bad expressions. Sense of alienation makes them worried if they are not being accepted in a group. They need admiration from friends and teachers. They do not often lose their temper since they learn that this kind of expression make them not in socially acceptation. Eventually, their fears turn to be an anxiety (Binns, 1989).

Social Development

Erikson (1968) stated that the development in pre-adolescence is the development of diligence and knowledge. Danger of development at this age is feeling inferior. This is the age of learning suitable roles of sex, obtaining facts from the society and building up the attitude towards themselves, social groups and other institutions. Social development begins once they go to school, or begin to have society outside their home. They have more friends and need reliable ones. They follow the group rules without any debates. They love them friends and behave in the same way through their actions, speaking, and dressing. They start to believe in friends more than their parents, confront and disobey adults but still need loves and warmth

from them. They want adults to look at their group activities as a serious matter. They imitate to adapt themselves in the society (Bandura, 1977).

Development of intelligence, thinking, reasoning and languages

The development of pre-adolescence is much more advanced than that of early pre-adolescence. They can build up attitudes in their daily life, and begin to have adult intelligence at this age which is widely developed. They are responsible, logical, and can use systematic problem solving based on facts. They can pursue abstract thinking; develop concepts as well as discriminative capacity. They do not like to be forced. However, it depends on different heredity and environment (Ford &Coleman 1999).

2. Nutritional Status and Nutritional Assessment of Pre-Adolescents

Burton & Foster (1988) mentioned that the nutritional status was the body condition resulting from the utilization of nutrients from the digested foods, and influencing an individual's health. Good nutritional status normally originated from the selection of complete essential food intake. In summary, the nutritional status means an individual's body condition resulting from the food behavior. Since one's eating behavior is directly associated with the nutritional status, then the individual, processed with appropriate food behavior, and would reflect in the good or desirable nutritional status. Alternatively, the improper food behavior, such as the over consumption, under consumption or the imbalance consumption, give the problems of overnutrition and under-nutrition. Sanjur (1982) (cited in Aree et al., 1999) stated that the nutritional status was the body condition resulted from the food consumption. Nutritional status was an indicator of human health which was associated with the food consumption (Townsend & Roth, 2000). In accordance with the idea of Kuntatong (2000), the nutritional status was the condition of body and mind resulted from the dietary intake and the utilization of nutrients for the body development. As a result, Vichaidit (1986) described the nutritional status as the body and mental conditions resulted from the dietary intake and the utilization process of nutrients for highest benefit.

The assessment of nutritional status of an individual, groups in communities, or clinical patients can be categorized into four methods: 1) Anthropometric

assessment; 2) Biochemical assessment; 3) Clinical assessment; and 4) Dietary consideration (Brown, 1999).

1) Anthropometric Assessment

Anthropometry is a technique of body weight and size measurement developed by anthropologists. Anthropometric measurement is simple, safe, inexpensive, and can be applied clinically at the bedside. The assessment generally consists of the measurement of body and its circumferences such as height, weight, head, arms, legs, hip, waist and other relevant measurement at specific parts like skinfolds thickness at biceps, triceps, subscapularis, and suprailiacs (Pongpaeo, 1996). Body weight, particularly in relation to height, is commonly used as an indicator for nutritional status. Underweight can be attributable to inadequate food intake, poor absorption or utilization, or imbalanced and excessive usage of energy by the body when the thyroid gland is overactive in hyperthyroidism. In the absence of disease, excess body weight usually reflects obesity an increase in the amount of fat tissue from excessive food intake, except for body builders who have a high muscle mass. More than 5% change in body weight, particularly recent and sudden in onset over the last month, indicates either change in dietary intake or underlying illness. To measure height, a person should be standing upright, arms resting by his side, and without shoes. According to the WHO recommendations, a child (aged 5-18 years) who has a z-score value of –2SD or below is regarding as malnutrition. Acute nutrient deficiency as indicated by weight for age (underweight)**.** Low weight-for height (wasting) reflects acute malnutrition. Low height-for-age (stunting or growth retardation) reflects chronic malnutrition (WHO, 1994). The indicators for nutritional assessment are as follows:

Weight for age

Weight for age indicates the state of protein and calorie status. Weight for age is an appropriate an indicator for acute nutrient deficiency; however, it is not appropriate to evaluate the overweight status since the height is not taken into account, leading to an erroneous interpretation particularly the weight comparison of the two different heights (Himes & Sietz, 1994). Since a body weight is the total weight of muscles, fats, water, and bones, change of weight cannot be clearly identified which

part of the body is a cause. Body weight measurement is a convenient method that uses simple equipment. It is widely used for a nutritional surveillance program and the follow-up program of the preschoolers (Shittchang, 1997).Weight is measured by using a beam balance portable scale with details of 0.1 kilograms. Students stand with their bare feet on the accurate weighing scale. The data is plotted in graph of standard growth graph for male and female at the age of 5-18 years (Department of Health, Ministry of Public Health, B.E. 2542).

The strength of weight for age is that it is simple and shortly to use. It was shown to reflect of acute malnutrition. However, a weakness of weight for age is that if a person had low weight it cannot identify acute or chronic nutrient deficiency. In addition, if a person had high height for age and overweight it may show that a person had overnutrition (Department of health, Ministry of Public Health, B.E. 2543).

Height for age

Height for age indicates the state of prolonged chronic protein and calories deficiencies. It indicates a result of the impaired skeletal development which demonstrates in shorter heights compared to others. Therefore, children with short height in a community would reflect the prolonged nutritional problem in the community (Durnin, 1991). The strength of height for age is that it is a better indicator for nutritional status than weight for age in terms of physical structure. At the community level, height for age is also used for indicating a level of community development. However, a weakness of height for age is that it cannot determine acute nutrient deficiency because height changes slowly. In addition, knowing a person's age is needed (Department of health, Ministry of Public Health, B.E. 2543).

Weight for height

Weight for height indicates nutritional status with an aim to identify normal-tall, skinny-tall, and obese-short children. In addition, weight for height is a good indicator for determining both overnutrition and undernutrition. It was found that overnutrition and undernutrition rates are higher when compared with height for age. This indicator is appropriate to use as a follow up and assessment of the short period of undernutrition and the overnutrition. Nevertheless, the weight for height indicator is not suitable for the nutritional assessment for a prolonged nutrient deficiency case

since a lack of nutrients in a long period can delay an increase in height, making normal weight for height when age is not included (Vichaidit, 1986).

The strength of weight for height is that it can determine overnutrition and undernutrition and identify between a person who has high height for age with normal weight and a person who has high height for age with under weight. However, a weakness of weight for height is that it can determine only a person who is thin, normal, and obesity if not using with height for age. Moreover, it cannot identify a person who is thin with stunting (Department of health, Ministry of Public Health, B.E. 2543).

2) Biochemical Assessment

The Biochemical evaluation of nutritional status involves an analysis of nutrients or related metabolites in tissue, blood, and urine (Department of Health, Ministry of Public Health, B.E. 2538). Anemia is a condition in which the hemoglobin content of the blood is lower than normal as a result of a deficiency of one or more essential nutrients. Iron deficiency is commonly assessed by measuring hemoglobin concentration and hematocrit in blood. The quantity of albumin and serum protein is regarded as an indicator of the body's protein status. In addition, blood cholesterol level, as a result of dietary pattern and dietary intake, reflects a risk for coronary heart disease (Robert & Devid, 2003).

Strength of biochemical assessment is that it is an accurate marker to examine nutritional status; however, it is a labor- intensive and expensive approach.

3) Clinical Assessment

The clinical assessment is normally simple, economical, and convenient method for the assessment of nutritional status in community settings. Examples of this method include hair examination for assessing protein and energy deficiencies, mouth and tongue examination for assessing vitamin B2 deficiency, and palpation technique of thyroid for assessing iodine deficiency (Department of Health, Ministry of Public Health, B.E. 2538; Pongpaeo1996). According to Peggy and Hui (1992), signs of malnutrition assessed by physical examination include:

3.1) Hair: Dull, dry, thin, wirelike, brittle, spares

3.2) Face: Pale, dark under eye, swollen, scaling, lumpiness

3.3) Eye: Dry membranes, redness, fissures at corners, red rimmed, scars at cornea

3.4) Lips: Red, swollen, lesions or fissures

3.5) Tongue: Scarlet or purplish color, raw tongue

3.6) Teeth: Cavities, black or gray spots, erupting abnormally, missing

3.7) Skin: Dry, flaky, scaling, swollen, grayish, no fat layer under skin

3.8) Glands: Front of neck and cheeks become swollen, lumps visible at parotid

3.9) Nails: Brittle, ridged, pale nail beds, clubbed, spoon shaped

3.10) Muscle and skeletal system: Flaccid, wasted muscles, weakness, tenderness, decreased reflexes, difficulty in walking

3.11) Gastrointestinal: Distended, enlarged abdomen, ascites, hepatomegaly

3.12) Cardiovascular: Pulse rate exceeds 100 beats/min, abnormal rhythm, blood pressure elevated, mental confusion, edema (Peggy and Hui, 1992:107)

4) Dietary Assessment

This method involves the collection of pertinent information of the food intake habits, patterns, nutritional food values, and other related factors in order to assess the individual nutritional status in conjunction with other assessment methods. Followings are the methods currently used for the individual dietary assessment (Dwyer & Coleman, 1997).

4.1) Food Record

Food Record is the list of food and its quantity consumed during a day for a specific period of one-seven days. Detail description of all foods and beverages and their method of preparation and cooking are recorded. Using a variety of procedures with locally available measurements at different sizes such as teaspoon, tablespoon and cup, and converting to standard measuring unit in gram can estimate

food portion size. This method represents a good food intake quantitative data (Dwyer & Coleman, 1997; Pongpaew, 1996). The strength of food record is that it is accurate and there is no need to remember the food eaten because they are recorded. Nevertheless, a weakness of food record is that it is time consuming, probably making a burden to obtain the data. Moreover, the quantity of food recorded is less accurate than weighing method (Bingham et al., 1998; Rosalind, 1990).

4.2) Twenty-Four Hours Food Recall

Twenty-four hours food recall is the most common method to assess food consumption by interview. A person recalls the food she consumes during the previous twenty-four hour. Then, the person is asked to describe details of food and beverages consumed by type and quantity as well as food preparation. The household measurement such as teaspoon, tablespoon, and cup is used to estimate the quantity. The data collected are appropriate to interpret qualitatively rather than quantitatively. In fact, this method saves both time and money to conduct. It can be applied for various populations. The strength of twenty-four hours food recall is less time-consuming, inexpensive, and easy. The assessment can also be repeated. The weakness of twenty-four hours food recall is that one-day food consumption recall might not demonstrate typical food intake. Differences in food intake might be caused by appetite, activity, and time. This method should not be provided to young children and elderly due to a limitation of recall memory (Dwyer & Coleman, 1997; Gibson R.S., 1990).

4.3) Food Frequency

This is a method that is widely used in an epidemiological study by using the interview or self-administered questionnaire on the frequency of food intake for each food category in a day, week, month, or year. Questionnaire can be semiquantitative when sample was asked to quantify usual portion sizes of food items, with or without the use of food models. The assessment of the dietary intake habit can be used to evaluate the associated nutritional status and emerging health condition. The strength of food frequency is that it can identify food patterns associated with adequate intakes of specific nutrients. It is fewer burdens to the sample compared to other methods. In addition, it can be used in a specific study for a long period and does

not require highly trained interviewer. The weakness of food frequency is that an inaccuracy might occur because of food item and portion size incompletion, and miscalculation. It also depends on recall memory (Dwyer & Coleman, 1997; Rosalind, 1990).

In community setting, it is unlikely to apply every method for nutritional assessment. Selecting an appropriate or a combination of some methods depending on the assessment's objective is still applicable. In the present study, the nutritional status is assessed by anthropometry including body weight and height and graph of standard growth for male and female aged 5-18 years is used according to the information on standard weight and height as indicators of nutritional status developed from Thai population, aged 1 day – 19 years (Department of Health, Ministry of Public Health, B.E. 2542).

Nutritional Problems

The nutritional problems occurred among pre-adolescents involves both undernutrition (including underweight, wasting, stunting, protein deficiency (Kwashiokor), energy deficiency (Marasmus) and overnutrition (including overweight and obesity).

Undernutrition

Undernutrition is defined as a status or condition of protein energy malnutrition and micronutrient deficiency. It is generally a result of inadequate food intake and lack of calories, protein that affect metabolism or absorption of nutrients, vitamins and minerals. (Undernutrition[online]. Available:http://www. chclibrary.org/ micromed/0005590 html [2005, September, 15]). Protein energy malnutrition is divided into two groups including marasmus and kwashiorkor. Marasmus is a severe deficiency of calories. It is a chronic condition of semi-starvation, characterized in later stages by muscle wasting and an absence of subcutaneous fat to which children adjust by reduced growth. Kwashiorkor is a deficiency of proteins. Kwashiorkor is reported less frequent than marasmus. In kwashiorkor, subcutaneous fat is usually preserved; muscle wasting occurs but is often masked by edema (swelling). Undernutrition is assessed in terms of degrees of weight loss in adults; in children,

height and weight are used and compared with growth charts.(Undernutrition[online]. Available:http://www.nutrition.org.uk/home.asp?siteld=43 [2005, October, 2]). It is a major public health problem worldwide, particularly in developing countries including Thailand. Undernutrition can be found among pre-adolescents in both rural and urban areas. At the national level, a study of nutritional status among pre-adolescents in 1990-1995 reported that 12.50 % of elementary students in rural area and 17.70% of those in urban area were underweight (Department of health, Ministry of Public Health, B.E. 2540). This problem is resulting in health problem, leading to increased health care cost, burden to family and the whole society.

Overnutrition

Overnutrition is a condition that involves overweight and obesity. Overnutrition is an increasing public health problem. It is indicated that the body had begun to accumulate the body fat, probably leading to chronic or non-communicable disease such as obesity, hypertension, and cardiovascular disease. A person with more weight for height compared to others may have overnutrition due to over eating or inappropriate food behavior (Nutrition Division, Department of Health, Ministry of Public Health, B.E. 2539). According to Nutrition Division, Department of Health, Ministry of Public Health (B.E. 2542), number of pre-adolescents who are overweight decreased from 13.60% in the year 2000 to 12.30% in the year 2001. A goal of the ninth National Economic and Social Development Plan is to reduce overweight or obesity in school children to be less than 10% (Department of Health, Ministry of Public Health, B.E. 2547). Overnutrition can be assessed by anthropometric assessment such as body weight and height as earlier mentioned. Body mass index (BMI) is commonly used for classifying overweight and obesity in adult. It is calculated as the weight in kilograms divided by the square of height in meter squared (kg/m^2). According to World Health Organization (WHO), the BMI cut -off points at 25 to less than 30 kg/m^2 is defined as overweight and the BMI cut-off points at 30 or greater is defined as obesity (WHO, 1998). However, in pre-adolescents, indicators including weight for age, weight for height, and height for age, are more frequently used. Overnutrition is divided into two groups as follows:

Overweight

Overweight is referred to an excess of body weight and is determined by weight and height (Townsend & Roth, 2000). Overweight means that a person has more weight for height than normal. Without advice from the parents, over eating pattern among pre-adolescents may lead to overweight when they become adults, resulting in difficulty in losing weight due to increased number and size of fat cell in a younger age (Department of Health, Ministry of Public Health, B.E. 2539). Moreover, controlling food can decrease only fat cell size but not fat cell numbers when they are adult.

Obesity

Obesity is defined as a state of increased amount of fat cell in one's body. It is caused by lipid accumulation with more than 25-30% of body weight (Doucet, 1997: 846-855). Obesity can affect both physical health problems (such as diabetes, hypertension, stroke, hypercholesterolemia, bone disease, and dysfunctional joints) and mental health problems. In addition, an issue is that the obese children are sometimes threatened by other children, making them lose their self-image. Moreover, the obese children may have lethargy and anxiety and may have negative interaction with other people.

3. Food intake

Food intake is amount of diet ingested during the day. Appropriate food intake includes having a balanced diet with appropriate proportion of macronutrients (carbohydrate: fat: protein = 5: 3: 2) (Department of Health, Ministry of Public Health, B.E. 2543). One gram of carbohydrate provides four kilocalories. Similarly, one gram of protein provides four kilocalories. One gram of fat provides nine kilocalories. Food intake represents a lifestyle and personal behavior that can directly reflect one's health and well being status. A proper food intake promotes good health and prevents illnesses as well as prolongs one's life. A consequence of food intake is nutritional status, resulting in quality of life. It is important that a person is guided in order to meet dietary requirement. Several guidelines have been developed and used widely in various forms, for example, food pyramid and food model. Currently in Thailand, the

Thailand Nutrition Flag is modified according to food pyramid and used to guide food intake for Thai people.

The Thailand Nutrition Flag (A Guide to daily food choices).

In B.E. 2543, the Department of health, Ministry of Public Health, has developed food guide called "Thailand Nutrition Flag" (Figure 1). It is a dietary guideline used for Thai people. The Thailand Nutrition Flag demonstrates food portions of the six food groups in pictures. The flag also provides information on types and quantity of food recommended for children aged six years or more and adult. Components of the Thailand Nutrition Flag include: 1) types of food including five major and one minor groups (rice-starchy food, vegetables, fruit, milk, meat, and oil-sugar-salt, and 2) recommended serving size of food that measured by proportion of food according to principle of food exchange or by food size and amount of food serving using household measuring unit. By following the dietary guideline, a person can have various foods. The flag shows a range of food serving for each food group .The number of serving a person should have depends on the number of calories required daily, age, sex, body size and physical activity. At the top of the flag, recommendation of rice-starchy food is made, whereas at the vertical end of the flag, fats, salt, and sugar are limited at a small amount only when needed. As shown in Table 1, the lower number of serving for each food group provides approximately 1600 kcal per day for persons aged 6-13 years, and the moderate number of serving provides approximately 2000 kcal per day for those at the age of 14-25 years, while the high number of serving provides approximately 2400 kcal per day for those who use a lot of energy such as labors, farmers and athletes.

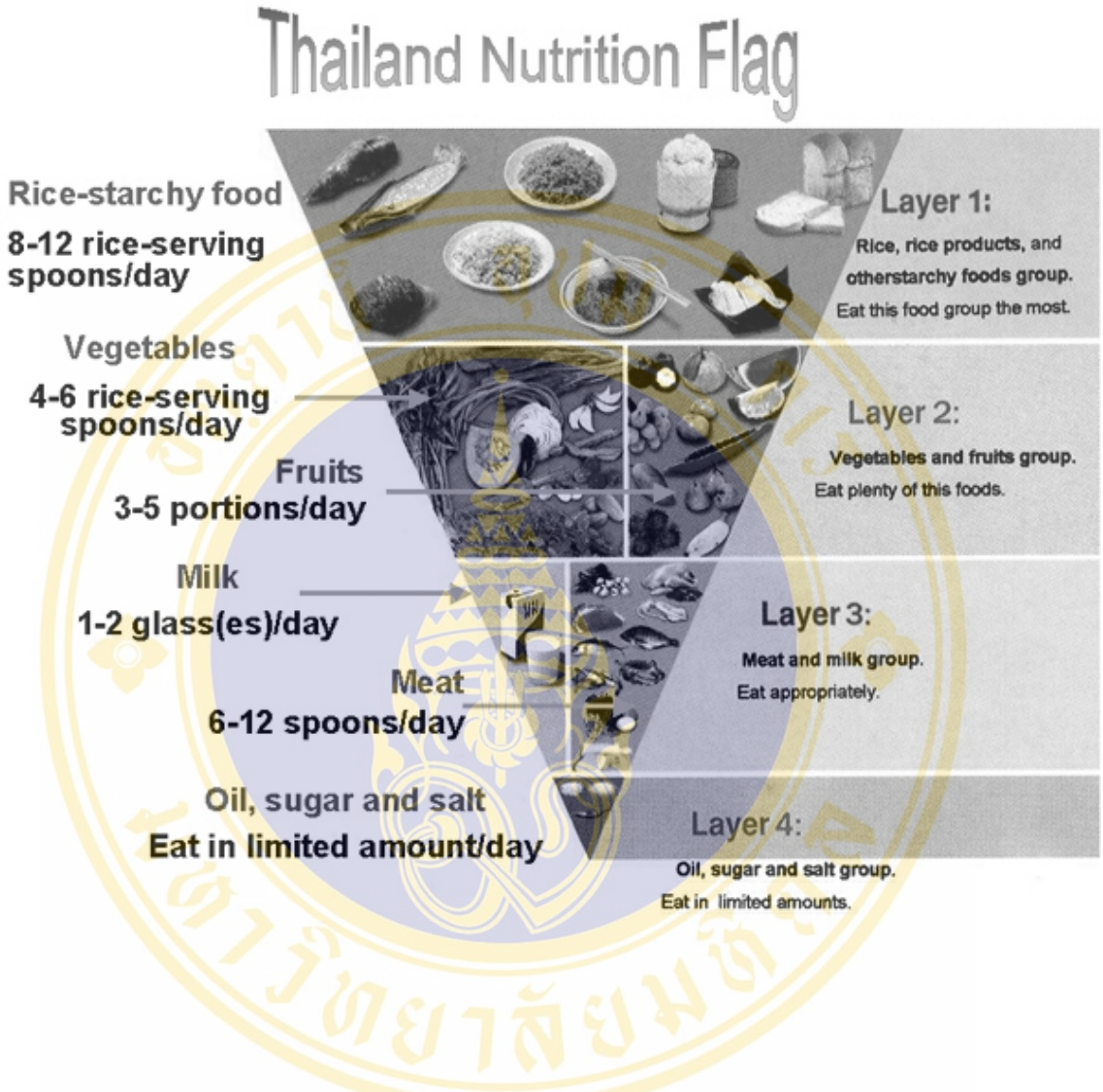

Figure 1 The Thailand Nutrition Flag

(From http://www.fao.org/es/esn/nutrition/ [2005, October, 8])

Table 1 Amount of Food Recommended by levels of daily calorie requirement

Food group	Measuring unit	Levels of daily calorie requirement		
		1600 kcal	2000 kcal	2400 kcal
Rice-starchy food	Rice-serving spoon	8	10	12
Vegetables	Rice-serving spoon	4(6)	5	6
Fruits	Portion	3(4)	4	5
Milk	Glass	2(1)	1	1
Meat	Tablespoon	6	9	12
Fat, salt ,and sugar	Teaspoon	Limited as needed		

(From the Department of health, Ministry of Public Health, B.E. 2543)

Types of food in the Thailand Nutrition Flag

Types of food recommended by the Thailand Nutrition Flag include six groups.

1) Rice-starchy food

Rice and flour is a staple food for Thai people. The rice-starchy food provides such essential energy, protein, vitamin, minerals and fibers. Foods included in this group are rice, sticky rice, noodle, bread, taro, potatoes, and flour. A recommendation set by the Department of Health, Ministry of Public Health is that "having rice as the main course and switching with the flour sometimes is better than simply having rice" (Department of Health, Ministry of Public Health, B.E. 2543).In addition, it is recommended to have brown rice because it provides more nutrients compared to white rice. Rice-starchy food is recommended at 8 to 12 rice-serving spoons per day for adult and eight rice-serving spoons per day for children (Figure 1).

2) Vegetables

Vegetables are good sources of vitamins, mineral, and fiber. The vegetables help reducing risk for non-communicable diseases such as cancer and cardiovascular disease. The phytochemical containing in the vegetables such as carotenoid is an antioxidant. Beta-carotene is a type of carotenoid which is found in yellow-colored vegetables such as carrots and pumpkins. Another type of carotenoid, lycopene, are found in tomatoes. These carotenoids can inhibit production of free radical reactions that damage cells, DNA, and development of cells. Vegetables are recommended at four-six rice-serving spoons per day for adult and four rice-serving spoons per day for children (Department of Health, Ministry of Public Health, B.E. 2543) (Figure 1).

3) Fruits

Fruits provide similar nutrients to vegetables. Thai people are able to have several kinds of fruits in different seasons. Fruits are good sources of antioxidant substances, such as bioflavonoid and vitamin C that can prevent non-infectious disease (such as cancer and heart disease). Moreover, fruits are good sources of fibers that help decreasing blood cholesterol. According to recommendation by the Department of Health, Ministry of Public Health (Department of Health, Ministry of Public Health, B.E. 2543), fruits are suggested for three to five portions per day (Figure 1).

4) Milk

Milk is a good source of calcium and phosphorus that contribute to a strong bone and teeth. In addition, milk is a source of protein, vitamin B_2 and vitamin B_{12}. Therefore, vegan people possibly have vitamin B_{12} deficiency. According to Department of Health, Ministry of Public Health (Department of Health, Ministry of Public Health, B.E. 2543), milk is recommended at two glasses per day for children and one glass per day for adult. Moreover, it is suggested that older people should drink one glass of low fat milk per day (Figure 1).

5) Meat

Meat, including lean meat, fish, eggs, and dry grains, is a major source of protein that is essential for growth and development. Having lean meat is highly recommended since lean meat has less fat content compared to fat meat. In addition, among meat group, eggs are high quality protein containing food that are available and inexpensive. According to Department of Health, Ministry of Public Health

(Department of Health, Ministry of Public Health, B.E. 2543), an egg a day is recommended for children whereas more than two-three eggs a week are recommended for adult. In addition, the recommendation stated that having fish is good because fish contains lower saturated fat cholesterol and also has lower energy than other meats. Fish contain many essential amino acids such as omega 3 which is a necessary nutrient to develop and contribute brain and eyes cells. Omega 3 also prevents heart disease and decrease risk of thrombosis. Thus, we should take fish and also other meats so that the body gets enough quality of protein. According to recommendation, meat is recommended at 6 to 12 rice-serving spoons per day for adult and six spoons per day for children (Figure 1).

6) Fat, salt, and sugar

Fat containing food includes oil, coconut milk, butter, margarine, salad dressing, and cream. Fat is classified as saturated fat (animal fat) and unsaturated fat (vegetables fat) that provides energy and heat to the body and helps absorption of vitamin A, D, E, K. However, over consumption of fat may cause obesity and other non-communicable diseases. Food intake of saturated fat received from animal contains high cholesterol, resulting in hyperlipidemia and a risk for cardiovascular disease. Having fat containing food cooked by boiling or steaming is recommended at five to nine teaspoons per day for adult and five teaspoons per day for children (Department of Health, Ministry of Public Health, B.E. 2543).

Salt added in food or cooking process contains sodium. Sodium is important mineral for cell functions that controls a balance of water and acid-base condition in human body. Furthermore, sodium used in food processing and food industry includes: 1) baking soda that used for making bread, 2) monosodium glutamate that used to enhance taste of food, and 3) fish and soy sauce that increases salty taste. However, evidence shows that a person having high sodium diet is more likely to have hypertension. Thus, avoiding salty food such as preserved egg, salted fish, and pickled food is recommended especially for patients with heart disease, hypertension, and renal disease. Salt is also recommended at one teaspoon per day for children and adult (Department of Health, Ministry of Public Health, B.E. 2543).

Sugar is generally found in food with various forms including sucrose, glucose, fructose, lactose, and maltose. Sucrose is widely used to make food more

tasting. However, consuming too much sugar can cause dental carries. In addition, in a long term, this may increase triglyceride level in blood and lead to excessive energy and fat accumulation. Sugar is recommended at four to eight teaspoons per day for adult and four teaspoons per day for children (Department of Health, Ministry of Public Health, B.E. 2543).

Related research on food intake and nutritional status in pre-adolescents

Personal characteristics related to food intake and nutritional status

1) Gender

Gender is a factor that affects food intake in pre-adolescents. From the literature review, Jamkratuke (1998) studied factors affecting fast food intake among students in high schools in Bangkok under Ministry of Education. In her study, she found that gender has negative correlation with fast food intake. Moreover, gender is a predictor explaining 30.08% variance of the intake. In 1998, Nakraung also studied factors affecting food intakes in 179 overweight male and 221 overweight female students in elementary schools of Bangkok Metropolis. She found that gender is positively related to the selection of food intake. In addition, gender is significantly related to the frequency of food intake and amount of food intake.

However, some studies reported that there is no relationship between gender and food intake of pre-adolescents. In 1991, Thippimonratana studied among Prathom 6 (grade 6) students in schools organized by the provincial primary education office in Choomporn province. Wittayapraphan (2000) found that gender was not significantly associated with fast food consumption behavior among high school students in Bangkok.

2) Father's and mother's education

Education is important for developing knowledge and skill. Mothers with high education take better care of their children than those with low education (Orem, 2001). Education of parents is found to be a factor affecting food intake and nutritional status of pre-adolescents. Mukthanaanan (1991) studied factors affecting

nutritional status among students in Grade Six of Surin Province. It was found that educational level of parents affected nutritional status of the students who reported optimal food intake. Bootsri (1995) studied food intake and nutritional status of students in Grade four of Amphur Muang, Ubonratchathani Province. She found that the educational level of parents within the sanitary area was significantly associated with children's food selection. Makarasen (1995) studied factor-affecting behaviors toward National Health Codes among students in Grade Six of Suphanburi Province. Among 450 students, it was found that educational level of parents was significantly related to food intake and nutritional status. Ahmed et al. (1998) studied nutritional status of children in Bangladesh and found that the children whose mother had completed primary education had malnutrition less than those whose mother had no education. The study regarding risk of severe malnutrition in children .It showed that illiteracy of mother was a risk factor for malnutrition (Middleman et al., 1998).

3) Father's and mother's occupation

Muktanaanunt (1991) studied factors affecting nutritional status of students in Grade Six, Surin Province. It was found that occupation of father affected nutritional status of the students who had medium to low levels of food intake, but occupation of mother affected nutritional status of the students who had low level of food intake. Thipphimolrat (1991) studied health-promoting behavior concerning food intake of 379 students in Grade six in primary school under the Primary Education Office, Chumporn Province. She found that food practices regarding chemical-free food consumption and purchase of non-toxic food by the students whose father and mother were government officers, were significantly better than those whose father and mother were farmers. Jamkratuke (1998) studied factors related to fast food intakes among high school students in schools under Department of General Education, Bangkok. She found that occupation of parents had significantly negative correlation with fast food intake. Srimahunt (1998) studied the nutritional status and food intake of 6-12 year-old children from 73 schools in Amphur Muang, Ratchaburi Province that were under the National Primary Education Board Office, the Private Education Board Office and the Provincial Education Office. She found that occupation of parents was significantly related to food intake. People with low income that result

from low occupational status had a greater tendency to consume unbalanced diets, particularly low intakes of fruit and vegetables. Better occupation mostly leads to better income and better chance for food selection (De Irala-Estevez et al., 2000).

4) Family income

Family income is a factor indicating financial status of a family. Boonjuea (1991) studied factors affecting food intake practices of 394 Grade six students in schools under the Primary Education Office, Surin Province. She found that family income could predict food intake, and explain 9.82% of variance of food intake. Muktanaanunt (1991) studied factors affecting nutritional status of students in Grade Six, Surin Province. Family income of the students with medium to low food intake was found to have an effect on nutritional status of the students. Temchareun & et al. (1996) studied changes in food intake and nutritional status of students in schools under jurisdiction of Bangkok Metropolis. They reported that family income of students was significantly related to habits of having breakfast regularly among the students. Kuntatong (2000) studied food habits of 323 secondary school students in Lampun Province. She found that food habit of students with high family income was better than those with low family income. In summary, evidence showed that children in family with low income tended to be malnourished. In contrast, the following researchers showed some distinctive features in comparison with those of the researchers mentioned above. According to Radebe (1996), education and income were not significant variables.

5) Number of kinsfolk

Muktanaanunt (1991) studied factors affecting nutritional status of students in Grade Six, Surin Province. It was found that number of kinsfolk affected nutritional status of the students with low food intake. Bootsri (1995) studied on food intake and nutrition of Grade Four students in schools under the Provincial Primary school Education office, Amphur Muang, Ubonratchathani Province. She found that number of kinsfolk of students both inside and outside sanitary areas was associated with food selection of the students.

6) Number of family members

Number of family members was a risk factor for malnutrition as reported by Phimmasone (1996). In addition, children living in large size family, small house and limited space may have more risk for infection and malnutrition due to inadequate food intake. Muktanaanunt (1991) studied factors affecting nutritional status of students in Grade Six, Surin Province. It was found that number of family members affected nutritional status of the students who had medium to low food intakes. Bootsri (1995) studied food intake and nutritional status of Grade Four students in Amphur Muang, Ubonratchathani Province. She found that number of family members of students was identified to have an effect on their food selection.

7) Daily allowance of pre-adolescents

Jamkratuke (1998) studied factors related to fast food intakes of high school students in schools under Department of General Education, Bangkok. She found that daily allowance of the students was negatively correlated with fast food intake. Nakraung (1998) studied factors affecting food intake of overweight students in grade six in elementary schools under the jurisdiction of Bangkok Metropolis. She reported that daily allowance was significantly related to their selection of food.

8) Environment

: Mass media

Ittimaiya (1990) (cited in Ousaha, 1996) reported that advertising shots on crispy flavored snacks, soft drinks, candies significantly affected the frequency of snack consumption of school age children. Jamkratuke (1998) studied factors associated with fast food intakes of high school students in schools under Department of General Education, Bangkok. She found that influence of mass media was positively correlated with fast food intake. Moreover, mass media could predict and explain 30.08% of variance of the food intake. Nakraung (1998) studied factors affecting food intake of overweight students in Grade Six in elementary schools under the jurisdiction of Bangkok Metropolis. She reported that perception of mass media influence was negatively correlated with food intake of students. Perception of mass media influence could also predict 21.20% variance of food intake.

9) Friends

Jamkratuke (1998) studied factors related to fast food intakes of high school students in schools under Department of General Education, Bangkok. She found that influence of friends was positively correlated with fast food intake and was a co-predictor explaining 30.08% variance of fast food intake. Nakraung (1998) studied factors affecting food intake of overweight students in Grade Six in elementary schools under the jurisdiction of Bangkok Metropolis and reported that influence of friend was negatively correlated with food intake of the students.

Nutritional knowledge related on food intake and nutritional status

Generally, there are many studies that have been done on relationship between nutritional knowledge and food intake with nutritional status among pre-adolescents. Pintu (1991) implemented a nutritious snack program in pre-adolescents at Watmoongindaram School, Prathum Thani Province. She found that the pre-adolescents had increased their knowledge and improved food behavior on snack. Amphaphon (1994) found that program on food habit increased knowledge on food behavior in elementary school in Nakornsawan Province. She also found that the students had positively changed in food intake according to knowledge regarding principle of nutrition. Kantamit (1995) studied the food behavior in elementary school in central region and reported that there was statistically significant difference in total nutritional knowledge and knowledge on healthy food behavior between pre-adolescents in urban and in rural areas. She found that the pre-adolescents had low on total nutritional knowledge and knowledge on healthy food behavior.

In 1998, Srimahunt (1998) studied the nutritional status and food intake of 6-12 year-old children from 73 schools in Amphur Muang, Ratchaburi Province, under the National Primary Education Board Office, the Private Education Board Office and the Provincial Education Office. She found that nutrition knowledge had relationship with food behavior. Nakraung (1998) found that knowledge had relationship with food behavior among over-weight students in elementary school in Bangkok. Suwannathorn (2000) found that teaching health education program to pre-adolescents in Chachaengsao Province had increased knowledge and positively changed their food behavior. Suntorntrawong (2001) found that giving a participatory

learning program on food selection with an aim for consumer protection among elementary school students in Nakornnayok Province increased their knowledge and food behavior. Virunrach (2002) found that gaining dietary information from teachers was significantly related to food consumption behavior of pre-adolescents. These findings were not congruent with Kearney et al. (2000) .They found that nutrition knowledge and good dietary habits are not strongly correlated. Person who has high education can understand and obtain knowledge from different sources such as self-study, teaching and learning process, and mass media. Therefore, knowledge can lead to proper food behavior practice.

Attitude towards food related to food intake and nutritional status

Attitude is belief or feeling of a person towards someone or something including people, actions, situations, and some other things, as well as expressions showing one's mind or condition of that person (Suwan, 1979). Attitude represents an individual's perception that may result from knowledge and experience. Also, attitude is a factor affecting behavior and a determinant of both concrete and abstract behaviors (Kaewkangwan, 1991). Beliefs are important factors influencing attitudes toward behavior. Beliefs in food are example of beliefs related to food consumption behavior (Ajzen & Fishbein, 1980). Beliefs in a certain diet may differ in different conditions. For example, a healthy person in healthy state may believe in one good food but it is not good for illness condition (Sammasud, 1996).

Sirithap (1987) conducted a comparative study on health attitudes and health-promoting behavior of students in grade six in Nakhonsawan Province between schools with and without supplemental teaching program. He found that health attitudes were significantly different between the two programs. Mukthananunt (1991) studied belief in food among students grade six in Surin Province. It revealed that food belief was significantly related to food consumption behavior. Kantamit (1995) studied the food behavior between elementary school students in urban and rural areas of the central region and reported that there was statistically significant difference in total score of attitude towards food and in food belief and food value. In addition, there was no significant difference in perception of benefit and consequences of food behavior between students in urban and in rural areas.

Makarasen(1995) studied factors affecting behavior among 450 students in grade six in Suphanburi Province. She found that attitudes toward food consumption were significantly related to food consumption behavior. Jamkratuke (1998) studied factors related to fast food intakes of high school students in schools under Department of General Education, Bangkok. She found that attitude towards fast food intake was significantly related to fast food consumption behavior. Nakraung (1998) found that nutrition beliefs of overweight students in elementary school in Bangkok were significantly related to their food consumption behavior. Rahothan (2000) conducted a study that integrated life experience into learning-teaching process for health promoting food behavior in students in grade five in Nonthaburi Province. She found that in the experimental group, attitudes toward food could significantly predict food behavior.

Related Research on Food intake

Earlier studies on food intake of elementary school children in Sixth Grade were reviewed as follows. Ittimaiya (1990) (cited in Ousaha, 1996) reported that soft drink was the most favorite drink for school age children. Later on, Rodchu (1993) studied the nutritive values of food among students in Grade Six under the Provincial Primary Education Office, Nakhornprathom Province. She found that 30.96 % of the students did not have their breakfast on a regular basis. According to Saena (1997), studied dietary patterns and nutritive value of food intakes of students in Bangkok Municipal schools in 1985 and 1995 .She found that the dietary pattern of the 1995 group had changed from 1985 in the way that they consumed soft drinks, milk and desserts/fruits along with breakfast and lunch more often. They also increased consumption of meat, meat product, eggs, oil and sugar but decreased consumption of rice and dry grains. Breakfast and lunch of the 1995 group provided higher nutritive value than the 1985 group, however, almost all nutrients did not meet the recommendation level for breakfast and lunch except for protein. Jamratuke (1998) studied factors related to fast food intakes of high school students in schools under Department of General Education, Bangkok. She found that 91.40% of the students used to eat fast food. The students rated that their favorite food were fried chicken (39.96%), pizza (26.50%), hamburger (14.30%), French fries (7.50%), sandwiches

(7.30%), hot dogs (3.50%), and sausages (3.10%). For nationwide, Ministry of Public Health (2000) studied health-promoting behavior of students in Grade Five and Six excluding Bangkok. Findings revealed that the students did not engage in health-promoting behavior properly in that the students reported having three meals a day (24.6%), having less than three meals a day (73.10%), and having more than three meals a day (2.30%). Moreover, 40.30% of them reported not having vegetables and 45.10 % reported having fried crispy and unhealthy food. Whereas 25.33 % had milk, 6.10% had soft drinks, 6.60% had tea or coffee, and 2.20% had energy drinks daily.

Food intake related to nutritional status

Nutrition Division, Department of Health, Ministry of Public Health,(B.E. 2539) reported that most of the students in Bangkok Metropolitan who had over nutrition and under nutrition had similar amount of sweetened drink/soft drink and crispy snacks at three-four glasses per day, and three-four packs per day, respectively. Hakhun (1993) studied snack consumption pattern between obese and normal children at the age of seven-nine years old of two private schools. She found that hours in the afternoon were the most common time for snack in both groups. Obese children consumed crispy snacks, chocolates, and sticky rice more often than the normal group. In 1998, Srimahunt studied nutritional status and food intake of 6-12 years-old children from 73 schools in Amphur Muang, Ratchaburi Province, under the National Primary Education Board Office, the Private Education Board Office and the Provincial Education Office. She found that the level of their food intake was low, and the students liked to have junk food, fried food, and soft drinks. Nakraung, (1998) studied on factors affecting food intake of overweight students in Grade Six in elementary schools under the jurisdiction of Bangkok Metropolis. It showed that 11.80% of the students had more than three meals a day. The meal they consumed with highest to lowest amount was dinner (76.30%), lunch (15.20%), breakfast (8%), and before bed time (0.50%). Food they liked the most were Thai food (72.90%), American fast food (41.10%), fruit juice (29%), soft drink (26.50%) and Thai fast food (8.70%). Mekusol (1999) studied determinants of food intake and nutritional status of youths in Bangkok. She reported that students did not perceive health promoting behavior properly, for example, drinking soft drinks. In a year after, Klanklin et al.

(2001) studied dietary patterns and nutritive value of food intakes of 6-12 year old children in Watmagok Community, Rajathewi District, Bangkok. They found that overweight children had breakfast and lunch at higher amount but had dinner at lower amount when compared to the normal group and underweight group.

CHAPTER III

MATERIALS AND METHODS

In this chapter, the methodology was organized in the following sessions: research design, population and sample, setting, instrument and measurement, data collection, and data analysis.

Research Design

A descriptive comparative design was used to compare nutritional knowledge, attitude towards food, food intake and nutritional status between pre-adolescents in urban and rural areas of Lampang Province, Thailand.

Population and Sample

The population in this study was total of 18,111 fifth to sixth grade students in the academic year 2004 among 452 elementary schools in Lampang, which includes 7,974 pre-adolescents in 165 elementary schools in urban areas and 10,137 pre-adolescents in 287 elementary schools in rural areas.

The total sample size included elementary schools in Lampang. Sample size determination was based on power analysis (Cohen, 1988). With the level of significant at .05, the effect size of .50 and the power of .90, sample size should be 85 for each group. Approximately 10% of sample size was added to substitute incomplete response; therefore total sample size of pre-adolescents was 200, including 100 pre-adolescents from urban and 100 pre-adolescents from rural areas who met the inclusion criteria:

The inclusion criteria of sample were:

1. Pre-adolescents who enrolled in the fifth and sixth grade in the elementary schools of municipal area and the elementary schools in a 100-Kilometer radius of the municipal area (Wang Neua, and Mae Prik).
2. Pre-adolescents who were able to verbally communicate in Thai.

3. Pre-adolescents who were willing to participate in the study.

Setting

There were two settings including one elementary school in municipal area of urban and one elementary school in rural Lampang Province. Urban area included schools inside and outside municipal areas. The researcher selected the schools in municipal area because they were located in the central of Amphur Muang, which were more urbanized compared to outside municipal areas of Lampang. Rural area included the school in Amphur Wang Neua. Therefore, the Ban Pong Sanook School in Amphur Muang and a kindergarten school (Anuban Wang Neua School) in Amphur Wang Neua were the setting for this study.

Ban Pong Sanook School was the setting for urban areas. It is a large size school that located on 10 Jammatawee Road, Vieng Nuang District, Amphur Muang, Lampang Province. This school had 77 teachers and 1,981 students in academic year 2004. There are eight levels which are the first pre-school with 126 students (65 males, 61 females), the second pre-school with 165 students (77 males, 88 females), grade 1 with 266 students (144 males, 122 females), grade 2 with 264 students (139 males, 61 females), grade 3 with 278 students (141 males, 137 females), grade 4 with 268 students (133 males, 135 females), grade 5 with 327 students (174 males, 153 females), and grade 6 with 287 students (136 males, 151 females). The population in this school enclosed grade 5 with 10 classes and grade 6 with 10 classes.

A kindergarten school (Anuban Wang Neua School) was the setting for rural areas. It is a middle size school that locates on Lampang - Wang Neua Road, Amphur Wang Neua, Lampang Province. This school had 25 teachers and 566 students in academic year 2004.There are eight levels which are the first pre-school with 44 students (24 males, 20 females), the second pre-school with 40 students (22 males, 18 females), grade 1 with 67 students (37 males, 30 females), grade 2 with 75 students (40 males, 35 females), grade 3 with 93 students (49 males, 44 females), grade 4 with 79 students (40 males, 39 females), grade 5 with 76 students (40 males, 36 females), and grade 6 with 92 students (47 males, 45 females). The population in this school enclosed grade 5 with 2 classes and grade 6 with 2 classes.

Sampling method

Multistage random sampling was used to achieve the participants. Lampang Province was divided into urban and rural areas. The Ban Pong Sanook School was randomly selected from 10 schools in urban area. The kindergarten school (Anuban Wang Neua School) was randomly selected from 10 schools in rural area. Subsequently, approximately 50 of the sample were drawn independently from the fifth and the sixth grade students in each selected school. The process of multistage random sampling is illustrated in Figure 2.

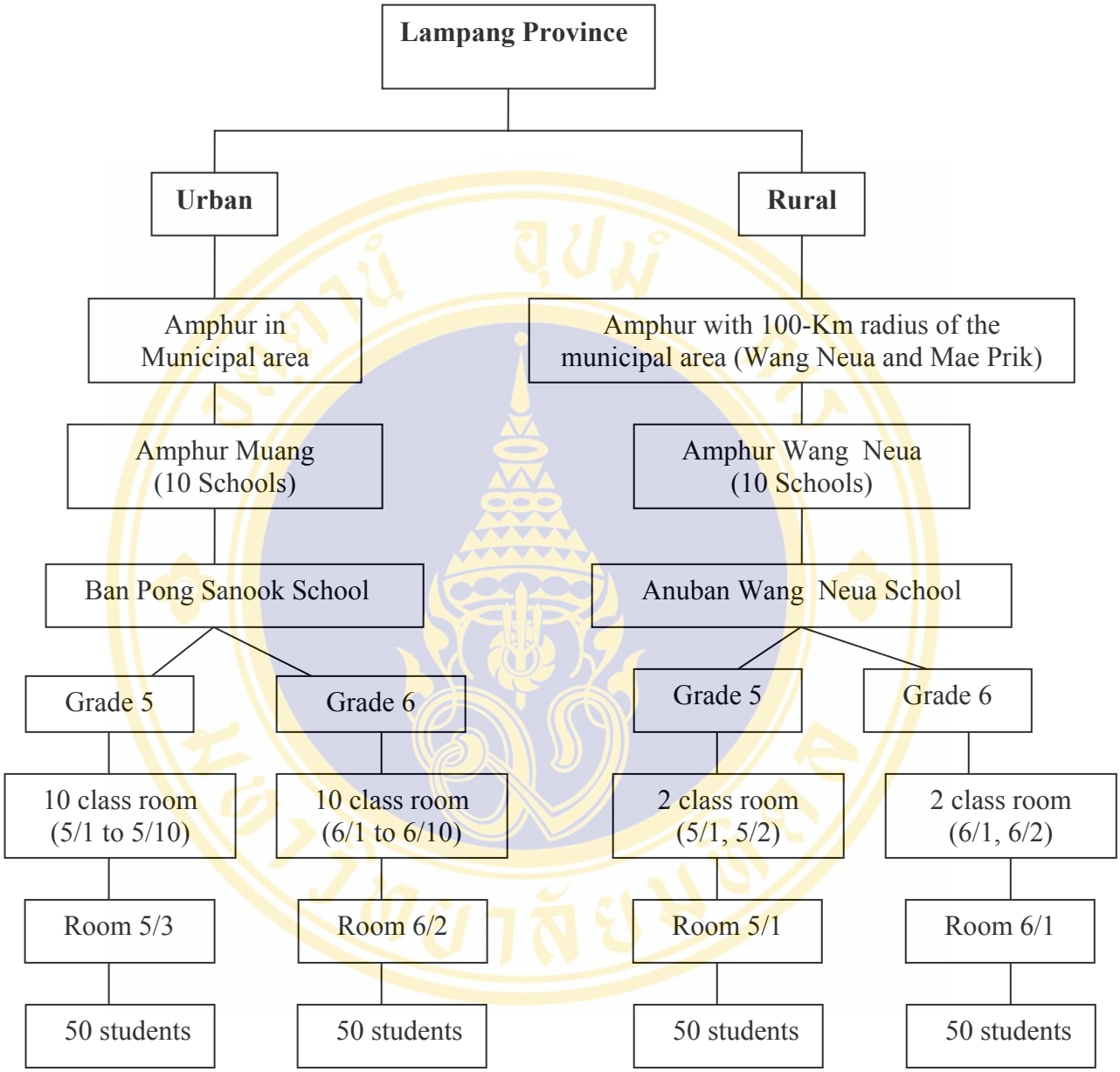

Figure 2 Multistage random sampling process

Instrument and Measurement

The instrument used in this study included questionnaires (personal characteristics, nutritional knowledge, attitude towards food), interview form (food intake), and instrument for nutritional assessment (height meter, weighing scale). Structured interview with questionnaire and interview with food intake interview form were used for data collection which divided into four parts. The instrument also included equipments used for nutritional assessment as described in the following part.

Part 1 The Personal characteristics

The personal characteristics questionnaire (Appendix A) was developed by the researcher. The questionnaire consisted of demographic data including gender, age, religion, father's and mother's education, father's and mother's occupation, family income, number of kinsfolk, number of family member and daily allowance. These data were used to describe characteristics of the sample. Additional questions on food preparation, food pattern, and food selection were added in the last part of the questionnaire.

Part 2 The Nutritional knowledge

The nutritional knowledge questionnaire (Appendix B) was modified from Kantamit (1995), including 20-items with multiple-choice that developed for grade 6 students in central region. The Kuder-Richardson 20 (KR-20) coefficient was .76. In the present study, the questionnaire consisted of 18-items with multiple-choice, including two major components: 1) knowledge on nutrient and nutritional food (item 1-3, item 11, item 13-14, and item 17); and 2) knowledge on healthy food behavior (item 4, item 5-10, item 12, item 15-16, and item 18). Total score ranged from 0 (all incorrect) to 18 (all correct). Interpretation of the score is based on cut off point at 11 (60% of the total score). Higher score ($\geq$11) indicated high nutritional knowledge and lower score (< 11) indicated low nutritional knowledge. Content validity of the instrument was approved by two nursing faculties who were experts in nutrition and one instructor who has been teaching health course at an elementary school. The revision was then made following comments and recommendations from the three experts. Finally, reliability of this instrument tested among 30 pre-adolescents in a

kindergarten school (the Anuban Lampang School).The Kuder-Richardson 20 (KR-20) coefficient was .94.

Part 3 The Attitude towards food

The attitude towards food questionnaire (Appendix C) was modified from Kantamit (1995) including 25-items with four-point rating scale ranging from 3 (agree) to 0 (disagree) that developed for grade 6 students in central region. The Cronbach alpha coefficient was .70. The modified tool consisted of 19-items with 2-dichotomous scale, agree (1) and disagree (0), including 2 main components: 1) perception of benefits and consequences of food behavior (item 1, item 3-5, item 7, item 9, item 12-13, and item 15); and 2) belief in food and food value (item 2, item 6, item 8, item 10-11, item 14, and item 16-19). There were 8 positive statements (item1, item 6-9, and item 15-17) and 11 negative statements (item 2-5, item 10-14, and item 18-19). The score was reversed for negative statement. Total score ranged from 0 (all negative) to 19 (all positive). Interpretation of the score was based on cut off point at 11 (60% of the total score). Higher score ($\geq$11) indicated good attitude; and 2) Lower score (<11) indicated poor attitude towards food. Content validity of the instrument was approved by two nursing faculties who were experts in nutrition and one instructor at an elementary school who has been teaching health course. Reliability of this instrument tested among 30 pre-adolescents in a kindergarten school (the Anuban Lampang School).The Kuder-Richardson 20 (KR-20) was .83.

Part 4 The Food intake

The food intake interview form (Appendix D) was modified from Mongkornpit (1999) including 171-checklist items developed for vocational students in Bangkok. The modification was based on the Thailand Nutrition Flag developed by the Ministry of Public Health (Department of health, Ministry of Public Health, B.E. 2543). Interview was used to ask frequency of dietary intake with a certain portion size for nine major groups of food list including 51 food items. The nine food lists were: 1) rice-starchy food, 2) vegetables, 3) fruits, 4) milk, 5) meat: fish, chicken, pork, beef, 6) oil, sugar and salt, 7) desserts and snacks, 8) beverages, and 9) other junk food.

According to the criteria of the Thailand Nutrition Flag set by the Ministry of Public Health, optimal daily intake for each food list was suggested as follows.

Group 1 Rice-starchy food: Eight rice-serving spoons per day

Group 2 Vegetables: At least four rice-serving spoons per day

Group 3 Fruits: At least three portions per day

Group 4 Milk: Two glasses per day

Group 5 Meat: fish, chicken, pork and beef: Six tablespoons per day

Group 6 Oil, sugar and salt: Eat with limited amount per day

Group 7, 8, and 9 Desserts and snacks, beverages, and other junk food were not recommended.

Content validity of the instrument was approved by two nursing faculties who were experts in nutrition and one instructor at an elementary school who has been teaching health course. Correlation coefficient for test-retest reliability of the instrument tested among 30 pre-adolescents in a kindergarten school (the Anuban Lampang School) within a one-month period was .81

Part 5 The Instrument for Nutritional Assessment

Anthropometry was an indirect method of nutritional assessment that measured body composition. The following measurements were carried out in each participant.

Height was measured by using height-meter with microtoist details of 0.1 centimeters. The only one height-meter was used throughout the study. The pre-adolescents were asked to stand straight barefoot on a horizontal platform with their heels together, stretching upward to the fullest extension. The back was as straight as possible against the vertical bar and the horizontal arm of the height meter was in contact with the student's head. The height was read in centimeters with details of millimeters.

Weight was measured by using a bathroom scale with details of 0.1 kilograms (RGZ120). The only one bathroom scale was used throughout the study. Pre-adolescents were stand barefoot on the accurate weighing scale. The instrument was calibrated daily.

INMU-ThaiGrowth 2002 program (Institute of Nutrition, Mahidol University, 2002) was used to calculate nutritional status for pre-adolescent in this study. The

program was developed according to graph of standard growth initiated to use as an indicator of nutritional status for Thai population aged 5 to 19 years old (Department of Health, Ministry of Public Health, B.E. 2542).

Data collection

The data were collected from February 21 to March 03, 2005 at two settings: 1) Ban Pong Sanook School, and 2) a kindergarten school (Anuban Wang Neua School). The data collection procedure included:

1. The researcher submitted the official letter of the Faculty of Graduate Studies, Mahidol University for permission to conduct the study and then took the permission letter to the administrator of the Ban Pong Sanook School and a kindergarten school (Anuban Wang Neua School) in order to get permission to conduct the research.

2. The researcher contacted the administrators of both schools to provide information on purpose of the study and a data collection plan set from February 21 to March 03, 2005.

3. The researcher made an appointment with the teachers who were responsible for grade 5-6 elementary school students to provide information on objectives of the study and the data collection process.

4. On the date of data collection at the Ban Pong Sanook School, the researcher described purposes of the study, provided instruction to the pre-adolescents. The questionnaires were administered by the researcher read questionnaires (the personal characteristics questionnaire, the nutritional knowledge questionnaire, the attitude towards food questionnaire) item by item. The pre-adolescents took approximately one hour to complete the questionnaires. Before the pre-adolescents returned the questionnaires, the researcher asked them to check if they missed some questions they wanted to respond. The researcher then checked for completion of the questionnaires.

5. The researcher matched the two pre-adolescents together by identification number. Then, the researcher interviewed the pre-adolescents by using the food intake interview form and wrote down the data for each preadolescent item by item. This interview lasted approximately 45-60 minutes per two pre-adolescents.

6. The researcher conducted nutritional assessment including body weight and height among the pre-adolescents. It took approximately two hours for all measures per each pre-adolescent.

7. Four day after data collection was completed at the Ban Pong Sanook School, the researcher collected data at a kindergarten school (Anuban Wang Neua School) with the same procedure as described earlier. All data obtained were kept confidentiality throughout the study.

Data analysis

Data analyses were performed by using the SPSS for Windows version 11.5. Descriptive statistics including frequency, percentage, mean, and standard deviation, were used to analyze personal characteristics, nutritional knowledge, attitude towards food, food intake, and nutritional status in this sample. After checking for assumptions (Munro, 2001), initially ANCOVA was used for data analysis with family income as a covariate variable. There was no statistical significance of family income influence as the covariance. Therefore, independent t-test was used to determine the significance of difference in nutritional knowledge, attitude towards food, food intake between pre-adolescents in urban and rural areas of Lampang Province. Then, chi-square test was applied to determine the significance of differences in nutritional status between pre-adolescents in urban and rural areas of Lampang Province. All probabilities were the two-tailed tests and the significance level for the statistic was set at 0.05.

CHAPTER IV
RESULTS

This study was aimed to compare nutritional knowledge, attitude towards food, food intake and nutritional status between 100 urban pre-adolescents and 100 rural pre-adolescents of Lampang Province. The data were analyzed and presented in the following parts.

Part I: Pre-adolescents' personal characteristics
Part II: Nutritional know ledges
Part III: Attitude towards food
Part IV: Food intake
Part V: Nutritional status
Part VI: Hypothesis Testing

Part I: Pre-adolescents' personal characteristics

Table 2 described general information of the sample which include gender, age, religion, father's and mother's highest education, father's and mother's occupation, family incomes, number of kinsfolk, number of family members and daily allowances. The total pre-adolescents were 200, which is 53.5% males and 46.5% females. There were 55% males and 45 females pre-adolescents in urban areas and 52% male and 48% female in rural areas. In urban areas, there were 62 % of 10-12 years old pre-adolescents and 38% of more than12-14 years old with mean age of 11.39 years old. In rural areas, there were 64 % of 10-12 years old pre-adolescents and 36% of more than 12-14 years old with mean age of 11.44 years old. All of pre-adolescents were Buddhist. Regarding the education, majority of fathers (29%) in urban areas has the highest education from secondary school and from elementary school for mothers (34%). In rural areas, majority of fathers (68%) and mothers (76%) graduated from elementary school. For occupation, most of fathers (41%) and mothers

(33%) in urban areas are employee .In rural areas, 51% of fathers and 42% of mothers are employee. In urban areas, family income range from 1,000 to 55,000 bahts/month with median income of 10,000 bahts/month and 62% of parents have family income more than 6,000 bahts/month. In rural areas, family income range from 1,000 to 50,000 bahts/month with median income of 5,000 bahts/month and more than half (66%) of parents has family income range from 1,000 to 6,000 bahts/month. More than 90 % of pre-adolescents in urban areas and rural areas had one to three kinsfolk. Most of pre-adolescents in urban areas (76%) and rural areas (91%) had two to five members in their family. The average daily allowance of pre-adolescents was more than 10 - 20 bahts/day as shown in Table 2.

Table 2 Personal characteristics of the pre-adolescents in urban and rural areas

Characteristics	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	n	%	n	%	n	%
Gender						
Male	107	53.5	55	55.0	52	52.0
Female	93	46.5	45	45.0	48	48.0
Age(years)						
10-12	126	63.0	62	62.0	64	64.0
>12-14	74	37.0	38	38.0	36	64.0
	Mean=11.42 SD=0.76		Mean=11.39 SD=0.78		Mean=11.44 SD=0.74	
Religion						
Buddhism	200	100	100	100	100	100
Christianity	0	0	0	0	0	0
Islam	0	0	0	0	0	0
Father's education						
No education	0	0	0	0	0	0
Elementary school	94	47.0	26	26.0	68	68.0
Secondary school	48	24.0	29	29.0	19	19.0
Diploma	28	14.0	24	24.0	4	4.0
Bachelor degree or higher	30	15.0	21	21.0	9	9.0
Mother's education						
No education	1	0.5	1	1.0	0	0
Elementary school	110	55.0	34	34.0	76	76.0
Secondary school	46	23.0	30	30.0	16	16.0
Diploma	19	9.5	16	16.0	3	3.0
Bachelor degree or higher	24	12.0	19	19.0	5	5.0
Occupation of father						
Employee	92	46.0	41	41.0	51	51.0
Private business	34	17.0	21	21.0	13	13.0
Farmer	31	15.5	7	7.0	24	24.0
Government enterprise	6	3.0	4	4.0	2	2.0
Government employee	36	18.0	26	26.0	10	10.0
Other	1	0.5	1	1.0	0	0

Table 2 Personal characteristics of the pre-adolescents in urban and rural areas (continued)

Characteristics	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	n	%	n	%	n	%
Occupation of mother						
Employee	75	37.5	33	33.0	42	42.0
Private business	55	27.5	29	29.0	26	26.0
Farmer	29	14.5	7	7.0	22	22.0
Government enterprise	1	0.5	1	1.0	0	0
Government employee	24	12.0	19	19.0	5	5.0
Housewife	16	8.0	11	11.0	5	5.0
Family income(bahts/month)						
1000-6000	104	52.0	38	38.0	66	66.0
>6000	96	48.0	62	62.0	34	34.0
	Median =6000		Median =10000		Median =5000	
Number of kinsfolk						
1-3	189	94.5	94	94.0	95	95.0
>3	11	5.5	6	6.0	5	5.0
Number of family members						
2-5	167	83.5	76	76.0	91	91.0
>5	33	16.5	24	24.0	9	9.0
Daily allowance (bahts)						
1-10	39	19.5	8	8.0	31	31.0
>10-20	116	58.0	54	54.0	62	62.0
>20	45	22.5	38	38.0	7	7.0

Most of pre-adolescents in urban (80%) and rural areas (88%) had mother who prepared food at home for them. The majority of them (85% of pre-adolescents in urban areas and 94% of pre-adolescents in rural areas) made food at home by their family. Regarding meals per day, pre-adolescents in urban areas had one meal (1%), two meals (11%), three meals (79%), four meals (9%) and those in rural areas had two meals (13%), three meals (84%), and four meals (3%). The majority of pre-adolescents in urban (86%) and rural area (89%) had breakfast everyday. However, more than one-tenth of pre-adolescents in urban (14%) and rural areas (11%) did not have breakfast everyday. Almost all of pre-adolescents had lunch and dinner everyday (99% and 97%, in urban areas, 92% and 100% in rural areas). Nevertheless, less than one-tenth of pre-adolescents in urban (1%) and rural areas (8%) did not have lunch everyday. Only 3% of pre-adolescents in urban areas did not have dinner everyday as shown in Table 3.

Table 3 Food preparation and food pattern of the pre-adolescents in urban and rural areas

Food preparation and food pattern	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	n	%	n	%	n	%
Person who prepare food at home						
: Father	8	4.0	6	6.0	2	2.0
: Mother	168	84.0	80	80.0	88	88.0
: Themselves	1	0.5	1	1.0	0	0
: Grandmother	20	10.0	13	13.0	7	7.0
: Older sister	3	1.5	0	0	3	3.0
Food at home						
: Eating at home	179	89.5	85	85.0	94	94.0
: Buying	21	10.5	15	15.0	6	6.0
Number of meal per day						
: 1 meal	1	0.5	1	1.0	0	0
: 2 meals	24	12.0	11	11.0	13	13.0
: 3 meal	163	81.5	79	79.0	84	84.0
: 4 meals	12	6.0	9	9.0	3	3.0
Having breakfast						
: Yes	175	87.5	86	86.0	89	89.0
: No	25	12.5	14	14.0	11	11.0
Having lunch						
: Yes	191	95.5	99	99.0	92	92.0
: No	9	4.5	1	1.0	8	8.0
Having dinner						
: Yes	197	98.5	97	97.0	100	100.0
: No	3	1.5	3	3.0	0	0

As shown in Table 4, for first choice, pre-adolescents in urban areas (34%) selected sweety drink and 35% of these in rural areas selected cracker. Twenty percent of pre-adolescents in urban areas selected cracker but 26% of those in rural areas selected ice cream for second choice. According to third choice, equal proportion of pre-adolescents in urban areas (14%) and rural areas (14%) selected cracker.

Table 4 Rank of food selection by the pre-adolescents in urban and rural areas

Rank of food selection	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	Food	n (%)	Food	n (%)	Food	n (%)
: First	cracker	55(27.5)	sweety drink	34(34.0)	cracker	35(35.0)
: Second	sweety drink	38(19.0)	cracker	20(20.0)	ice cream	26(26.0)
: Third	fruits ice cream	29(14.5) 29(14.5)	fruits	14(14.0)	fruits	15(15.0)

As shown in Table 5, rank of food advices, for first priority, pre-adolescents in urban areas (40%) selected mother whereas 40% of those in rural areas selected teacher. Twenty-eight percent of pre-adolescents in urban areas selected father but 36% of those in rural areas selected mother for second priority. According to third priority, 22% of pre-adolescents in urban areas selected teachers and 16% of those in rural areas selected father.

Table 5 Rank of food advice for the pre-adolescents in urban and rural areas

Rank of advice in food	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	person	n (%)	person	n (%)	person	n (%)
: First	mother	76(38.0)	mother	40(40.0)	teachers	40(40.0)
: Second	teachers	62(31.0)	father	28(28.0)	mother	36(36.0)
: Third	father	44(22.0)	teachers	22(22.0)	father	16(16.0)

Part II Nutritional knowledge

Regarding the total score for nutritional knowledge by using 60% cut off point at 11, more than half of pre–adolescents in urban areas (58%) had low nutritional knowledge and 42% of pre–adolescents had high nutritional knowledge. In rural areas, approximately half of pre–adolescent (51%) had high nutritional knowledge and half of pre–adolescents (49%) had low nutritional knowledge (Table 6).

Table 6 Scores on nutritional knowledge of the pre-adolescents in urban and rural areas

Level of nutritional knowledge	Criteria	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
		n	%	n	%	n	%
Low	< 60 %	107	53.5	58	58.0	49	49.0
High	60-100 %	93	46.5	42	42.0	51	51.0

Part III Attitude towards food

Regarding the total score for attitude towards food by using 60% cut off point at 11, most of pre–adolescents in urban areas (87%) had good attitude toward food whereas only 13% of these had poor attitude towards food. In rural areas, 83% of the pre–adolescents had good attitude towards food whereas 17% of these had poor attitude toward food (Table 7).

Table 7 Scores on attitude towards food of the pre-adolescents in urban and rural areas

Level of attitude towards food	Criteria	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
		n	%	n	%	n	%
Poor	< 60 %	30	15.0	13	13.0	17	17.0
Good	60-100 %	170	85.0	87	87.0	83	83.0

Part IV Food intake

After interviewing and recording the pre-adolescents food intake data in form of average amount of daily food intake, the researcher calculated their household unit of daily food intake based on the Thailand Nutrition Flag. The results showed that most of pre-adolescents in urban (85%) and rural areas (82%) had rice-starchy food less than eight rice-serving spoons per day, while only one percent (1%) in both urban and rural areas had rice-starchy food for eight rice-serving spoons per day. Less than one-fifth of pre-adolescents in urban (14%) and rural areas (17%) had rice-starchy food more than eight rice-serving spoons per day.

Approximately half of pre-adolescents in urban areas (55%) but less than half of these in rural areas (38%) had vegetables for four rice-serving spoons per day or more. Less than half of pre-adolescents in urban areas (45%) and more than half (62%) of those in rural areas had vegetables less than four rice-serving spoons per day. Most of pre-adolescents in urban (88%) and rural areas (61%) had fruit more than or about three portions per day while approximately one-tenth (12%) in urban areas and more than one-third in rural areas (39%) had fruit less than three portions per day.

Most of pre-adolescents in urban areas (70%) had milk more than two glasses per day whereas most of pre-adolescents in rural areas (64%) had milk less than two glasses per day. Less than one-tenth of pre-adolescents in urban (6%) and rural areas (4%) had milk equal to 2 glasses per day.

Most of pre-adolescents in urban (62%) and rural areas (61%) had meat less than six tablespoons per day. Thirty six percent of pre-adolescents in urban and 39% of pre-adolescents in rural areas had meat more than six tablespoons per day. Only 2% of pre-adolescents in urban and none in rural areas had meat equal to six tablespoons per day.

Regarding oil, salt, and sugar, more than 90% of pre-adolescents in urban and rural areas had oil less than or equal to five teaspoons per day, had salt less than or equal to one teaspoon per day, and had sugar less than or equal to four teaspoons per day. In addition, more than ninety five percents of pre-adolescents in urban and rural areas had snacks, bakery, beverages and desserts daily (Table 8).

Table 8 Daily food intake of the pre-adolescents in urban and rural areas

Aspects	Quantity	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
		n	%	n	%	n	%
1.Rice -starchy food group	< 8 rice-serving spoons	167	83.5	85	85.0	82	82.0
	= 8 rice-serving spoons	2	1.0	1	1.0	1	1.0
	>8 rice-serving spoons	31	15.5	14	14.0	17	17.0
	(Mean = 5.97)						
2. Vegetables	< 4 rice-serving spoons	107	53.5	45	45.0	62	62.0
	≥ 4 rice-serving spoons	93	46.5	55	55.0	38	38.0
	(Mean = 4.50)						
3. Fruits	< 3 portions	51	25.5	12	12.0	39	39.0
	≥ 3 portions	149	74.5	88	88.0	61	61.0
	(Mean = 4.76)						
4. Milk	0 glass	0	0	0	0	0	0
	< 1 glass	21	10.5	0	0	21	21.0
	1- 2 glasses	79	39.5	30	30.0	49	49.0
	> 2 glasses	100	50.0	70	70.0	30	30.0
	(Mean = 2.10)						
5. Meat	< 6 tablespoons	123	61.5	62	62.0	61	61.0
	= 6 tablespoons	2	1.0	2	2.0	0	0
	> 6 tablespoons	75	37.5	36	36.0	39	39.0
	(Mean = 5.60)						
6. Oil	≤ 5 teaspoons	198	99.0	98	98.0	100	100
	> 5 teaspoons	2	1.0	2	2.0	0	0
	(Mean=0.90)						
7. Salt	≤ 1 teaspoons	186	93.0	93	93.0	93	93.0
	> 1 teaspoons	14	7.0	7	7.0	7	7.0
	(Mean=0.70)						
8. Sugar	≤ 4 teaspoons	193	3.5	97	97.0	96	96.0
	> 4 teaspoons	7	96.5	3	3.0	4	4.0
	(Mean=0.56)						

Table 8 Daily food intake of the pre-adolescents in urban and rural areas (continued)

Aspects	Quantity	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
		n	%	n	%	n	%
9.Snacks	> 0 pack	194	97.0	98	98.0	96	96.0
	≤ 0 pack	6	3.0	2	2.0	4	4.0
	(Mean = 1.44)						
10.Bakery	> 0 piece	199	99.5	100	100	99	99.0
	≤ 0 piece	1	0.5	0	0	1	1.0
	(Mean = 2.11)						
11.Beverages	> 0 glass	193	96.5	97	97.0	96	96.0
	≤ 0 glass	7	3.5	3	3.0	4	4.0
	(Mean = 0.96)						
12.Desserts	> 0 cup	199	99.5	99	99.0	100	100
	≤ 0 cup	1	0.5	1	1.0	0	0
	(Mean = 1.40)						

Part V Nutritional status

In Table 9, using criteria developed by the Ministry of Public Health (Department of Health, Ministry of Public Health ,B.E. 2547), it was shown that the obesity was reported in pre-adolescents in urban (9%) and rural areas (7%), while the malnutrition was reported at lower percentage in rural (4%) and urban areas (1%). The rest are normal nutritional status was found in urban (77%) and rural areas (76%).

Table 9 Nutritional status by weight for age among pre-adolescents in urban and rural areas

Nutritional status	Z-score	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
		n	%	n	%	n	%
Obesity	>2 S.D.	16	8.0	9	9.0	7	7.0
Overweight	2 S.D. to >1.5 S.D.	5	2.5	3	3.0	2	2.0
Normal	1.5 S.D. to -1.5 S.D.	153	76.5	77	77.0	76	76.0
Underweight	<-1.5 S.D. to - 2 S.D.	21	10.5	10	10.0	11	11.0
Malnutrition	<-2 S.D.	5	2.5	1	1.0	4	4.0

In Table 10, using criteria developed by the Ministry of Public Health (Department of Health, Ministry of Public Health ,B.E. 2547), it was shown that high height for age was reported in pre-adolescents in urban (4%) and rural areas (3%), while the stunting was reported in rural (8%) and urban areas (1%). In addition, normal height was found in urban (89%) and rural areas (80%).

Table 10 Nutritional status by height for age among pre-adolescents in urban and rural areas

Nutritional status	Z-score	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
		n	%	n	%	n	%
High height-for-age	>2 S.D.	7	3.5	4	4.0	3	3.0
Begin high height-for-age	2 S.D. to >1.5 S.D.	6	3.0	4	4.0	2	2.0
Normal height	1.5 S.D. to -1.5 S.D.	169	84.5	89	89.0	80	80.0
Begin to stunt	<-1.5 S.D. to - 2 S.D.	9	4.5	2	2.0	7	7.0
Stunting	<-2 S.D.	9	4.5	1	1.0	8	8.0

In Table 11, using criteria developed by the Ministry of Public Health (Department of Health, Ministry of Public Health ,B.E. 2547), it was shown that the obesity was reported in 2% of pre-adolescents in urban and 4% of those in rural areas, while the wasting was reported equaling at 5% in rural and urban areas. In addition, normal nutritional status was found majority of pre-adolescents in urban (66%) and rural areas (73%).

Table 11 Nutritional status by weight for height among pre-adolescents in urban and rural areas

Nutritional status	Z-score	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
		n	%	n	%	n	%
Obesity	>3 S.D.	8	4.0	2	2.0	6	6.0
Begin obesity	3 S.D.to >2 S.D.	12	6.0	8	8.0	4	4.0
Overweight	2 S.D. to >1.5 S.D.	10	5.0	7	7.0	3	3.0
Normal	1.5 S.D.to - 1.5 S.D.	139	69.5	66	66.0	73	73.0
Begin wasting	<- 1.5 S.D. to -2 S.D.	21	10.5	12	12.0	9	9.0
Wasting	<-2 S.D.	10	5.0	5	5.0	5	5.0

Part VI: Hypothesis Testing

Hypothesis 1 stated that "Nutritional knowledge between pre-adolescents in urban and rural areas of Lampang Province is different".

Regarding nutritional knowledge, the mean score and standard deviation among pre-adolescents in urban and rural areas were 9.6 ± 2.7 (ranging from 3-16) and 10.7 ± 3.5 (ranging from 3-17), respectively. Furthermore, the mean score and standard deviation of knowledge on nutrient and nutritional food among pre-adolescents in urban and in rural areas were 3.9 ± 1.5 (ranging from 0-7) and 4.3 ± 1.8 (ranging from 0-7), respectively. For know ledges on healthy food behavior, the mean score and standard deviation among pre-adolescents in urban and rural areas, were 5.8 ± 1.8 (ranging from 2-10) and 6.4 ± 2.0 (ranging from 1-10), respectively.

Comparing the total nutritional knowledge between pre-adolescents in urban and rural areas by using independent t-test, the results showed that there was a statistically significant difference (p= .016). Similarly, there was a significant difference in knowledge on healthy food behavior between pre-adolescents in urban and rural areas (p= .015). However, there was no significant difference in knowledge on nutrient and nutritional food between the pre-adolescents in urban and rural areas (p= .073) (Table 12).

Table 12 Comparison of nutritional knowledge between pre-adolescents in urban and rural areas by Independent t-test

Nutritional knowledge (aspects)	Total (n=200)			Urban areas (n=100)			Rural areas (n=100)			t	p-value
	Mean	S.D.	Min-Max.	Mean	S.D.	Min-Max.	Mean	S.D.	Min-Max.		
Total nutritional knowledge	10.2	3.2	3-17	9.6	2.7	3-16	10.7	3.5	3-17	-2.438	0.016
Knowledge on nutrient and nutritional food	4.1	1.7	0-7	3.9	1.5	0-7	4.3	1.8	0-7	-1.805	0.073
Knowledge on healthy food behavior	6.1	1.9	1-10	5.8	1.8	2-10	6.4	2.0	1-10	-2.446	0.015

Hypothesis 2 stated that “Attitude towards food between pre-adolescents in urban and rural areas of Lampang Province is different”.

Among pre-adolescents in urban and in rural areas, for attitude towards food (total score), the mean score and standard deviation were 13.3 ± 2.5 (ranging from 5-18) and 12.8 ± 2.2 (ranging from 8-17), respectively. Furthermore, the mean score and standard deviation for perception of benefits and consequences of food behavior of pre-adolescents in urban and rural areas were 5.6 ± 1.4 (ranging from 2-8) and 4.9 ± 1.8 (ranging from 2-7), respectively. For belief in food and food value, the mean score and standard deviation among pre-adolescents in urban and rural areas were 7.7 ± 1.8 (ranging from 1-100) and 7.9 ± 1.4 (ranging from 4-10), respectively.

Comparing the total score of attitude towards food between pre-adolescents in urban and those in rural are as using independent t-test ,the results showed that there was no significant difference (p= .158). Similarly, there was no significant difference in belief in food and food value between pre-adolescents in urban and rural areas (p= .459). However, there was a statistically significant difference (p= .001) in perception of benefits and consequences of food behavior between the pre-adolescents in urban and rural areas (Table 13).

Table 13 Comparison of attitude towards food between pre-adolescents in urban and rural areas by Independent t-test

Attitude towards food (aspects)	Total (n=200)			Urban areas (n=100)			Rural areas (n=100)			t	p-value
	Mean	S.D.	Min-Max.	Mean	S.D.	Min-Max.	Mean	S.D.	Min-Max.		
Total attitude towards food	13.0	2.3	5-18	13.3	2.5	5-18	12.8	2.2	8-17	1.418	0.158
Perception of benefits and consequences of food behavior.	5.2	1.4	2-8	5.6	1.4	2-8	4.9	1.8	2-7	3.371	0.001
Belief in food and food value	7.8	1.6	1-10	7.7	1.8	1-10	7.9	1.4	4-10	-0.742	0.459

Hypothesis 3 stated that “Food intake between pre-adolescents in urban and rural areas of Lampang Province is different”.

When analyzing the food intake, the mean score and standard deviation of rice-starchy food group among pre-adolescents in urban and in rural areas were 6.1 ± 1.8 (ranging from 2.5-10.5) and 5.8 ± 2.1 (ranging from 2.6-12.3), respectively. The mean score and standard deviation of vegetables among pre-adolescents in urban and rural areas were 5.0 ± 3.3 (ranging from 0.03-17) and 4.1 ± 2.5 (ranging from 0.9-14), respectively.

For fruits, the total mean score and standard deviation among pre-adolescents in urban and rural areas were 5.4 ± 2.1 (ranging from 1.4-11.3) and 4.1 ± 2.3 (ranging from 0.8-10), respectively. The mean score and standard deviation of milk among pre-adolescents in urban and rural areas were 2.6 ± 1.3 (ranging from 1-12) and 1.6 ± 0.8 (ranging from 0.3-4.1), respectively. In addition, the mean score and standard deviation of meat among pre-adolescents in urban and rural areas were 5.6 ± 2.4 (ranging from 1.3-13) and 5.7 ± 2.5 (ranging from 0.6-14.3), respectively.

The mean score and standard deviation of oil among pre-adolescents in urban and rural areas were 0.9 ± 1.1 (ranging from 0-6) and 0.3 ± 0.3 (ranging from 0-2), respectively. On the other hand for salt, the mean score and standard deviation among pre-adolescents in urban and rural areas were 0.7 ± 0.6 (ranging from 0-3) and 0.7 ± 0.6 (ranging from 0-3), respectively. The mean scores and standard deviation of sugar among pre-adolescents in urban and rural areas were 0.6 ± 0.5 (ranging from 0-2) and 0.5 ± 0.5 (ranging from 0-3), respectively.

For snacks intake, the mean score and standard deviation among pre-adolescents in urban and rural areas were 1.5 ± 0.9 (ranging from 0-4) and 1.2 ± 0.9 (ranging from 0-4), respectively. The mean scores and standard deviation of bakery among pre-adolescents in urban and rural areas were 2.8 ± 1.9 (ranging from 0.09-10.1) and 1.4 ± 0.9 (ranging from 0-4.6), respectively. Lastly, the mean scores and standard deviation of beverages among pre-adolescents in urban and rural areas were 1.0 ± 0.8 (ranging from 0-3) and 0.9 ± 0.7 (ranging from 0-3), respectively. The mean scores and standard deviation of desserts among pre-adolescents in urban and rural areas were 1.3 ± 1.1 (ranging from 0-6) and 1.5 ± 0.9 (ranging from 0.1-4.6), respectively.

Hypothesis 3 was tested by using independent t-test**.** Table 13 showed that there were statistically significant differences in vegetables (p= .026), fruit (p= .000), milk (p= .000), oil (p= .000), snacks (p= .022) and bakery product intake (p= .000) between pre-adolescents in urban and rural areas. However, there was no statistically significant difference in rice-starchy food group (p= .304), meat (p= .964), salt (p= .730), sugar (p= .405), beverages (p= .349) and desserts (p= .223) between pre-adolescents in urban and rural areas (Table 14).

Table 14 Comparison of food intake between pre-adolescents in urban and rural areas by Independent t-test

Food Group	Total (n=200)			Urban areas (n=100)			Rural areas (n=100)			t	p-value
	Mean	S.D.	Min-Max.	Mean	S.D.	Min-Max.	Mean	S.D.	Min-Max.		
1.Rice- starchy food group	6.0	2.0	2.5-12.3	6.1	1.8	2.5-10.5	5.8	2.1	2.6-12.3	1.030	0.304
2. Vegetables	4.5	3.0	0.03-17	5.0	3.3	0.03-17	4.1	2.5	0.9-14	2.264	0.026
3. Fruits	4.8	2.3	0.8-11.3	5.4	2.1	1.4-11.3	4.1	2.3	0.8-10	4.162	0.000
4. Milk	2.1	1.2	0.3-12	2.6	1.3	1-12	1.6	0.8	0.3-4.1	6.101	0.000
5. Meat	5.6	2.4	0.6-14.3	5.6	2.4	1.3-13	5.7	2.5	0.6-14.3	-0.045	0.964
6. Oil	0.9	1.1	0-6	0.9	1.1	0-6	0.3	0.3	0-2	6.252	0.000
7. Salt	0.7	0.6	0-3	0.7	0.6	0-3	0.7	0.6	0-3	0.346	0.730
8. Sugar	0.6	0.5	0-3	0.6	0.5	0-2	0.5	0.5	0-3	0.835	0.405
9.Snacks	1.4	0.9	0-4.1	1.5	0.9	0-4	1.2	0.9	0-4	2.311	0.022
10.Bakery	2.1	1.6	0-10.1	2.8	1.9	0.09-10.1	1.4	0.9	0-4.6	6.868	0.000
11.Beverages	1.0	0.7	0-3.3	1.0	0.8	0-3	0.9	0.7	0-3	0.939	0.349
12.Desserts	1.4	1.0	0-6.1	1.3	1.1	0-6	1.5	0.9	0.1-4.6	-1.221	0.223

Hypothesis 4 stated that "Nutritional status between pre-adolescents in urban and rural areas of Lampang Province is different".

Hypothesis 4 was tested by using Chi-square test. Since, there was a small number in some levels of nutritional status, including "overweight" and "undernutrition". Therefore, "overweight" was combined with "obesity" and "malnutrition" was combined with "underweight". Table 15 illustrated the nutritional status of pre-adolescents between urban and rural areas of Lampang Province. The pre-adolescents in urban and rural areas had overnutrition 12% and 9%, respectively. In addition, the pre-adolescents in urban and rural areas had undernutrition at 15% and 11%, respectively. Majority of the pre-adolescents in urban (77%) and rural areas (76%) were normal nutrition. The Chi-square test revealed that there was no statistically significant difference in nutritional status (weight for age) between pre-adolescents in urban and rural areas (χ^2 =1.050, p =.591).

Table 15 Comparison of nutritional status (weight for age) between pre-adolescents in urban and rural areas by Chi-square test

School	Nutritional status			χ^2	p-value
	Undernutrition n (%)	Normal n (%)	Overnutrition n (%)		
Urban	11(11.0)	77(77.0)	12(12.0)	1.050	0.591
Rural	15(15.0)	76(76.0)	9(9.0)		
Total	26(13.0)	153(76.5)	21(10.5)		

From Table 16, hypothesis 4 was tested by using Chi-square test. Since, there was a small number in some levels of nutritional status, including “begin high height-for-age” and “stunting”. Therefore, “begin high height-for-age” was combined with “high height-for-age” and “stunting” was combined with “begin to stunt”. Table 16 illustrated the nutritional status of pre-adolescents between urban and rural areas of Lampang Province. The pre-adolescents in urban and rural areas had undernutrition at 3% and 15%, respectively. In addition, the pre-adolescents in urban and rural areas had overnutrition at 8% and 5%, respectively. Normal nutrition in urban and rural areas was reported by the higher percentages (89% and 80%, respectively). The Chi-square test revealed that there was a statistically significant difference in nutritional status (height for age) between pre-adolescents in urban and rural areas (χ^2 =9.172, p =.010).

Table 16 Comparison of nutritional status (height for age) between pre-adolescents in urban and rural areas by Chi-square test

School	Nutritional status			χ^2	p-value
	Undernutrition n (%)	Normal n (%)	Overnutrition n (%)		
Urban	3(3.0)	89(89.0)	8(8.0)	9.172	0.010
Rural	15(15.0)	80(80.0)	5(5.0)		
Total	18(9.0)	169(84.5)	13(6.5)		

Comparing a nutritional status (by weight for height) between pre-adolescents in urban and rural areas Lampang Province by using Chi-square test, since there was a small number in some levels of nutritional status, including “begin obesity”, “overweight” and “rather thin”. Therefore, “begin obesity” and “overweight” were combined with “obesity” and “rather thin” was combined with “wasting”. Table 17 illustrated the nutritional status of pre-adolescents between urban and rural areas of Lampang Province. The pre-adolescents in urban and in rural areas had overnutrition at 17% and 14%, respectively. In addition, the pre-adolescents in urban and in rural areas had undernutrition at 17% and 13%, respectively. Normal nutrition in urban and in rural areas were reported by the higher percentages (66% and 73%, respectively). The Chi-square test revealed that there was no statistically significant difference in nutritional status (weight for height) between pre-adolescents in urban and rural areas (χ^2 =1.176, p =.555).

Table 17 Comparison of nutritional status (weight for height) between pre-adolescents in urban and rural areas by Chi-square test

School	Nutritional status			χ^2	p-value
	Undernutrition n (%)	Normal n (%)	Overnutrition n (%)		
Urban	17(17.0)	66(66.0)	17(17.0)	1.176	0.555
Rural	14(14.0)	73(73.0)	13(13.0)		
Total	31(15.5)	139(69.5)	30(15.0)		

CHAPTER V

DISCUSSION

The discussion of this research is organized into four parts: 1) comparison of nutritional knowledge between pre-adolescents in urban and rural areas of Lampang Province; 2) comparison of attitude towards food between pre-adolescents in urban and rural areas of Lampang Province; 3) comparison of food intake between pre-adolescents in urban and rural areas of Lampang Province; and 4) comparison of nutritional status between pre-adolescents in urban and rural areas of Lampang Province.

Comparison of nutritional knowledge between pre-adolescents in urban and rural areas of Lampang Province

Hypothesis 1 stated that "Nutritional knowledge between pre-adolescents in urban and rural areas of Lampang Province is different".

By applying the Independent t-test, the total nutritional knowledge (p= .016) and knowledge on healthy food behavior (p= .015) between pre-adolescents in urban and those in rural areas were statistically significant difference as shown in Table 12. The result was congruent with the results of Kantamit (1995) reported that there was a statistically significant difference in total nutritional knowledge and knowledge on healthy food behavior between pre-adolescents in urban and in rural areas. However, there was no significant difference in knowledge on nutrient and nutritional food between the pre-adolescents in urban and rural areas (p= .073).

The finding of this study showed that more than half of pre–adolescents both in urban and rural areas had low total score on nutritional knowledge, low knowledge on nutrient and nutritional food, and low knowledge on healthy food behavior (Table 6). The result in this study was congruent with the results of Kantamit (1995). The

report showed that students (grade 1-6 within urban and rural areas) had low knowledge on food and nutrition addressing and knowledge on healthy food behavior.

In addition, pre–adolescents in urban areas had lower nutritional knowledge, knowledge on nutrient and nutritional food, and knowledge on healthy food behavior than those in rural areas. A possible reason supporting the finding is that the majority of the pre-adolescents in urban areas (40%) received advice regarding nutritional knowledge from their mother, whereas most of the pre-adolescents in rural areas (40%) received advice from their teachers who had higher education and competence in conveying knowledge compared to the mothers (Table 5). The mother with lower education may not able to select better food for their children and convey their knowledge to their children. Therefore, education may lead to proper food behavior practice (Kearney and et al., 2000). The finding was congruent with a previous study; Virunrach (2002) found that gaining information from teachers was significantly related to food consumption behavior. Because teachers who were the key persons to whom a student pays most respect; teachers were also being closed persons with their students who advised in many things. In conclusion, teachers were important social persons who effected to students' behavior. Moreover, the teachers in urban areas may address more cognitive contents on major subjects (such as Mathematics and English) so that the students can pass the test in higher education.

Comparison of attitude towards food between pre-adolescents in urban areas and rural areas of Lampang Province

Hypothesis 2 stated that "Attitude towards food between pre-adolescents in urban and rural areas Lampang Province is different".

As shown in Table 13, Independent t-test revealed that the total score of attitude towards food between pre-adolescents in urban and those in rural areas has no significant difference (p= .158). Correspondingly, there was no significant difference in belief in food and food value between pre-adolescents in urban and rural areas (p= .459). This may be explained by the reason that the children live in the same environment, same province and also have same customs, tradition and culture, which

can lead the children to have slightly different attitude. They have the belief in food intake which is transferred from their closed surrounding for example, their parents. This may influence their belief, attitude and may lead to their permanent habit in the future.

However, there was a statistically significant difference (p= .001) in perception of benefits and consequences of food behavior between pre-adolescents in urban and rural areas. Pre-adolescents in urban areas had higher score for this aspect of attitude compared to pre-adolescents in rural areas (Table 13). It can be explained that pre-adolescents in urban areas who have low nutritional knowledge may have a good attitude towards food because they realize in perception of benefits and consequences of food behavior. For example, in item 12 of the Attitude towards food questionnaire that asked "Adding monosodium glutamate (MSG) to the food makes it more tasty" and the finding showed that 51% of the pre-adolescents in urban areas whereas 43% of those in rural areas had correct answer. It is possible that the children in rural areas saw their mothers adding MSG while cooking and the food was tasty but they did not perceive the negative consequences of having the MSG.

In addition, the finding in this study was not consistent with a previous study. It is reported that there was a statistically significant difference in total score of attitude towards food and in belief in food and food value and no significant difference in perception of benefits and consequences of food behavior between pre-adolescents in urban and in rural areas (Kantamit,1995).

Comparison of food intake between pre-adolescents in urban and rural areas of Lampang Province

Hypothesis 3 stated that "Food intake between pre-adolescents in urban and rural areas Lampang Province is different".

As shown in Table 14, Independent t-test revealed that there were statistically significant differences in vegetables (p= .026), fruits (p= .000), milk (p= .000), oil (p= .000), snacks (p= .022) and bakery product intake (p= .000) between pre-adolescents in urban and rural areas. As shown in Table 8, the findings illustrated that pre-adolescents in urban areas have average intake of vegetables, fruits, milk, oil, snacks,

and bakery more than pre-adolescents in rural areas. Interestingly, pre-adolescents in urban area had more vegetables and fruits than those in rural areas. It is possibly because their attitude regarding perception of benefits and consequences of food behavior is higher than those in rural areas. However, the pre-adolescents both in urban and rural areas consume vegetables and fruits as in following recommendation set by Thailand Nutrition Flag. The Nutrition Flag stated that the Thai people should have at least three portions of fruits per day and have at least four rice-serving spoons of vegetables per day (Department of Health, Ministry of Public Health, B.E. 2543). In contrast, the Ministry of Public Health (2000) studied health-promoting behavior of students in grade five and six nationwide excluding Bangkok. It was revealed that more than 40.3% of the students did not eat vegetables. It is evident that this food group is currently promoted through media, including television, radio, and poster presentation. In terms of oil consumption, it is less than the recommendation, which is probably due to method of measurement that is under estimation when interviewing the pre-adolescents' intake. Moreover, the researcher directly asked the preadolescents for how many teaspoons of oil they eat per day. In reality, oil is added in food or cooking process which is difficult in terms of estimation.

Regarding snack and bakery, an explanation why it is higher in urban areas is that snack and bakery product intake are more available and the pre-adolescents in urban areas can easily access to them. Moreover, the pre-adolescents in urban areas have better economic status than those in rural areas; they, therefore, can afford the snack and bakery product intake. However, the average intakes of snacks and bakery in both urban and rural pre-adolescents were higher than requirement recommended by the Thailand Nutrition Flag (Department of Health, Ministry of Public Health, B.E. 2543). This can be explained that snack and bakery product intake of pre-adolescents are influenced by westernization. In addition, pre-adolescents always prefer to try the new products with attractive packages from advertising posted by Food Company. This is consistent with a previous study of Itthimaiya, 1990 (cited in Ousaha, 1996) reporting that advertising shots on crispy flavored snacks, soft drinks, and candies have a significant effect on frequency of snack consumption among school age children.

There was no statistically significant difference in rice-starchy food (p= .304), meat (p= .964), salt (p= .730), sugar (p= .405), beverages (p= .349) and desserts (p= .223) between pre-adolescents in urban and rural areas. This maybe because living in similar province results similar food consumption. According to the Thailand Nutrition Flag, pre-adolescents in both in urban and rural areas had rice-starchy food less than eight rice-serving spoons, which is lower than the recommendation. This is partly because the pre-adolescents believe that decreasing the rice-starchy food leads them to be in a good shape. This is congruent with the study from Saena (1997), dietary patterns and nutritive value of food intakes of students in Bangkok Municipal schools in 1985 and 1995. She found that students decreased consumption of rice and dry grains.

Regarding meat, the finding showed that pre-adolescents in urban and pre-adolescents in rural areas had meat less than 6 tablespoons per day, which is lower than the recommendation according to the Thailand Nutrition Flag. This may partly due to their belief in meat consumption that passes on from generation to generation. For example, item 8 of the Attitude towards food questionnaire asked “Having grilled chicken liver prevents us from malnutrition and dark blindness”. Less than 50% of the pre-adolescents in urban (48%) and rural areas (37%) had correct answer.

The findings also illustrated that pre-adolescents both in urban and rural areas had no difference in salt, sugar, beverages, and desserts (Table14). According to the Thailand Nutrition Flag, they had salt (0.7 teaspoon/day) less than the recommendation which is less than or equal to one teaspoon. Similarly, they had less sugar (0.6 teaspoon/day) compared to the recommendation at less than or equal to four teaspoons. However, they had more beverages (one glass/day) and desserts (1.4 cup/day) than the recommendation that suggest not to have these foods (Table14). In general, although beverages and desserts are non-nutritious food, containing high sugar and calories, they are popular foods and children’s preference whether they are in urban or rural areas or not. Therefore, the pre-adolescents had beverages and desserts higher than the recommendation. In terms of salt and sugar that is less than recommendation, it is probably due to under estimation when interviewing the pre-adolescents’ intake. The findings were not congruent with Spyckrelle et al. (1992)

who study food behavior of 200 male adolescents in French. They found that the adolescents had sugar more than recommendation.

Comparison of nutritional status between pre-adolescents in urban and rural areas of Lampang Province

Hypothesis 4 stated that "Nutritional status between pre-adolescents in urban and rural areas Lampang Province is different".

According to Table 15, the Chi-square test revealed that there was no difference in nutritional status (by using weight for age) between pre-adolescents in urban and rural areas. Findings indicate that the numbers of urban and rural pre-adolescents who have undernutrition, normal, and overnutrition are not different. The findings also support that the majority of pre-adolescents in both urban and rural areas did not have acute nutrient deficiency as indicated by weight for age.

However, when using height for age, there was a significant difference in nutritional status between pre-adolescents in urban and rural areas (Table 16). As shown in Table 16, 3% of urban pre-adolescents whereas 15% of rural counterparts were undernutrition, called stunting. This may be due to low milk intake (mean = 1.6 glasses per day) among the rural pre-adolescents compared with the urban counterparts (mean = 2.6 glasses per day). Moreover, it is less than recommendation at $\geq$ 2 glasses per day. In addition, the significant difference in height for age is consistent with the significant difference in milk intake between pre-adolescents in urban and rural areas (Table 14). It is the fact that milk is a major source of calcium and phosphorus that contribute to bone growth, especially for children in the growing years. In this study, height for age was appropriate to identify chronic status for undernutrition in children aged 5-18 years (Department of Health, Ministry of Public Health, B.E. 2542). Evidently, chronic protein and calories deficiencies in children results in impaired skeletal development and shorter height compared to the average children. Therefore, children with short height in a community would reflect the prolonged nutritional problem in the community. The finding in this study is consistent with the finding from a survey of nutritional status among pre-adolescents conducted by the Ministry of Public Health in 1990-1995. Using height for age criteria in the survey, it was found that 17.6% of the pre-adolescents were stunting

(Department of health, Ministry of Public Health, BE.2547). Stunting reported in the survey and the present study is still high and did not meet the goal of the ninth National Economic and Social Development Plan that is aimed to reduce stunting in school children to be less than 5% (Department of Health, Ministry of Public Health, B.E. 2547). Thus, a nutrition program with an emphasis on health promoting behavior to increase protein and milk were needed particularly in rural areas.

As indicated in Table 16, overnutrition is still existed although less than 10% was reported among the pre-adolescents in this study and the rate of overnutrition achieve the goal of the National Economic and Social Development Plan aiming to reduce overnutrition in school children at less than 5% (Department of Health, Ministry of Public Health, B.E. 2547). It is important to monitor nutritional status among this population since traditional food consumption is rapidly effected by the westernization.

According to Table 17, weight for height was used to determine nutritional status with an aim to identify normal-tall children, skinny-tall, and obese-short children. In addition, weight for height is a good indicator for determining both overnutrition and undernutrition. It was found that overnutrition and undernutrition rates were higher when compared with height for age. In this study, overnutrition and undernutrition was reported at 17% of the urban pre-adolescents. Thirteen percent of rural pre-adolescents and 14% of them had overnutrition and undernutrition, respectively (Table 17). Nevertheless, nutritional status between urban and rural pre-adolescents was not statistically different. The finding supported that weight for height is not a suitable indicator to assess chronic nutrient deficiency.

CHAPTER VI

CONCLUSION

The conclusion of this research is presented in the following parts: 1) summary of the study, and 2) recommendation and limitation.

Summary of the Study

This descriptive comparative research was conducted to compare nutritional knowledge, attitude towards food, food intake and nutritional status between pre-adolescents in urban and rural areas of Lampang Province, Thailand.

The data were collected from February 21 to March 03, 2005 including two settings: 1) Ban Pong Sanook School and 2) a kindergarten school (Anuban Wang Neua School).

The total sample size included elementary schools in Lampang. Sample size determination was based on a power analysis (Cohen, 1988). With the level of significant at .05, the effect size of .50 and the power of .90, sample size of pre-adolescents should be 85 for each group. Approximately 10% of sample size was added to substitute incomplete response; therefore total sample size of pre-adolescents was 200, including 100 urban and 100 rural area pre-adolescents who met the following inclusion criteria:

1. Pre-adolescents who enrolled in the fifth and sixth grade in the elementary schools of municipal area and the elementary schools in a 100-Kilometer radius of the municipal area (Wang Neua, and Mae Prik).
2. Pre-adolescents who were able to verbally communicate in Thai.
3. Pre-adolescents who were willing to participate in the study.

Structured and semi-structured interviews with questionnaire and forms were used for data collection. The instrument includes 5 parts.

Part 1 The Personal characteristics

Part 2 The Nutritional knowledge

Part 3 The Attitude towards food

Part 4 The Food intake

Part 5 The Instrument for Nutritional Assessment

Content validity of the instrument was approved by 2 nursing faculties who were experts in nutrition and 1 instructor at an elementary school who taught health course. The reliabilities of instrument in part 2, 3, 4, and part 5 were good. The pilot test was done among 30 pre-adolescents in a kindergarten school (the Anuban Lampang School), which was not the setting in this study but had similar characteristics of the sample. The internal consistency, Kuder-Richardson 20 (KR-20) coefficient for the nutritional knowledge questionnaire and the attitude towards food questionnaire were .94 and .83, respectively. The Correlation coefficient for test-retest reliability of the food intake questionnaire was .81

The data collection procedure included multistage random sampling and sample determination according to Cohen (1988). Structured interview with questionnaire and interview with food intake interview form were used for data collection. The questionnaire was given to the pre-adolescents. All of pre-adolescents completed the questionnaire. Then, the researcher interviewed them by using the food intake interview form and wrote down the data item by item for each pre-adolescent.

The results of the study were as follows:

1. Approximately half of the sample was male. Three-fifth of pre-adolescents in urban and rural areas was 10-12 years old. Buddhism was the religion of all pre-adolescents in urban and rural areas. Regarding the education, the majority of fathers and mothers in urban areas have the highest degree from secondary school and elementary school, respectively. In rural areas, the majority of fathers and mothers graduated from elementary school. For occupation, most of fathers and mothers in urban and rural areas are employee. In urban areas, family income ranged from 1,000 to

55,000 bahts/month whereas in rural areas, family income ranged from 1,000 to 50,000 bahts/month. More than 90 % of pre-adolescents in urban and rural areas had one to three kinsfolk. Most of pre-adolescents in urban and rural areas had 2-5 members in their family. The average daily allowance of pre-adolescents was more than 10 - 20 bahts/day.

2. On average, the total score for nutritional knowledge of pre-adolescents in urban and in rural areas were 9.6 ± 2.7 (ranging from 3-16) and 10.7 ± 3.5 (ranging from 3-17), respectively. Using 60% cut off point at 11, more than half of pre–adolescents in urban areas had low nutritional knowledge whereas approximately half of pre–adolescent in rural areas had high nutritional knowledge. Furthermore, the knowledge on healthy food behavior of pre-adolescents in urban and in rural areas were 5.8 ± 1.8 (ranging from 2-10) and 6.4 ± 2.0 (ranging from 1-10), respectively. There were significant differences in total nutritional knowledge (p= .016) and knowledge on healthy food behavior (p=.015) between pre-adolescents in urban and rural areas.

Knowledge on nutrient and nutritional food among pre-adolescents in urban and rural areas were 3.9 ± 1.5 (ranging from 0-7) and 4.3 ± 1.8 (ranging from 0-7), respectively. However, there was no significant difference in knowledge on nutrient and nutritional food between the pre-adolescents in urban and rural areas (p= .073).

3. On average, the total score for attitude towards food among pre-adolescents in urban and in rural areas were 13.3 ± 2.5 (ranging from 5-18) and 12.8 ± 2.2 (ranging from 8-17), respectively. Using 60% cut off point at 11, most of pre–adolescents in urban and rural areas had good attitude towards food. Furthermore, the belief in food and food value among pre-adolescents in urban and in rural areas were 7.7 ± 1.8 (ranging from 1-100) and 7.9 ± 1.4 (ranging from 4-10), respectively. There were no significant difference in total score for attitude towards food (p= .158) and belief in food and food value (p= .459) between pre-adolescents in urban and rural areas.

Perception of benefits and consequences of food behavior of pre-adolescents in urban and rural areas were 5.6 ± 1.4 (ranging from 2-8) and 4.9 ± 1.8 (ranging from 2-7), respectively. There was a statistically significant difference in perception of benefits and consequences of food behavior between the pre-adolescents in urban and rural areas (p= .001).

4. On average, most of pre-adolescents in urban and rural areas had rice-starchy food less than eight rice-serving spoons. Approximately half of pre-adolescents in urban areas and less than half of those in rural areas had vegetables for four rice-serving spoons or more per day. Most of pre-adolescents in urban and in rural areas had fruits more than or about three portions per day. Most of pre-adolescents in urban areas drank milk more than two glasses per day whereas most of pre-adolescents in rural areas drank milk less than two glasses per day. Three-fifth of pre-adolescents in urban and rural areas had meat less than six tablespoons per day. More than 90% of pre-adolescents in urban and rural areas had oil, salt, and sugar intake that met the requirement per day. In addition, more than 95% of pre-adolescents in urban and rural areas had snacks, bakery, beverages and desserts daily.

Regarding food intake, there were statistically significant differences in vegetables (p= .0258), fruits (p= .000), milk (p= .000), oil (p= .000), snacks (p= .022) and bakery product intake (p= .000) between pre-adolescents in urban and rural areas. However, there was no statistically significant difference in rice-starchy food group (p= .304), meat (p= .964), salt (p= .730), sugar (p= .405), beverages (p= .349) and desserts (p= .223) between these 2 groups.

5. On average, using weight for age, nutritional status between pre-adolescents in urban and rural areas was not statistically different (χ^2 =1.050, p =.591). About 12% of pre-adolescents in urban and 9% of those in rural areas had overnutrition. Approximately 11% of pre-adolescents in urban and 15% of those in rural areas had undernutrition. In addition, most of pre-adolescents in urban (77%) and rural areas (76%) had normal weight (normal nutritional status).

Similarly, using weight for height, nutritional status between pre-adolescents in urban and rural areas was not statistically different (χ^2 =1.176, p =.555). About 17% of pre-adolescents in urban and 13% of those in rural areas had overnutrition. Approximately 17% of pre-adolescents in urban and 14% of those in rural areas had undernutrition. In addition, most of pre-adolescents in urban (89%) and rural areas (80%) had normal weight (normal nutritional status).

In contrast, using height for age, nutritional status between pre-adolescents in urban and rural areas was a statistically different (χ^2 =9.172, p =.010). It was shown that 8% of pre-adolescents in urban whereas 5% of those in rural areas had overnutrition.

There were 3% in urban whereas 15% in rural areas of pre-adolescents were undernutrition. Most of pre-adolescents in urban (89%) and rural areas (80%) had normal nutritional status.

Recommendations

Nursing practice

1. According to the results in this study, the overall nutritional knowledge of the pre-adolescents in urban areas was quite low. Community health nurses could collaborate with a school or a community in urban areas by providing education on nutrition or nutrition program to enhance knowledge in many different approaches such as group discussion, food game, vocal public announcement, and promotion for healthy behavior using the Thailand Nutrition Flag, health exhibition, leaflet, poster illustration and videotape playing.

2. Monitoring nutritional status is also recommended since the results in this study showed that the stunting was reported in pre-adolescents particularly in rural areas. Advice addressing the importance of the undernutrition problems as well as approaches to the solutions should be given to pre-adolescents and their family. In addition, continuous evaluation afterward should be made in order to see whether or not the nutritional status improvement.

3. Promoting healthy food behavior using the Thailand Nutrition Flag is recommended. The results in this study indicated that pre-adolescents had rice-starchy food and meat group less than the recommendation level whereas they had snacks, bakery, beverages and desserts daily, non-nutritious foods containing high calories, which are not recommended. As a result, school health should be paid closely attention on pre-adolescents' food behavior. Encouraging health exhibition or food contest for pre-adolescents who have appropriate food behavior is recommended in order to enhance their attitude towards food and food behavior.

4. Regarding school health, community health nurses should collaborate with multidisciplinary team such as school's administrators and nutritionists to promote food behavior. Nutrition programs such as school lunch program and school milk program should be supported. In addition, variety of food should be provided for the pre-adolescents and quality of food should be effectively controlled.

Nursing research

1. A future study could be replicated by using the Thailand Nutrition Flag in other provinces that reported nutritional problems as a priority.

2. An intervention study could be conducted since the ninth National Economic and Social Development Plan has policy to address issues concerning health promotion and promote health as well as prevent health problems.

3. A future research should be conducted with more complicated concepts and more integrated methodologies, such as the causal analysis study that can predict and explain factors influencing food intake and nutritional status.

Health education

1. The results in this study revealed that the pre-adolescents in urban areas had low nutritional knowledge, knowledge on nutrient and nutritional food, and knowledge on healthy food behavior. A Curriculum development for a relevant course such as health education that incorporates body of nutritional knowledge, knowledge on nutrient and nutritional food, and knowledge on healthy food behavior should be considered. The Ministry of Education should consider preventive approach to health. Emphasizing information on the Thailand Nutrition Flag could help pre-adolescents learn how they can have food properly.

2. Teaching and learning process should be actively implemented with an emphasis on cognitive domain and its application, providing pre-adolescents adequate understanding to start improving their food behavior on their own. In addition, there should be an activity for pre-adolescents in each classroom for example, setting up a health and food/nutrition corner in the classroom. Teacher could also encourage a group activity related to food problems due to inappropriate food behavior or undernutrition or set up a group for researching and discussing about their local foods. This would give the best improvement on food behavior since pre-adolescents could discuss and share from what they have learnt and experienced.

3. Regarding attitude towards food, most of pre-adolescents had good attitude towards food, however some of them had poor attitude towards food. Therefore, teachers must have a strategy to promote positive attitude towards food among pre-adolescents.

4. Each school in any setting should motivate and provide any kind of knowledge such as booklets or brochures to pre-adolescents for practicing nutrition and health promotion. With this approach, pre-adolescents can read and learn by themselves at any time.

Limitations

1. Generalizability was limited to pre-adolescents in elementary schools in Lampang Province.

2. There may be an error due to data collection process. The researcher matched the two pre-adolescents together when interviewing the food intake with interview form. It is possibly lead the pre-adolescents to respond to the questions similarly.

3. During data collection procedure, some pre-adolescents had short concentration while responding to the questionnaire and form and did not pay much attention in the data collection procedure.

4. Assessing food intake with the food intake interview form used in this study was limited and it was under estimated for some food items that needed details in terms of estimation such as some ingredients (sugar, salt, and oil). In addition, some non-seasonal food was missing in the completion of the form since there are many kinds of Thai food to be recorded. This might increase an error.

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APPENDIX

Appendix A

The Personal characteristic questionnaire

แบบสอบถามข้อมูลทั่วไปเกี่ยวกับนักเรียน

คำชี้แจง แบบสอบถามส่วนนี้มีวัตถุประสงค์เพื่อทราบข้อมูลส่วนตัวของนักเรียนสำหรับนำไปใช้ประกอบการศึกษาเกี่ยวกับพฤติกรรมการบริโภคอาหารและภาวะโภชนาการของนักเรียน โดยจะรวบรวมจากการสอบถามนักเรียนและจากการประเมินโดยการชั่งน้ำหนักและวัดส่วนสูง โดยนักเรียนจะต้องเติมคำลงในช่องว่างหรือทำเครื่องหมาย X ทับข้อที่ตรงกับข้อมูลส่วนตัวของนักเรียนให้ครบทุกข้อคำถาม ดังนี้

วันเดือนปีที่สัมภาษณ์.....

1. ชื่อนักเรียน.....นามสกุล.....โรงเรียน.....
2. เพศ.... ก. ชาย ข. หญิง
3. วันเดือนปีเกิด .....
4. อายุ .....ปี.....เดือน
5. น้ำหนัก.....กิโลกรัม
6. ส่วนสูง.....เซนติเมตร
7. โรคประจำตัวหรือการเจ็บป่วยของนักเรียนที่เป็นบ่อย.....
8. อายุของบิดา/ผู้ปกครอง.....ปี
9. อายุของมารดา.....ปี
10. ครอบครัวนับถือศาสนา
    - ก. พุทธ ข. คริสต์
    - ค. อิสลาม ง. อื่นๆ
11. ระดับการศึกษาของบิดา/ผู้ปกครอง
    - ก. ไม่ได้เรียน ข. ประถมศึกษาปีที่.....
    - ค. มัธยมศึกษาปีที่..... ง. อนุปริญญา.....
    - จ. ปวช. ชั้นปีที่..... ฉ. ปวส. ชั้นปีที่.....
    - ช. ปริญญาตรีหรือสูงกว่า.....
12. ระดับการศึกษาของมารดา
    - ก. ไม่ได้เรียน ข. ประถมศึกษาปีที่.....
    - ค. มัธยมศึกษาปีที่..... ง. อนุปริญญา.....
    - จ. ปวช. ชั้นปีที่..... ฉ. ปวส. ชั้นปีที่.....
    - ช. ปริญญาตรีหรือสูงกว่า.....

13. อาชีพของบิดา/ผู้ปกครอง

ก. รับจ้าง ข. ค้าขาย

ค. เกษตรกร ง. รัฐวิสาหกิจ

จ. รับราชการ ฉ. อื่นๆ ระบุ.....

14. อาชีพของมารดา

ก. รับจ้าง ข. ค้าขาย

ค. เกษตรกร ง. รัฐวิสาหกิจ

จ. รับราชการ ฉ. แม่บ้าน

ช. อื่นๆ ระบุ.....

15. รายได้ของครอบครัว(คิดรวมทั้งบิดาและมารดา).....บาท/เดือน

16. จำนวนพี่น้อง.....คน

17. พี่คนโตอายุ.....ปี , น้องคนสุดท้องอายุ.....ปี

18. จำนวนสมาชิกที่อาศัยอยู่ภายในครอบครัว.....คน

19. นักเรียนได้รับเงินไปโรงเรียน.....บาท/วัน

20. นักเรียนนำเงินที่ได้รับมาโรงเรียนซื้ออะไรรับประทานบ้าง
เรียงลำดับสิ่งที่ซื้อเป็นประจำ 3 อันดับ (เรียงลำดับ1, 2, 3)

.....ขนมถุงกรอบแกรบ ..... น้ำอัดลม, น้ำหวาน

..... น้ำผลไม้ ..... ลูกอม

..... ของทอด, ปิ้ง, ย่าง เช่น ลูกชิ้นปิ้ง, ไส้กรอกทอด

..... ผลไม้สด ..... ผลไม้ดอง

..... ขนมปัง, แซนวิช, โดนัท ..... มาม่า

.....ไอศกรีม ..... อื่นๆระบุ.....

21. นักเรียนได้รับคำแนะนำเกี่ยวกับการรับประทานอาหารบ้างหรือไม่

( ) ไม่เคย

( ) เคย โดยได้รับคำแนะนำจากใครมากที่สุด 3 ลำดับ (เรียงลำดับ1, 2, 3)

..... คุณครู

..... คุณพ่อ

..... คุณแม่

..... พยาบาล

..... แพทย์

..... เพื่อน

..... โทรทัศน์

..... สื่อโฆษณาต่างๆ เช่น ใบปลิว

..... อื่นๆ ระบุ.....

22. ใครเป็นผู้ดูแลและจัดเตรียมอาหารให้นักเรียนรับประทานที่บ้าน

( ) คุณพ่อ ( ) คุณแม่ ( ) อื่นๆ ระบุ.....

23. ส่วนใหญ่อาหารที่รับประทานที่บ้าน

ก. ทำรับประทานเอง ข. ซื้อมาจากร้านค้า

ค. อื่นๆ ระบุ.....

24. นักเรียนรับประทานอาหารวันละกี่มื้อ

ก. 1 มื้อ ข. 2 มื้อ

ค. 3 มื้อ ง. 4 มื้อ

จ. 5 มื้อ ฉ. อื่นๆ.....มื้อ

25. นักเรียนได้รับประทานอาหารมื้อเช้าหรือไม่

ก. ไม่รับประทาน ข. รับประทาน

26. นักเรียนได้รับประทานอาหารมื้อกลางวันหรือไม่

ก. ไม่รับประทาน ข. รับประทาน

27. นักเรียนได้รับประทานอาหารมื้อเย็นหรือไม่

ก. ไม่รับประทาน ข. รับประทาน

Appendix B

The Nutritional knowledge questionnaire

แบบสอบถามความรู้เกี่ยวกับการบริโภคอาหาร

<u>คำชี้แจง</u> ให้นักเรียนเขียนเครื่องหมาย X ทับตัวอักษร ก ข ค หรือ ง ของแต่ละข้อที่เห็นว่าเป็นคำตอบที่ถูกต้องที่สุด เพียงคำตอบเดียวลงในแบบสอบถามฉบับนี้

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1. อาหารชุดใดให้โปรตีนทั้งหมด
   - ก. ถั่วพู ไข่
   - ข. ผักบุ้ง เนื้อเป็ด
   - ค. ถั่วฝักยาว มันหมู
   - ง. ถั่วเหลือง เนื้อไก่
2. อาหารชนิดใดให้สารอาหารแตกต่างจากข้ออื่น
   - ก. ถั่วแดง
   - ข. มันแกว
   - ค. ข้าว
   - ง. มันเทศ
3. หากไม่สามารถซื้อเนื้อสัตว์รับประทานได้ นักเรียนจะเลือกซื้ออาหารในข้อใด
   - ก. เผือก
   - ข. ถั่วดำ
   - ค. ฟักทอง
   - ง. ข้าวโพด
4. ถ้านักเรียนไม่รับประทานผักอาจจะทำให้มีอาการอะไร
   - ก. ท้องผูก
   - ข. เหน็บชา
   - ค. แผลในปาก
   - ง. เลือดออกตามไรฟัน
5. ถ้านักเรียนไม่รับประทานผักและผลไม้ที่มีสีเหลือง เช่น ฟักทอง มะละกอสุก จะทำให้มีปัญหาต่อสุขภาพอย่างไร
   - ก. เป็นแผลที่มุมปาก
   - ข. มีเลือดออกตามไรฟัน
   - ค. มองเห็นไม่ชัดเวลากลางคืน
   - ง. เวลามีบาดแผลเลือดจะไหลไม่หยุด

6. นักเรียนควรดื่มน้ำอย่างน้อยวันละกี่แก้ว
   ก. 1-3 แก้ว
   ข. 4-6 แก้ว
   ค. 6-8 แก้ว
   ง. 9-11 แก้ว
7. อาหารมื้อเช้าที่นักเรียนควรเลือกรับประทานเพื่อให้ได้คุณค่าอาหารครบทั้ง 5 หมู่คือข้อใด
   ก. นมสด
   ข. มาม่าต้ม
   ค. ข้าว ไข่ดาว
   ง. ข้าว ผัดผักใส่ไก่
8. ถ้านักเรียนไม่อยากเป็นโรคโลหิตจาง ควรรับประทานอาหารประเภทใด
   ก. นม ไส้หมู
   ข. ถั่วแดง กระเพาะหมู
   ค. ผักใบเขียว ตับหมู
   ง. เต้าหู้ขาว หัวใจหมู
9. เพื่อไม่ให้เกิดอาการเลือดไหลไม่หยุดเวลามีบาดแผล นักเรียนควรรับประทานอาหารในข้อใด
   ก. ผักกาดหอม กะหล่ำปลี
   ข. ผักกาดขาว แตงกวา
   ค. หัวไชเท้า เห็ดฟาง
   ง. ถั่วงอก หน่อไม้
10. ถ้านักเรียนอยากมีฟันแข็งแรง ควรเลือกรับประทานอาหารในข้อใด
   ก. นมสด
   ข. น้ำแตงโม
   ค. นมข้นหวาน
   ง. น้ำแครอท
11. เพื่อป้องกันอาการท้องผูก นักเรียนควรเลือกรับประทานอาหารในข้อใด
   ก. ลาบเนื้อ
   ข. ต้มยำไก่
   ค. ผัดเผ็ดปลาดุก
   ง. แกงส้มมะละกอ
12. อาหารที่นักเรียนไม่ควรเลือกรับประทานคือข้อใด
   ก. ก๋วยเตี๋ยวราดหน้า
   ข. ก๋วยเตี๋ยวเนื้อลูกชิ้นเด้ง
   ค. ข้าวเหนียว ส้มตำ ไก่ย่าง

ง. บะหมี่กึ่งสำเร็จรูปต้มใส่ผักใส่ไข่

13. ข้อใดเป็นอาหารและเครื่องดื่มที่เหมาะสมกับนักเรียน
    ก. ก๋วยเตี๋ยว น้ำโค้ก
    ข. ข้าวผัดใส่ไข่ ไวตามิลค์
    ค. ข้าวเหนียว ไก่ย่าง แป๊ปซี่
    ง. ขนมจีน แกงไก่ น้ำส้มแฟนต้า
14. ในช่วงฤดูร้อนที่มีโรคอุจจาระร่วงระบาด นักเรียนควรเลือกซื้ออาหารในข้อใด
    ก. ขนมจีนน้ำยา
    ข. ก๋วยเตี๋ยวลูกชิ้นเนื้อเปื่อย
    ค. ข้าวน้ำพริก ผักดอง
    ง. ข้าวเหนียว ส้มตำ
15. เพื่อป้องกันเลือดออกตามไรฟัน นักเรียนควรเลือกรับประทานผลไม้ในข้อใด
    ก. ฝรั่ง
    ข. ขนุน
    ค. ทุเรียน
    ง. มะม่วง
16. เด็กในวัยเจริญเติบโตควรรับประทานอาหารชนิดใดให้มาก
    ก. ข้าว
    ข. เนื้อสัตว์,ไข่,นม
    ค. ผลไม้
    ง. ผัก
17. ในข้อใดต่อไปนี้ใครเลือกรับประทานอาหารที่ได้ประโยชน์ครบหมู่<u>มากที่สุด</u>
    ก. ด.ช. แดงรับประทานขนมจีน ส้มตำ
    ข. ด.ช. เขียวรับประทานบะหมี่กึ่งสำเร็จรูปต้มใส่ผัก
    ค. ด.ญ. ส้มรับประทานข้าวเหนียวมูลหน้าสังขยา ไก่ย่าง
    ง. ด.ญ. เหลืองรับประทานข้าวมันไก่ น้ำซุปฟัก
18. ในช่วงที่อากาศหนาวนักเรียนจะเลือกรับประทานอาหารในข้อใดที่มีประโยชน์ต่อสุขภาพ<u>มากที่สุด</u>
    ก. ข้าวเหนียว ส้มตำ
    ข. ข้าวต้ม ปลาเค็ม
    ค. บะหมี่กึ่งสำเร็จรูปต้มใส่ผัก
    ง. ข้าว ผัดถั่วฝักยาวใส่กุ้ง

Appendix C

The Attitude towards food questionnaire

แบบสอบถามทัศนคติเกี่ยวกับการบริโภคอาหาร

<u>คำชี้แจง</u> ให้นักเรียนเขียนเครื่องหมาย √ ในช่องของแต่ละข้อที่ตรงกับความคิดเห็นของนักเรียนมากที่สุด เพียงข้อละคำตอบเดียว

ข้อความ	เห็นด้วย	ไม่เห็นด้วย
1. รับประทานผัก ผลไม้มีประโยชน์มากกว่ารับประทานวิตามินเม็ด		
2. รับประทานไข่ทำให้แผลกลายเป็นแผลเป็น		
3. รับประทานเม็ดฝรั่ง เม็ดมะเขือ ทำให้เกิดโรคไส้ติ่งอักเสบได้		
4. นมเป็นอาหารมื้อเช้าที่เพียงพอสำหรับเด็ก		
5. รับประทานไข่ดิบจะเพิ่มพลังมากกว่ารับประทานไข่ที่ต้มสุกแล้ว		
6. รับประทานอาหารที่หวานมากจะทำให้เป็นโรคเบาหวาน		
7. เคี้ยวหมากฝรั่งช่วยบริหารฟัน		
8. รับประทานตับไก่ปิ้งทำให้ไม่เป็นโรคตาฟางและตานขโมย		
9. ดื่มน้ำอัดลมเป็นประจำทำให้อ้วนได้		
10. แหนมดิบมีรสชาติดีกว่าแหนมที่ปรุงสุก		
11. เมื่อเข้าสู่วัยรุ่น ผู้หญิงควรรับประทานอาหารให้น้อยลงเพื่อรักษาทรวดทรง		
12. ใส่ผงชูรสในอาหารทำให้อาหารอร่อยขึ้น		
13. หวานเย็นเป็นของหวานที่เหมาะสำหรับเด็ก		
14. การอดอาหารเป็นวิธีลดน้ำหนักที่ดี		
15. รับประทานผักบุ้งทำให้ตาหวาน		
16. รับประทานถั่วเขียวต้มน้ำตาลแก้ร้อนในได้		
17. รับประทานมะเขือเทศทำให้ผิวสวย		
18. รับประทานมาม่ากรอบแทนอาหารมื้อหลักได้		
19. รับประทานขนมถุงสำเร็จรูปแสดงถึงความเป็นคนทันสมัย		

Appendix D

The food intake interview form

แบบสัมภาษณ์เกี่ยวกับความถี่ของอาหารที่บริโภค

คำชี้แจง ให้นักเรียนตอบจำนวนขนาดอาหารแต่ละชนิดที่รับประทานเป็นประจำ โดยกะปริมาณเทียบกับขนาดส่วนอาหารที่กำหนดให้ และถ้านักเรียนไม่เคยรับประทานอาหารชนิดนั้นเลยให้บอกผู้วิจัยว่าไม่เคยรับประทานอาหารชนิดนั้นเลยและถ้ามีรายการอาหารอื่นๆนอกเหนือจากที่ระบุในแบบสัมภาษณ์นี้ให้บอกผู้วิจัยเพื่อเพิ่มเติมลงในช่องอื่นๆ โดยผู้วิจัยจะเป็นผู้บันทึกแบบสัมภาษณ์ด้วยตนเอง

รายการอาหาร	ขนาดส่วนอาหาร	ความถี่ในการรับประทานอาหาร			
		จำนวน/วัน	จำนวน/สัปดาห์	จำนวน/เดือน	ไม่ได้รับประทาน
ข้าว แป้ง ธัญพืช					
ข้าว	1 ทัพพี				
ก๋วยเตี๋ยวน้ำ, แห้ง	1 ชาม				
ขนมจีน	1 จาน				
ขนมปัง	1 แผ่น				
เผือกต้ม,มันต้ม	2 ชิ้น ขนาด 1”x 2” (1 ทัพพี)				
ข้าวโพด	1 ฝักขนาดกลาง				
ผัก					
ผักบุ้ง	1 ทัพพี				
คะน้า	1 ทัพพี				
กะหล่ำปลี	1 ทัพพี				
ฟักทอง	1 ทัพพี				
มะเขือเทศ	1 ลูก				
ตำลึง	1 ทัพพี				

รายการอาหาร	ขนาดส่วนอาหาร	ความถี่ในการรับประทานอาหาร			
		จำนวน/วัน	จำนวน/สัปดาห์	จำนวน/เดือน	ไม่ได้รับประทาน
ผักกาดขาว	1 ทัพพี				
เห็ด	1 ทัพพี				
แตงกวา	1 ทัพพี				
อื่นๆ.....					
ผลไม้					
ส้ม	1 ผลขนาดกลาง (1 ส่วน)				
ฝรั่ง	1/2 ผลขนาดกลาง (1 ส่วน)				
สับปะรด	6-8 ชิ้น (1 ส่วน)				
มะละกอ	6-8 ชิ้น (1 ส่วน)				
กล้วย	1 ผล (1 ส่วน)				
มะม่วงดิบ	1/2 ผลขนาดกลาง (1 ส่วน)				
มะม่วงสุก	1/2 ผลขนาดกลาง (1 ส่วน)				
อื่นๆ.....					
นม					
นมรสจืด UHT	1 แก้ว (140 cc.)				
นมที่มีรสหวาน (สตรอเบอรี่, ช็อคโกแลต, ไมโล, โอวัลติน UHT)	1 แก้ว (140 cc.)				
นมเปรี้ยว	1 แก้ว (140 cc.)				

รายการอาหาร	ขนาดส่วนอาหาร	ความถี่ในการรับประทานอาหาร			
		จำนวน/วัน	จำนวน/สัปดาห์	จำนวน/เดือน	ไม่ได้รับประทาน
เนื้อสัตว์					
เนื้อหมู/เนื้อไก่/เนื้อวัว	1ช้อนกินข้าว				
ปลา	1ช้อนกินข้าว				
อาหารทะเล (กุ้ง,หอย, ปลาหมึก,ปู)	1 ช้อนกินข้าว				
ไข่	1ฟอง (2ช้อนกินข้าว)				
เต้าหู้	1 ช้อนกินข้าว				
ไขมัน, น้ำตาล, เกลือ					
มาการีน, เนย	1 ช้อนชา				
กะทิ (จากแกงเผ็ด)	3 ช้อนกินข้าว				
น้ำตาล	4 ช้อนชา				
เกลือ	1 ช้อนชา				
ขนมขบเคี้ยวและอาหารว่าง					
ขนมกรุบกรอบ (คอนเน่, เลย์, ฮานามิ ฯลฯ)	1 ถุง (5 บาท)				
เค้ก, ขนมปังไส้ต่างๆ	40 กรัม (1 ชิ้น ขนาด ½"x2")				
คุกกี้	20 กรัม (4 ชิ้น)				
พาย, กะหรี่พัฟ, โดนัท	40 กรัม (1 ชิ้น)				
ปลาแผ่นอบ (ทาโร่,เบนโตะ)	1 ถุง (5 บาท)				
ซาลาเปาไส้ต่าง ๆ	1 ลูกเล็ก				
เวเฟอร์ (คิทแคท, เซียงไฮ)	2 ชิ้น				
เยลลี่ (ปีโป้)	3 ถ้วยเล็ก				

รายการอาหาร	ขนาดส่วนอาหาร	ความถี่ในการรับประทานอาหาร			
		จำนวน/วัน	จำนวน/สัปดาห์	จำนวน/เดือน	ไม่ได้รับประทาน
ชอคโกแลต	2 ชิ้น (ขนาด 3x2 ซม.)				
ลูกอม, ทอฟฟี่	3 เม็ด				
ไอศกรีม	65 กรัม (1 แท่ง,1ถ้วย)				
ขนมหวาน เช่น ซาหริ่ม, ลอดช่อง, บัวลอย, ขนมถ้วย, เฉาก๊วย	1 ถ้วย				
อื่นๆ.....					
เครื่องดื่ม					
น้ำอัดลม (โค้ก, เป๊ปซี่, สไปรท์)	1 ขวด (280 cc.)				
เครื่องดื่มที่มีน้ำตาล (น้ำแดง, น้ำหวาน)	1 แก้ว (200 cc.)				
อื่น ๆ					
แฮมเบอร์เกอร์	1 ชิ้น				
พิซซ่า	2 ชิ้น (1 ถาดกลาง)				

Appendix E

List of Expert for instrument validity

The content validity of all questionnaires was determined by three experts include:

1. Assistant Professor Somboon Jaiyavat
   Faculty of Medicine, Ramathibodi Hospital, Mahidol University

2. Lecturer Streerut Thadakant
   Faculty of Medicine, Ramathibodi Hospital, Mahidol University

3. Mrs. Nongnoot Sriparn
   Ban Pong Sanook School, Lampang

Appendix F

Number and percentage on each item of nutritional knowledge

Item	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	True n (%)	False n (%)	True n (%)	False n (%)	True n (%)	False n (%)
1.อาหารชุดใดให้โปรตีนทั้งหมด	117 (58.5%)	83 (41.5%)	56 (56%)	44 (44%)	61 (61%)	39 (39%)
2.อาหารชนิดใดให้สารอาหารแตกต่างจากข้ออื่น	59 (29.5%)	141 (70.5%)	16 (16%)	84 (84%)	43 (43%)	57 (57%)
3.หากไม่สามารถซื้อเนื้อสัตว์รับประทานได้ นักเรียนจะเลือกซื้ออาหารในข้อใด	55 (27.5%)	145 (72.5%)	25 (25%)	75 (75%)	30 (30%)	70 (70%)
4.ถ้านักเรียนไม่รับประทานผักอาจจะทำให้มีอาการอะไร	118 (59%)	82 (41%)	45 (45%)	55 (55%)	73 (73%)	27 (27%)
5.ถ้านักเรียนไม่รับประทานผักและผลไม้ที่มีสีเหลือง เช่น ฟักทอง มะละกอสุก จะทำให้มีปัญหาต่อสุขภาพอย่างไร	55 (27.5%)	145 (72.5%)	28 (28%)	72 (72%)	27 (27%)	73 (73%)
6.นักเรียนควรดื่มน้ำอย่างน้อยวันละกี่แก้ว	141 (70.5%)	59 (29.5%)	75 (75%)	25 (25%)	66 (66%)	34 (34%)
7.อาหารมื้อเช้าที่นักเรียนควรเลือกรับประทานเพื่อให้ได้คุณค่าอาหารครบทั้ง 5 หมู่คือข้อใด	132 (66%)	68 (34%)	63 (63%)	37 (37%)	69 (69%)	31 (31%)
8.ถ้านักเรียนไม่อยากเป็นโรคโลหิตจางควรรับประทานอาหารประเภทใด	143 (71.5%)	57 (28.5%)	69 (69%)	31 (31%)	74 (74%)	26 (26%)
9.เพื่อไม่ให้เกิดอาการเลือดไหลไม่หยุดเวลามีบาดแผล นักเรียนควรรับประทานอาหารในข้อใด	57 (28.5%)	143 (71.5%)	36 (36%)	64 (64%)	21 (21%)	79 (79%)
10.ถ้านักเรียนอยากมีฟันแข็งแรง ควรเลือกรับประทานอาหารในข้อใด	158 (79%)	42 (21%)	77 (77%)	23 (23%)	81 (81%)	19 (19%)
11.เพื่อป้องกันอาการท้องผูก นักเรียนควรเลือกรับประทานอาหารในข้อใด	139 (69.5%)	61 (30.5%)	69 (69%)	31 (31%)	70 (70%)	30 (30%)
12.อาหารที่นักเรียนไม่ควรเลือกรับประทานคือข้อใด	100 (50%)	100 (50%)	44 (44%)	56 (56%)	56 (56%)	44 (44%)

Number and percentage on each item of nutritional knowledge (continued)

Item	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	True n (%)	False n (%)	True n (%)	False n (%)	True n (%)	False n (%)
13.ข้อใดเป็นอาหารและเครื่องดื่มที่เหมาะสมกับนักเรียนเหมาะสมกับนักเรียน	152 (76%)	48 (24%)	78 (78%)	22 (22%)	74 (74%)	26 (26%)
14.ในช่วงฤดูร้อนที่มีโรคอุจจาระร่วงระบาด นักเรียนควรเลือกซื้ออาหารในข้อใด	127 (63.5%)	73 (36.5%)	62 (62%)	38 (38%)	65 (65%)	35 (35%)
15.เพื่อป้องกันเลือดออกตามไรฟัน นักเรียนควรเลือกรับประทานผลไม้ในข้อใด	59 (29.5%)	141 (70.5%)	19 (19%)	81 (81%)	40 (40%)	60 (60%)
16.เด็กในวัยเจริญเติบโตควรรับประทานอาหารชนิดใดให้มาก	144 (72%)	56 (28%)	68 (68%)	32 (32%)	76 (76%)	24 (24%)
17.ในข้อใดต่อไปนี้ใครเลือกรับประทานอาหารที่ได้ประโยชน์ครบหมู่มากที่สุด	165 (82.5%)	35 (17.5%)	80 (80%)	20 (20%)	85 (85%)	15 (15%)
18.ในช่วงที่อากาศหนาวนักเรียนจะเลือกรับประทานอาหารในข้อใดที่มีประโยชน์ต่อสุขภาพมากที่สุด	109 (54.5%)	91 (45.5%)	51 (51%)	49 (49%)	58 (58%)	42 (42%)

Appendix G

Number and percentage on each item of attitude towards food

Item	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	True n (%)	False n (%)	True n (%)	False n (%)	True n (%)	False n (%)
1.รับประทานผัก ผลไม้มีประโยชน์มากกว่ารับประทานวิตามินเม็ด	186 (93%)	14 (7%)	96 (96%)	4 (4%)	90 (90%)	10 (10%)
2.รับประทานไข่ทำให้แผลกลายเป็นแผลเป็น	135 (67.5%)	65 (32.5%)	74 (74%)	26 (26%)	61 (61%)	39 (39%)
3.รับประทานเม็ดฝรั่ง เม็ดมะเขือ ทำให้เกิดโรคไส้ติ่งอักเสบได้	143 (71.5%)	57 (28.5%)	75 (75%)	25 (25%)	68 (68%)	32 (32%)
4.นมเป็นอาหารมื้อเช้าที่เพียงพอสำหรับเด็ก	87 (43.5%)	113 (56.5%)	49 (49%)	51 (51%)	38 (38%)	62 (62%)
5.รับประทานไข่ดิบจะเพิ่มพลังมากกว่ารับประทานไข่ที่ต้มสุกแล้ว	178 (89%)	22 (11%)	88 (88%)	12 (12%)	90 (90%)	10 (10%)
6.รับประทานอาหารที่หวานมากจะทำให้เป็นโรคเบาหวาน	173 (86.5%)	27 (13.5%)	86 (86%)	14 (14%)	87 (87%)	13 (13%)
7.เคี้ยวหมากฝรั่งช่วยบริหารฟัน	62 (31%)	138 (69%)	40 (40%)	60 (60%)	22 (22%)	78 (78%)
8.รับประทานตับไก่ปิ้งทำให้ไม่เป็นโรคตาฟางและตานขโมย	85 (42.5%)	115 (57.5%)	48 (48%)	52 (52%)	37 (37%)	63 (63%)
9.ดื่มน้ำอัดลมเป็นประจำทำให้อ้วนได้	140 (70%)	60 (30%)	74 (74%)	26 (26%)	66 (66%)	34 (34%)
10.แหนมดิบมีรสชาติดีกว่าแหนมที่ปรุงสุก	163 (81.5%)	37 (18.5%)	80 (80%)	20 (20%)	83 (83%)	17 (17%)
11.เมื่อเข้าสู่วัยรุ่น ผู้หญิงควรรับประทานอาหารให้น้อยลงเพื่อรักษาทรวดทรง	144 (72%)	56 (28%)	63 (63%)	37 (37%)	81 (81%)	19 (19%)
12.ใส่ผงชูรสในอาหารทำให้อาหารอร่อยขึ้น	94 (47%)	106 (53%)	51 (51%)	49 (49%)	43 (43%)	57 (57%)
13.หวานเย็นเป็นของหวานที่เหมาะสำหรับเด็ก	111 (55.5%)	89 (44.5%)	54 (54%)	46 (46%)	57 (57%)	43 (43%)

Number and percentage on each item of attitude towards food (continued)

Item	Total (n=200)		Urban areas (n=100)		Rural areas (n=100)	
	True n (%)	False n (%)	True n (%)	False n (%)	True n (%)	False n (%)
14.การอดอาหารเป็นวิธีลดน้ำหนักที่ดี	170 (85%)	30 (15%)	87 (87%)	13 (13%)	83 (83%)	17 (17%)
15.รับประทานผักบุ้งทำให้ตาหวาน	45 (22.5%)	155 (77.5%)	28 (28%)	72 (72%)	17 (17%)	83 (83%)
16.รับประทานถั่วเขียวต้มน้ำตาลแก้ร้อนในได้	152 (76%)	48 (24%)	69 (69%)	31 (31%)	83 (83%)	17 (17%)
17.รับประทานมะเขือเทศทำให้ผิวสวย	188 (94%)	12 (6%)	94 (94%)	6 (6%)	94 (94%)	6 (6%)
18.รับประทานมาม่ากรอบแทนอาหารมื้อหลักได้	179 (89.5%)	21 (10.5%)	88 (88%)	12 (12%)	91 (91%)	9 (9%)
19.รับประทานขนมถุงสำเร็จรูปแสดงถึงความเป็นคนทันสมัย	172 (86%)	28 (14%)	83 (83%)	17 (17%)	89 (89%)	11 (11%)

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