FACTORS RELATED TO HEALTHY EATING BEHAVIORS AMONG FIRST YEAR MAHIDOL UNIVERSITY STUDENTS, IN SALAYA, NAKHON PATHOM, THAILAND

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Thesis
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ABSTRACT

This cross-sectional study was conducted to identify factors influencing healthy eating behaviors in first year students of Mahidol University in Salaya. 268 self-administered questionnaires were obtained from students who were approached randomly at campus' cafeterias on January 24-25, 2007. Chi-square test and Fisher's exact test were used for analysis along with frequency distribution of variables.

The result showed that 68.3% of students had healthy eating behaviors at fair level. In the period of 6-7days of the past week students could recall what they ate with summarized food frequency question, 45.9% of responding students ate from the five food groups, followed by vegetable at 41.8%, fruit at 44%. The factors significantly associated with healthy eating behaviors of the total respondents were availability ($p<0.001$) and ease of choosing food for eating healthily ($p=0.003$) as enabling factors, formal or non-formal health education in school ($p=0.034$) and leaflets ($p=0.003$) as healthy eating information sources of reinforcing factors.

Better availability of healthy food should be sustained to encourage students' healthy eating. Students who had healthy eating information from health education at school or leaflets were more likely to practice healthy eating behaviors at a good level. This emphasizes the need to support of health education for the nutritional well -being of students.

KEY WORDS: EATING BEHAVIOR/ FIRST YEAR UNIVERSITY STUDENT/AVAILABILITY OF FOOD

93 pp.

CONTENTS

Page

CONTENTS (Cont.)

Page

LIST OF TABLES

LIST OF FIGURES

FIGURE Page

LIST OF ABBREVIATIONS

FBDG : Food Based Dietary Guidelines

MOPH : Ministry of Public Health

NCDs : Non-Communicable Diseases

PRECEDE : Predisposing, Reinforcing, and Enabling Constructs in Educational/ Ecological Diagnosis and Evaluation

PROCEED : Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development

RDI : Recommended Daily intake

WHO : World Health Organization

CHAPTER 1
INTRODUCTION

1.1 Rational and justification

Rapid changes in diets and lifestyles that have occurred with economic development and globalization over the past decade. It normally accompanied by improvements in a country's food supply and the gradual elimination of dietary deficiencies, thus improving the overall nutritional status of the country's population (1).

While food availability has become more diversified, there have been significant negative consequences in terms of inappropriate dietary patterns. The nutritional transition is marked by a shift away toward an industrialized diet that is usually more varied, includes more preprocessed food, food of animal origin, sugar and fat, and less in unrefined carbohydrates, fiber, and minerals. (1-3). Focusing on Asian diets, they are also shifting away from staples and increasingly towards livestock and dairy products, vegetables and fruit, and fats and oils (4).

One study reported that results from several nation-wide surveys indicate that the food consumption pattern of Thai population has changed considerably; Thai staples and side dishes are being replaced by diets containing a higher proportion of fats and animal meat. A shift in the proportion of expenditure on food prepared at home and that expended on purchased, ready-to-eat food, in both rural and urban settings (5).

Non-communicable diseases (NCDs) are becoming an increasingly significant cause of disability and premature death, placing additional burdens on already overtaxed national health budgets at a global level. Nutrition is coming to the fore as a major modifiable determinant of NCDs (1). Overweight and obesity including

hypertension and hyper-lipid anemia, are significant consequences of NCDs such as coronary heart disease, chaemic stroke, type 2 diabetes, certain types of cancer, osteoporosis and psychosocial problems (1,6,7). The role of diet in the etiology of most NCDs is well established (8).

Those health issues associated with unhealthy eating behavior like as choosing inappropriate foods, snacks and drinks, cutting out or lacking of particular foods from the diet, skipping meals, as occurs in a number of popular diets. This may, amongst other things, lead to low intake or imbalance of vitamins and minerals, low fiber intake in both the short and long term (9-11).

In Thailand, the rapid changes in food intake and lifestyle patterns clearly demonstrate a significant impact on the shifting pattern of disease burden of the population (5). The National Health Examination Survey II, that the prevalence of overweight and obesity were 28.3% and 6.8% respectively among 3,220 Thai adults (20-59yrs) (12). The prevalence of overweight and obesity among children and adolescents has increased dramatically during the past 20 years (5). Moreover, the increase of type 2 diabetes in Thai children and adolescents from 5% during 1986-1995 to 17.9% during 1996-1999 was reported (13). The Ministry of Public Health reported that currently NCDs have become the leading causes of morbidity and mortality, by such an increasing trend results from unhealthy consumption behaviors and physical inactivity. Total percentage of cause of Disability-Adjusted Life Years Lost NCDs in Thailand is 58.3% (14).

Despite the importance of healthy eating during adolescent, their unhealthy eating behaviors are often reported in countries. The reported unhealthy eating behaviors are such as unhealthy snaking including increase of consumption of carbonated drinks, skipping meals, excessive dieting especially among female (15,16). Overall, diets of today's adolescents are low in fruits, vegetables, dairy products, whole grains, and high in total fats, saturated fats and added sugars (17). In addition, soft drinks displace more nutrient-dense drinks such as milk and fruit juice, and may result in over-consumption of energy (18).

Adolescent diet-related to the main health problems are such as overweight, obesity, micronutrient deficiencies, iron deficiency, anemia in particular on the context, eating disorders, and under-nutrition or obesity and co‑morbidity. Like in any other age group, poor nutrition is usually the result of dietary inadequacies (11, 15, 16).

Study in the United States found most adolescents ate fewer serving of five major food groups than national recommends (17). One in five students (15-18yrs) regularly skip breakfast, 13% of high school girls vomit, take laxatives, or take diet pills to lose or keep from gaining weight (15). Another survey in the U.S. reported on the day before the survey, 41% of high school students ate no vegetables and 42% ate no fruits (19), 20 % of young people did not consume any fruit and 4% did not consume any vegetables (20).

In Thailand, a study among adolescents in Konkean in 2002, average consumption of vegetable was 132g per day (21). A study among Mahidol university student in 2001 reported 35% of the students had food from all five food groups each day, left of 65% could not (22). A study conducted among sixth grade students in Bangkok in 2004, 44% of them eat complete five group of food per day, 31 % added more sugar/salt in food before eating, 85% favor in innutritious snacks, 76% instant noodles and 81% carbonated juice (23). A study among secondary school students in remote area in 2005, fruits (69%) and vegetables (79.4%) consumptions were in the high level, at the same time, 74.0% of them always consumed commercial snacks, 64.4% always consuming instant noodles (24).

Unhealthy eating practices that contribute to NCDs are established early in life; young persons having unhealthy eating habits tend to maintain these habits as they age. Promoting healthy eating and physical activity behaviors during childhood and adolescence may not only prevent some of the leading causes of illness and death but also decrease direct health-care costs and improve quality of life (19,25).

All of these situations may contribute to undesirable eating behavior, immediate effect their health status, and place young people at health risk later in life. For these reason, healthy eating behaviors of the students should be considered. Thus, there needs to be better understanding of healthy eating behaviors of the students along with considered variables.

1.2 Research Questions

What factors are related to healthy eating behaviors among first year university students at the Salaya Campus of Mahidol University?

1.3 Research Objectives

1.3.1 General objective

To identify factors influencing healthy eating behaviors among first year university students at the Salaya Campus of Mahidol University.

1.3.2 Specific Objectives:

1) To describe healthy eating behaviors among first year university students at the Salaya Campus of Mahidol University.

2) To measure an association between predisposing factors and healthy eating behaviors among first year university students at the Salaya Campus of Mahidol University.

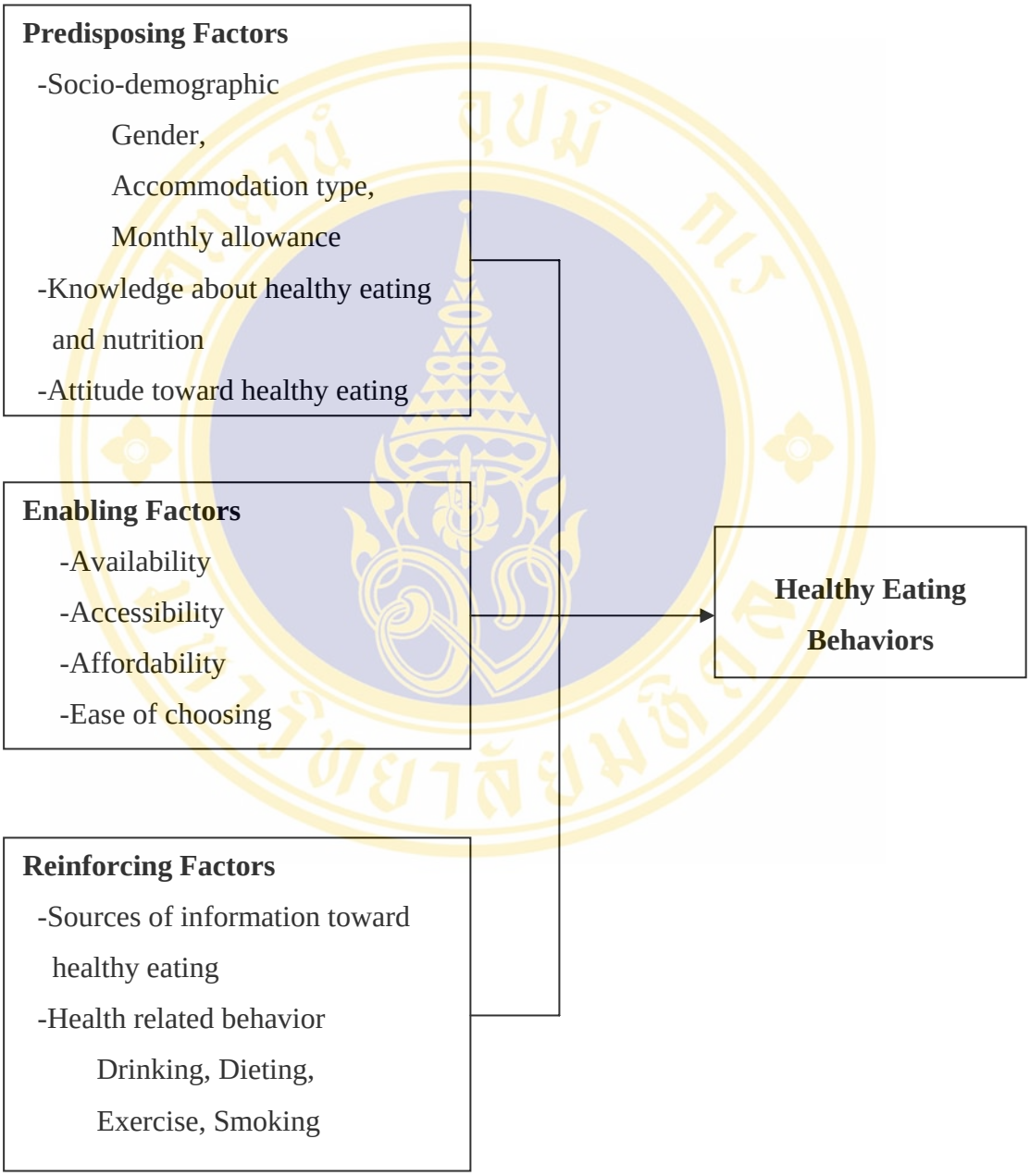
3) To measure an association between enabling factors and healthy eating behaviors among first year university students at the Salaya Campus of Mahidol University.

4) To measure an association between reinforcing factors and healthy eating behaviors among first year university students at the Salaya Campus of Mahidol University.

5) To compare factors associated with healthy eating behaviors between female and male among first year university students at the Salaya Campus of Mahidol University.

1.4 Conceptual Framework

Independent Variables **Dependent Variable**



1.5 Operational Definition

1.5.1 Predisposing factors

Socio-demographic

Includes gender, accommodation type, and monthly allowance with the following;

Age refers to age at the time of data collection.

Accommodation type refers to a type where a student is staying during the semester, which was categorized into: Dormitory at Salaya campus, Dormitory outside Salaya campus, Living with family, and others.

Allowance refers how much money each student received per month.

Knowledge refers to the knowledge of students about healthy eating and nutrition including five food groups, nutrients in some specific foods, dietary recommendations, and necessity and excessive intake of nutrients.

Attitude refers to a degree, to which a student has a favorable or unfavorable evaluation of healthy eating.

1.5.2 Enabling factors

Refer to availability, accessibility, affordability of food for healthy eating, and ease of choosing food to practice healthy eating.

Safe food refers to food that we can eat without worry about hygiene and chemicals in food such as pesticide, insecticide, food preservatives.

1.5.3.1 Reinforcing factors

Study focused on sources of information and health-related behavior.

Sources of information refers to the information resources on healthy eating which the student received from mass media, leaflets, formal or informal health education class in schools, friend, family and others.

Mass media refers to book, newspaper, magazine, television, radio, website on Internet.

Health related behaviors refers student's status of behavior related to health, which included Drinking alcohol, Exercise, Dieting and Smoking, declared by students at a point in time.

Drinking refers to student's status of habitual alcohol drinking opportunity. Habitual opportunity refers to students drinking any kind of alcoholic beverage 2 days or more days in an ordinary week.

Exercise refers to a student's practice of regular exercise. Regular exercise refers to exercise at least 3 times to 5 times a week, and each workout at least last 20 minutes to 30 minutes.

Dieting refers to a student's status of losing weight by controlling diets.

Smoking refers to smoking status of a student categorized into smoker, non-smoker, and ex-smoker.

Smoker refers to a student who has a habit of smoking in ordinal days.

Non-smoker refers to a student who never smokes.

Ex-smoker refers to a student who used to be a smoker, but has quit and not smoked again.

1.5.4 Healthy eating behaviors

Refers to the student's eating practices that are consistent with improving, maintaining and enhancing health, explained as eating a variety of food from all five food groups on a regular basis, eating with consideration of fat, sugar and salt in foods including snacking, and eating safe food. Alcohol drinking was excluded in healthy eating behaviors in this study.

1.6 Limitation of the study

The data collected in this study among samples approached randomly at university cafeterias selected. Therefore, its results had limited generalization and representative to all first year students in Salaya Campus of Mahidol University.

The data collected were answers to a questionnaire. The true eating behavior among respondents was not actually observed. Therefore, the bias cannot be prevented.

1.7 Expected Outcome

This study learns how students behave toward healthy eating. The result will benefit students' diet and nutrition for further developing their healthy eating.

CHAPTER 2
LITERATURE REVIEW

A review of literature and previous studies on healthy eating behaviors of this study includes;

2.1 Healthy Eating Behaviors
2.2 Factors of Healthy Eating Behaviors
2.3 Characteristics of Adolescence
2.4 Theoretical Model

2.1 Healthy Eating Behaviors

2.1.1 Healthy behaviors

Health is defined in WHO's Constitution as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (26).

Healthy behaviors were defined as any specific behaviors that maintain and enhance health such as eating a good diet, undertaking physical activity and obtaining adequate sleep (27).

2.1.2 Definition of healthy eating

A distinction should be made at this point between ‘healthy foods’ and ‘healthy eating/healthy diets’. The former is about foods that contain specific nutrients, whilst the latter is about eating the right amount and best combination of these foods. Definitions of healthy eating vary but most tend to emphasize achieving the right balance of different foods (28).

The 2005 Dietary Guidelines for Americans by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services give the following advice for healthy eating (29);

-Eat a variety of foods.

-Balance the food you eat with physical activity.

-Eat plenty of grain products, vegetables, and fruits.

-Choose a diet that is low in fat, saturated fat, and cholesterol.

-Moderate in sugars, salt, and sodium.

Many studies were carried out to find out how people defined healthy eating.

According to the results of the Spanish national survey in 1998, the majority of the Spanish adults (15yrs upwards) defined healthy eating as a diet with 'more vegetables' as the main description. Following 'more vegetables', the four most frequent descriptions were 'balanced diet', 'more fruit', 'less fat' and 'more fish'. Another description was 'more lean meat' (30).

A pan-EU survey in 1995 to 1996 showed overall 80% of respondents (15 yrs upwards) mentioned either more fruit and vegetables or less fat, fatty foods, or a low fat diet, or balance and variety as the definitions of healthy eating. The results of the study shown many people defined healthy eating in a way, which suggested in their healthy dietary guidelines (31).

A study in the United States in 2001 found that the meanings of healthy eating among adolescents (senior and junior high school students) were healthy eating involves moderation, balance, and variety (32).

Another study in the United States in 2006 shown definitions for healthy eating which defined by youth, eating different types of food from all food groups like bread, grains, cereals, fruit, vegetables, milk, and meat while limiting sugary and fatty foods (33).

A study in Canada in 2006 identified definitions of healthy eating among samples of university students that consuming all food groups of Canada's Food Guide to Healthy Eating, with the associated notions of moderation and balance (34).

A study in Japan, adults interpreted 'eating a nutritionally balanced diet' and 'eating plenty of vegetables' as the most important definitions of healthy eating (35).

A study in the United States in 2001 shown healthy eating definitions as the seven predominant themes that distinguished the participants (18 yrs upwards) of their study as follows (36);

1. Healthy eating is eating low fat (“low fat”).
2. Healthy eating is eating natural/unprocessed foods (“natural”).
3. Healthy eating is balanced eating (“balance”).
4. Healthy eating is eating to prevent disease (“disease prevention”).
5. Healthy eating is maintaining nutrient balance (“nutrient balance”).
6. Healthy eating is eating to manage an existing disease (“disease management”).
7. Healthy eating is eating to control weight (“weight control”).

A reviewed articles suggested relative homogeneity in the perceptions of healthy eating despite the studies being conducted in different countries and involving different age groups, sexes and socio-economic status. As part of healthy eating, fruits and vegetables were consistently recognized. Characteristics of food such as naturalness, and fat, sugar and salt contents were also important in healthy eating (37).

Although most studies were limited to western countries, concepts related to healthy eating, such as balance, variety and moderation, could be summarized.

A research suggested that lay understanding of healthy eating did generally conform to dietary guidelines (38).

Dietary guidelines designed to explain the principles of healthy eating based on scientific evidences obtained from studies. It is based on the diet as a whole, which endeavors to encourage people to choose a variety of foods in the recommended

proportions. It must be noted that the recommendation is based on the premise that eating a variety of foods in the recommended proportions over a period of time will provide all the nutrients and energy that the 'majority' of individuals require to maintain good health (9).

Table 1 Main nutrients provided by each of the five food groups in UK.

Fruits and vegetables	Vitamin C, Carotenes, Foliate Carbohydrate, Fiber
Breads, other cereals and starchy carbohydrate	Carbohydrate, Calcium Iron, B Vitamins, Fiber
Milk and dairy products	Calcium, Protein Vitamin B12, A, D
Meat fish and alternatives	Iron, Protein, B Vitamins Zinc, Magnesium
Foods containing fat and foods containing sugar	Fat, Carbohydrate Fat soluble vitamins, Salt

Source: Hannah E. Theobald. A whole diet approach to healthy eating. British Foundation Nutrition Bulletin 2004; 29 (1): 46.

All foods can form part of a balanced diet and that there are no good or bad foods, rather consumption of some foods too frequently or in excess can lead to bad diets (9).

2.1.3 Food Based Dietary Guidelines for Thai (FBDGs)

Thai Food Based Dietary Guidelines for Good Health (39) was designed to help what should the Thai people eat to stay healthy, by the Division of Nutrition, Department of Health, Ministry of Public Health and Institute of Nutrition Mahidol University, in co-operation with other related food and nutrition institutions. The guidelines were developed with Thai food habits and culinary culture in mind and derived from scientific evidence of the associations between health and disease. The guidelines consist of the following nine guidelines for Thai people's health.

1. Eat a variety of foods from each of the five food groups and maintain proper weight;
2. Eat adequate amount of rice or alternative carbohydrate sources;
3. Eat plenty of vegetables and fruits regularly;
4. Eat fish, lean meat, eggs, legumes and pulses regularly;
5. Drink milk in appropriate quality and quantity for one's age;
6. Eat a diet containing appropriate amounts of fat;
7. Avoid sweet and salty food;
8. Eat clean and safe food;
9. Avoid or reduce the consumption of alcoholic beverages.

The detail of these guidelines is as follows.

Rule1: Eat a variety of foods from each of the five food groups and maintain proper weight

Our body needs nutrients in food including protein, carbohydrate, vitamins, fat, water, and fiber. If some of these foods were not consumed or others were eaten repeatedly on a daily basis, it likely received too few, or too much of certain nutrients. One particular food or food group cannot provide all of the nutrients that an individual needs to maintain health (39).

For example within the meat, fish and alternatives food group, meat does not provide fiber or vitamin C, and whilst beans and nuts provide fiber, they only contain trace amounts of vitamin C (9).

Therefore, we need to eat from each five groups of food with varieties. Five food groups in Thailand are follows:

Group1 : Milk, eggs, meat, legumes and sesame seeds for contributing to growth and maintenance of body tissues.

Group2 : Rice, cereals, starchy foods, sugar for providing energy.

Group3 : Vegetables for assisting regular body functions.

Group4 : Fruits, same function as group3

Group5 : Oils and fats from plants and animals for providing energy and body warmth.

Rule2: Eat adequate amount of rice or alternative carbohydrate sources

Rice is the staple food of the Thai people that gives a source of energy and contains mainly carbohydrates and other substantial nutrients such as protein, fat, dietary fiber, minerals and vitamins. Unpolished rice or slightly polished rice is especially rich in these nutrients. Appropriate quantities of rice or alternative carbohydrate such as rice noodles, fermented rice noodles, wheat noodles bread, taro and potatoes should be eaten daily.

Rule3: Eat plenty of vegetables and fruits regularly

Vegetables and fruits are good source of vitamins, minerals, fiber and other useful substances that are necessary for health. As a result, eating wide variety of vegetables and fruits on a regular basis was one way to reduce the risk of obesity and coronary disease. Variety of vegetables during every meal, regular intake of fruits after meal or as a snack suggested.

Rule4: Eat fish, lean meat, eggs, legumes and pulses regularly

Fish, lean meat, eggs, legumes, and pulses mainly provide protein that works for function and maintenance of the body. However, frequent consumption of meat that has visible fat should be avoided. Legumes and pulses including their product such as tofu, fermented soybeans, soybean milk. Children should eat one egg a day while normal adults should eat 2 to 3 eggs per week.

Rule5: Drink milk in appropriate quality and quantity for one's age

Milk is suitable for all ages as it is not only rich in calcium and phosphorus, but also contains s protein, lactose, vitamin (especially Vitamin B2). Recommendation for adolescents and adults was 1 to 2 glasses of milk each day.

Rule6: Eat a diet containing appropriate amounts of fat

Fats including oil from plants provide energy and heat to the body and work as a carrier for vitamins A,D,E and K. Neither an excessive fat intake nor absolute avoidance were suggested. Fatty food or oily food such as deep-fried food,

foods with coconut milk, oily snacks should be eaten in moderation. It was also advised to choose cook foods by boiling, steaming, or grilling which yield less fat.

Rule7: Avoid sweet and salty food

Eating food with too sweet or too salty tastes can have fewer health benefits. We often add excessive amounts of sugar in our regular diet, since most foods that are eaten on a daily basis, as either a main dish or dessert, contain sugar, and we take additional sugar from beverages. Excessive sugar gives excess of energy. Salty food increases a risk of hypertension. Thus, sugary foods and salty foods should be limited.

Rule8: Eat clean and safe food

Eating freshly cooked, hygienic foods averts sickness from contaminated foods and brings us the benefit of eating foods. Criteria for selection of non-contaminated foods included: a clean appearance, freshly prepared foods, foods produced from reputable institutions, and food products having the Thai FDA logo.

Rule9: Avoid or reduce the consumption of alcoholic beverages

The regular consumption of alcoholic drinks should be reduced, if not avoided altogether. Those who drink alcoholic beverages occasionally or are beginners should avoid alcoholic drinks as much as possible. It decrease work capacity, and increase risks of hypertension, cirrhosis of liver pose, peptic or duodenal and esophageal cancer and obese, and nutritional deficiencies if taken only alcohol without food (39).

Table 2 Recommended amounts of foods daily consumed for good health, based on Thai FBDGs.

Food group	Household measurement	Weight
Cereals, cereal products and other starchy roots	8-12 rice-serving spoons	480-720 g
Vegetables	4-6 rice-serving spoons	160-240 g
Fruits	3-5 servings	210-350 g
Meats, fish, eggs, soybean and products	6-12 table-spoons	90-180 g
Milk	1-2 glasses	200-400 ml
Sugar	No more than 40 – 55g or 3-4 tablespoons	

Source: Prapasri Puwastien, et.al. Thai Food Composition Table. Institute of Nutrition Mahidol University (40).
: Food Based Dietary Guideline for Thai. Institute of Nutrition, Mahidol University and Nutrition Division, Department of Health, MOPH (39).

Table 3 Thai RDI and the percent energy distribution of total energy of daily intake

Nutrients	Thai RDI (≥6years,based on a 2,000kcal diet)	% Distribution
Protein	50g	10%
Fat	65g (20g of saturated fat included)	<30%
Carbohydrate	300g	60%
Fiber	25g	–

Source: Prapasri Puwastien, et.al. Thai Food Composition Table. Institute of Nutrition Mahidol University (40).

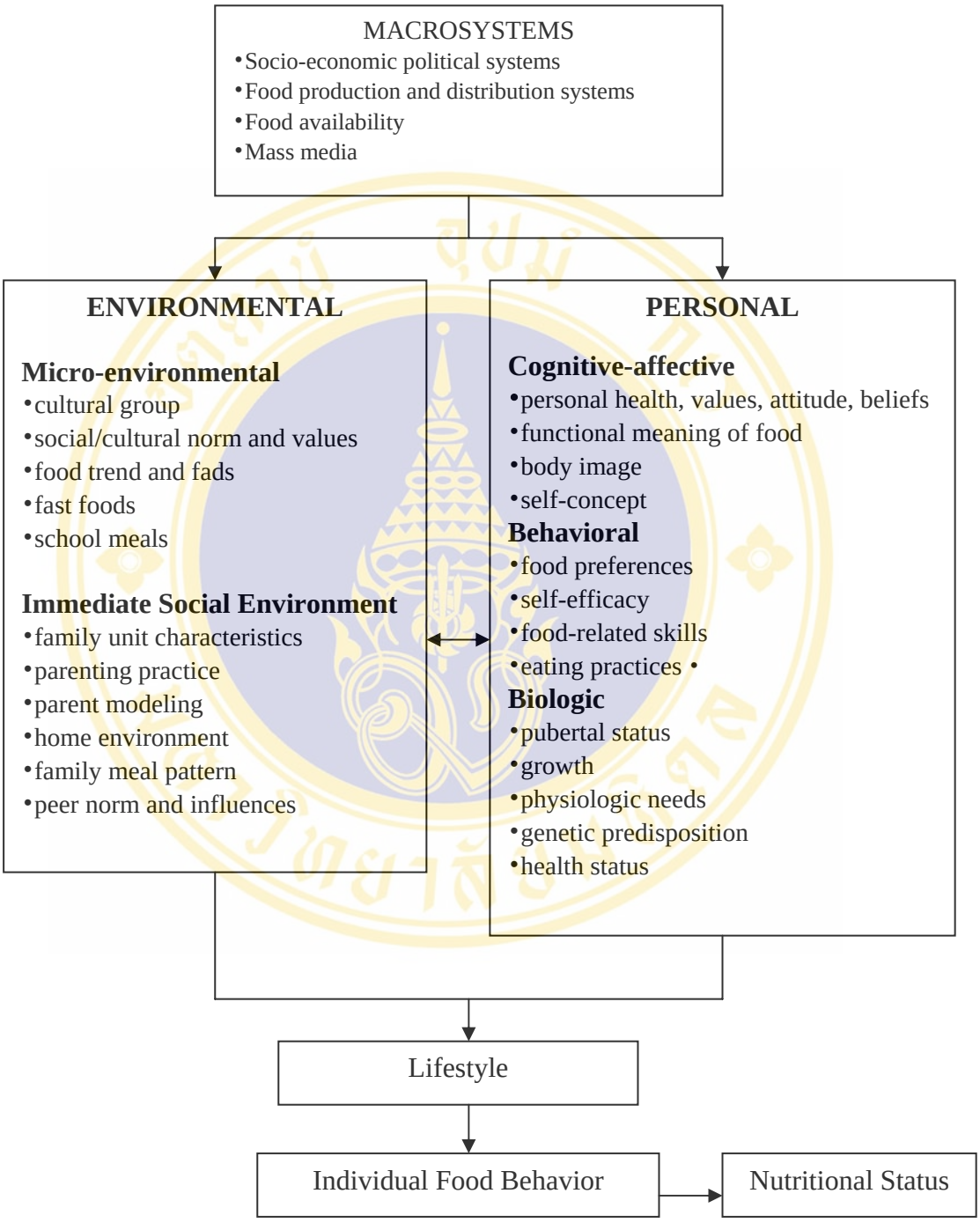
Only four nutrients shown in Table3 though Thai RDI settled for other nutrients. As shown in the table, the percent distribution is recommended balance for Thai adult's daily intake. To aim the balance with considering with many other nutrients, eating adequate amount of rice or alternative carbohydrate sources as a staple food with side dishes could be important.

2.1.4 Unhealthy eating behaviors

Contrast to healthy eating behaviors, unhealthy eating behaviors could be cause of common health problems. Examples, eating many fatty or sugary foods with physical inactivity increase the likelihood of developing obesity, Type 2 diabetes and coronary heart disease (27). Skipping breakfast is related to cardiovascular risk factors such as high blood pressure, and high serum total cholesterol (41). It is also possible that less adequate breakfast habits contribute to the appearance and further development of obesity (42). High consumption of carbonated soft drinks during adolescence may reduce bone mineral accrual and increase fracture risk over an individual's lifetime (43,44). Dieting with unhealthy eating behaviors are identified risk factors that have been reliably linked to the development of eating disorders (45).

2.2 Factors of Healthy Eating Behaviors

A conceptual synthesis of the literature revealed that individual determinants of personal food choice (physiological state such as hunger, food preferences, nutritional knowledge, perceptions of healthy eating and psychological factors) are necessary, but not sufficient, to explain eating behavior, which is highly contextual. Collective determinants of eating behavior include a wide range of contextual factors. These may be the interpersonal environment created by family and peers, the physical environment, which determines food availability and accessibility, the economic environment, in which food is a commodity to be marketed for profit, and the social environment, in which social status (income, education and gender) and cultural milieu are determinants of healthy eating that may be working "invisibly" to structure food choice (46). (Figure 1)



Source: ©Mary Story. Reprinted from Story M, Alton I. Becoming a woman: nutrition in adolescence. In: Krummel DA, Kris-Etherton PM, eds. Nutrition in women's health. Gaithersburg, MD: Aspen Publishers; 1996

Figure 1 Multiple factors influencing eating behavior of adolescents.

2.2.1 Predisponding factors

2.2.1.1 Socio-demographic factors

There reported a range of socio-demographic, economic factors contributing to healthy eating behaviors, such as age, gender, length of education, income, region and so on.

Gender is associated with indicators for healthy eating, which varies according to behaviors (47-49). The samples of European females (17 to 30 yrs) have been found to have healthier behavior patterns in general than males (Steptoe & Wardle, 1992) and are more likely to have and maintain better eating patterns than males (18 to 30 yrs) (Wardle & Steptoe, 1991) (50). Young women are generally more receptive to healthy eating messages than men are. Surveys of young people consistently demonstrated that young women are more likely than young men to consume healthy foods, and consider healthy eating to be important (Dennison and Shepherd, 1995; Miles and Eid, 1997;Sweeting et al., 1994) (28).

A study among sixth-grade students in Bangkok in 2004 shown that gender had a relationship with food consumption behavior (23). In a study in northeast Thailand, female university students had positive health habits, in terms of drinking, fruit consumption, conscious efforts to avoid fat and cholesterol (51).

Healthy foods were predominantly associated with parents/adults and the home, whilst fast food was associated with pleasure, friendship and social environments (28). Familial factors, parental presence at the evening meal is positively associated with adolescents' higher consumption of fruits, vegetables, and dairy foods, as well as the likelihood of skipping breakfast (52). In contrast, if family members did not like healthy foods, they may not be available at home. Some adolescents also discussed parents as barriers if they did not have enough time to purchase and prepare healthy foods (53).

Independence from home, and greater financial autonomy as allowance enabling young people to purchase or prepare foods of their own choice (20).

2.2.1.2 Knowledge

Knowledge and information alone do not seem to be a predisponding factor for the adoption of a healthy diet. Both female and male samples involved an adequate understanding of nutrition principles, but for some reason fail to put the knowledge they possess into practice (54).

For adolescents, studies indicated that they have a significant amount of knowledge regarding good nutrition, healthy foods and health, but did not use their knowledge to make healthy food choices (19,32). Adolescents appear to be familiar with the general relationship between nutrition and health but are less aware of the relationship between specific foods and health. Young persons understand the importance of limiting fat, cholesterol, and sodium in one's diet, but they do not know which foods are high in fat, cholesterol, and sodium, or fiber (19). College students need more information about making dietary choices that include more nutrient-dense foods especially for calcium and iron, and reduced-fat foods (10).

2.2.1.3 Attitude

Attitudes about food are often formed by adolescence and carried forward into later life (54). There reported that attitudes towards healthy eating were associated with healthy eating behaviors.

Females, increasing age, higher social class, tertiary education, non-smokers, lower body-weights and increased recreational activity were associated with a lower odds ratio for having a negative attitude towards their healthy eating behavior. It was concluded that attitudes towards eating healthily was related to measured dietary and lifestyle behavior in the sample (55).

A study among Netherlands students (12-14yrs), shown that more positive attitude towards eating fruit was significant correlate of a higher consumption of fruit

and a more positive attitude to breakfast more frequently was associated with more frequent breakfast consumption (56). A study in UK shown those who were currently reporting a less healthy diet were more likely to hold negative attitudes about healthy eating (57).

Although young people's attitudes towards healthy eating were generally positive, personal preferences for fast foods on grounds of taste tended to dominate food choice (28).

Many adolescents feel that healthy eating is not a primary concern during the teenage years, because in relation to other concerns, taste preferences, hunger, convenience and so on. Because of a lack of sense of urgency about personal health (16,58).

Regarding on gender, in many of these studies, females have been found to have more negative attitudes than males towards high-fat foods in the UK and more positive attitudes than males towards low-fat foods in the Netherlands (50).

A study reported that female are more health conscious than male; they tend to be more reflective about food and health issues in comparison to men who tend to have a more traditional and uncritical view of eating. Male seem to attach more importance to good taste and pleasure derived from food and less importance to health as a criterion in food choice compared to women (59). In addition, a research suggested that females are sensitive to the way other people think they should eat in order to fulfill the standards and expectations regarding appropriate feminine behavior and appearance (50).

2.2.2 Enabling factors

There could be considered enabling factors for healthy eating such as availability, accessibility, affordability and skill toward eating healthily. These factors facilitate to promote or maintain people for healthier eating behaviors. Lack of facilitates factors could be barriers to practice healthy eating. Previous studies reported as following.

As physical environmental, factors inhibiting them ability to eat healthily included limited availability of nature foods, healthy food, healthy meals at school and in young people's social spaces, healthy foods sometimes being more expensive, and wide availability of, and personal preferences for, fast foods (28,32,53). Example, better availability (e.g. Having a good selection of healthy options in canteens) or lower pricing of healthy snacks, included information about nutritional content of foods/better labeling can facilitate to improve healthy eating (20,28).

Barriers to healthy eating were included: 'cost', 'lack of time', 'self-control', 'selection influences', 'lack of knowledge' (60,61). A study among European adults, reported that the lacking of time for healthy eating is barrier was frequently reported by the younger and the higher education people (60).

A study reported that adolescents said they were too busy to worry about food and eating right. Common remarks were that "People our age are so busy that we don't have time to change bad habits." "We have too many other pressures on us." Moreover, some mention inconvenience of eating healthy food (16). Which was not always easy to access, whereas outlets providing fast foods were plentiful (20). Adolescents felt that healthy foods are more difficult to prepare and are difficult to obtain in certain settings. The prevailing view among adolescents was that while good nutrition was important, it was too much of a bother (16).

2.2.3 Reinforcing factors

2.2.3.1 Source of information

Informational sources for healthy eating such as educational material, health professionals and the media, and informal informational sources such as family and peers have all been reported to be influences associated with healthy eating.

In young people, encouragement from the family was commonly mentioned support mechanisms for healthy eating, though likewise identified as barriers. Teacher and friends were not always being a source of information for healthy eating. Friends were considered to be facilitators of health, although less so in the area of healthy eating (20,28). Peer groups greatly influence their individual food habits. (i.e. what kinds of food they like to eat, their daily meal pattern and the composition of the meal.) Bad eating habits can occur sometimes through pressure from peers who may devalue healthy eating. (62,63).

Previous studies, a high school curriculum designed to promote healthy eating patterns, the females who participated in the program shown a significant improvement in knowledge and awareness regarding their diet as well as in their actual eating habits. Males also gained nutrition knowledge and appeared to modify their salt use (64). Another study to modify students' eating behavior showed that females receiving the intervention reported healthier eating behaviors after follow-ups. For males, they observed a significant short-term positive effect on eating behavior as well as a maintained positive impact on healthy eating knowledge by the program (65).

Mass media and advertisements in the press, radio and television are powerful factors behind changes in food habits. Today's adolescents are growing up with more advertisements and commercials in the mass media, particularly television, than any other generation, which had an enormous potential influence to eating behaviors (63,66). Those media, particularly television, able to overshadow familial influences of healthy eating in adolescsents (66). Young person’s food choice are influenced by television advertisements for low nutritive foods. Most of the foods advertisements

are high in fat, sugar, or sodium; practically no advertisements are for healthy foods such as fruits and vegetables (19).

Regarding reliability, a study in Ukrainian adults (18-55yrs) showed that sources of healthy eating information included: 'relatives/friends' (cited by 65%, trusted by 85%) and health professionals (trusted by 92%, but used by only 35%), while advertising was the least trusted source (cited by 28%) (67).

In addition, nowadays there is a lot of confusion surrounding what constitutes a healthy diet, at least as far as the public is concerned. New reports or articles appearing in the press each week suggesting that a particular food is good or bad for health, or articles on the merits of a new 'wonder' diet. Such conflicting nutrition messages can lead to confusion and misinterpretation, having one potential cause of individual unhealthy eating patterns (9).

2.2.3.2 Health related behaviors

One way to understand adolescent eating problems is to view them as part of an overall pattern of risky behavior in teens. Bad eating habits can occur the same way other risky adolescent behaviors occur, sometimes through pressure from peers (62).

Drinking

A study shown that the association between drinking and healthy eating behavior, alcohol consumption with a recommended weekly limit was associated with unhealthy eating in men and healthy eating in women, though the gender differences were small (47).

Dieting

Dieting is a common and widespread practice among adolescents, especially girls (16,20). They were considered about their appearance and body image, which had implications for their diet and engagement in physical activity. Dieting had association with healthy eating considered both promote and hinder healthy eating behavior (20).

Dieting amongst young men however is not uncommon. In a study of the dieting patterns of 12 years old in the UK, 15% of young men reported dieting to lose weight (Edmunds and Hill, 1999) (28).

Exercise

The results of a study shown that samples of both women and men who engaged in moderate walking activity and vigorous sporting activity were significantly more likely to have higher odds of healthy eating than those who engaged in no walking activity or light sporting activity (47). Another study reported that physical activity levels had significant relationships with the frequency of consumption of all food groups (68).

Concerning on regular exercise, the Rule1 of Thai FBDGs mentioned appropriate exercise should be carried out regularly for health suggested, at least 3 to 5 times per week, and each exercise workout should last for 20-30 minutes (39). Alternatively, 10 minutes for 3 times a day fur aerobic training, or one set instead of three sets of repetitions on resistance training provide individuals with health benefits (69).

Smoking

Studies indicated that there was a significant association between smoking and healthy eating behavior (47-49,57). Those who smoked had lower mean healthy eating scores than nonsmokers (both never and previously smoked). Current women smokers and those who did not answer the smoking questions had significantly higher odds of unhealthy eating than those who had never smoked (47,48). Current smoking was concomitant with obesity-promoting behaviors such as eating higher calorie foods compared to nonsmoker college students, current smokers ate significantly more at restaurants serving high calorie foods. Amount smoked was related to significantly more frequent eating at restaurants that serving high calorie foods (70).

Along with dieting behavior, one study indicated that many white female high school students who smoke reported using smoking to control their appetite and weight (19).

2.3 Characteristics of Adolescence

2.3.1 General characteristics

Adolescence was defined by WHO as a person between 10 and 19 years of age range, those between 15 and 24 years of age was defined as youth (11)

Adolescence is a period of physical, psychological, and social change. The transition from childhood to adulthood may extend over variable periods, depending upon various factors (11).

This period can be divided into three chronologic phases: early (i.e., eight to 13 yrs), middle, and late adolescence. Middle adolescence (i.e., 14 to 17 yrs) is characterized by continuing physical development along with social and emotional changes. Middle adolescence are able to think more abstractly; typically are capable of complex, logical thinking; and sometimes are allowed to make their own health care decisions. In this stage, further experimentation with risky behaviors often occurs. Late adolescence (i.e., 18 yrs) have a more longitudinal understanding of how their behaviors can affect their health than in early or middle adolescence (71). The cognitive, social, and lifestyle changes during adolescence can create profound changes in their eating patterns (16).

Adolescents are relatively healthy compared to other lifecycle groups, and they show roughly similar morbidity and mortality trends in developed and developing countries. As adolescents have a low prevalence of infection compared with under-five children, and of chronic disease compared with ageing people (11).

2.3.2 First year Mahidol University students

Regarding first year Mahidol University students, they are approximately 17-20 years old. They had to responsibility for all activities including their diet since most of them live with separating from family. They were transition from the home dinner table to the university cafeteria where meals were not prepared in the manner to which they are accustomed. There also is no one to monitor what they eat and whether or not they eat (22).

2.3.3 Common eating behaviors among adolescence

As common eating behaviors among adolescence, snacking, skipping, family meals, eating out, dieting and non-traditional eating patterns.

Food choices made by adolescents while snacking tend to be high in sugar, sodium, and fat, while relatively low in vitamins and minerals (44).

Skipping meals is common among adolescents, especially during middle and late adolescence. Breakfast is the most commonly skipped meal and it attributed to lack of time, desire to sleep longer in the morning, lack of appetite, and dieting to lose weight. Skipping breakfast may affect concentration, learning, and school performance. Young people who skipped breakfast had lower total daily energy, vitamin and mineral intakes compared to those who ate breakfast. As with breakfast, skipping lunch reduces intakes of energy, protein, and other nutrients (16).

During adolescence, teens spend less time with family and more time with friends. As teens become more independent, eating away from home increases. Family meals are associated with better overall dietary quality among children and adolescents. Increasing frequency of family dinner was associated with more healthful dietary intake patterns, including more fruits and vegetables, less fried food and soft drinks, less saturated and trans fats and more fiber and micronutrients from food. Adolescents gave several reasons for not having family meals, including parent and teen schedules, desire for autonomy, and dissatisfaction with family relations (16).

2.4 Theoretical Model

2.4.1 PRECEDE Model

The PRECEDE model is a framework in the PRECEDE PROCEED (respectively, for Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation and Policy, Regulatory, and Organization Constructs in Educational and Environmental Development) model developed by Lawrence W.G and Marshall W. K as a planning and evaluation logic model and procedural model for health education programs. It ca be applied in various health areas such as smoking, exercise, HIV/AID education, cancer prevention, consumer behavior, eating behavior), and the settings particularly relevant to community and organizational.

The PRECEDE component proposes three set of causal factors are identified, predisposing factors, reinforcing factors, and enabling factors influencing or supporting behavioral and environmental change. The critical element of the phase is the selection of the factors that, if modified, will be most likely to result in behavior change. This selection process includes identifying and sorting.

2.4.2 Predisposing factors

Include a person's knowledge, attitudes, beliefs, values, perceived needs and abilities that facilitate or hinder motivation for behavioral change (i.e. nutritional knowledge and perceptions of diet and health.) Predisposing factors interact with genetic predisposition. Some types of knowledge and skills may serve both predisposing and enabling functions in supporting different types of behavior, like as today's reinforcement becomes tomorrow's predisposition. Predisposing factors also include the early childhood experiences that created the attitude, values, and perception in the first place (72).

Like any other change in the complex system of predisposing factors, a change in awareness or knowledge will affect other areas because of the human drive for consistency (73). Behavior may not change immediately in response to new awareness or knowledge, but the cumulative effects of heightened awareness,

increased understanding, and grater command (recognition and recall) of facts will seep into the system of beliefs, values, attitudes, intentions, self-efficacy, health literacy, and eventually behavior (72).

An attitude towards a behavior can be defined as a person's judgment that performing the behavior is good or bad and whether the individual is either in favor, or against, performing the behavior (74). With his Health Belief Model collaborators, Kirscht viewed attitude as a collection of beliefs that always includes an evaluate aspect (75).

2.4.3 Enabling factors

Mostly conditions of the environment, enabling factors facilitate the performance of an action by individuals or organizations. They were factors antecedence to behavior that allow a motivation or aspiration to be realized. The absence of adequate enabling conditions inhibits action. Those skills (i.e. can the person cook?), community resources, or barrier (such as accessibility (i.e. is the fruit low cost? and visible?), and availability (i.e. is fruit available at school?, nutritional curriculums available?)) that can help or hinder the desired behavioral change as well as environmental changes.

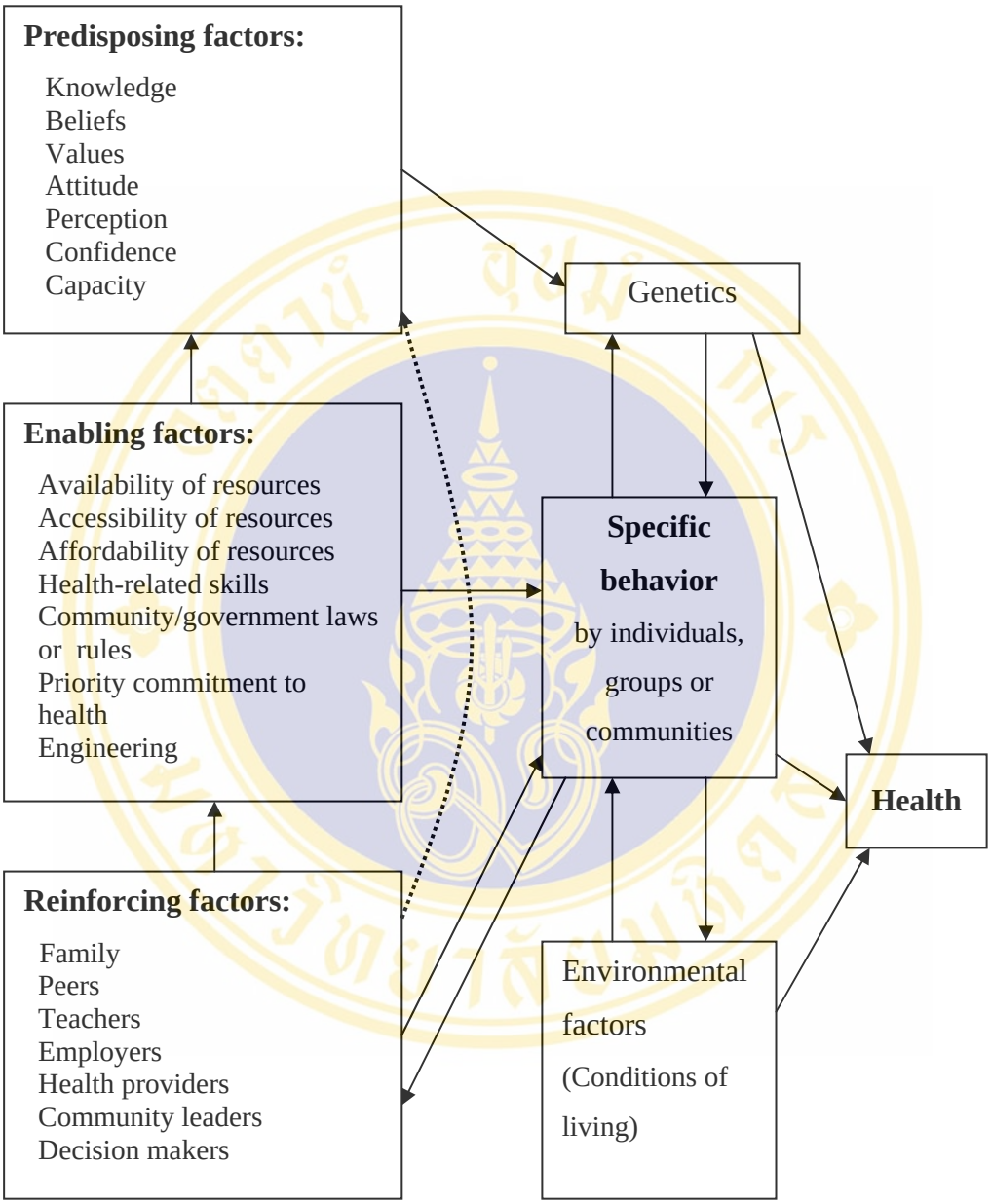
Skill refers here to a person’s ability to perform the tasks that constitute a health-related behavior. Skills for health promotion include abilities to control personal risk factors for disease, skills in appropriate selection of food, and skills in changing or controlling exposures to the environment.

One can view them as vehicles or barriers, created mainly by societal force or systems. Facilities and personal or community resources may be ample or inadequate, as might income, or rules and statutes may be supportive or restrictive. The skill required for a desired behavior to occur also qualify as enabling factors (72).

2.4.4 Reinforcing factors

The reward received and the feedback the learner receives from others following adoption of a behavior-may encourage or discourage continuation of the behavior (e.g. mass media influence and social support). Reinforcing behavior produces lifestyles (enduring patterns of behavior), which in turn influence the environment through social norms, political advocacy, consumer demand, or cumulative actions. In dietary settings, it may come from family, peers, teachers, and health providers, among other sources.

Reinforcing factors also include adverse consequences of behavior, or punishments, that can lead to the extinction of a positive behavior. Rewards also can reinforce behavior that is not conductive to health. For individuals, these rewards might include the “high” that rewards the masking of emotions that accompanies compulsive eating, as example (72).



Source: Lawrence W. Green, Marshall W.Kreuter. Health Program Planning: an educational and ecological approach 4th ed. NY: McGraw-Hill Companies, Inc.: 2005

Figure 2 Precede model, relationships among the three types of factors.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Research Design

This study was a cross-sectional study was designed to identify factors related to healthy eating behaviors of first year students of Mahidol University, Salaya.

3.2 Study Population

Population was first year of Mahidol University students in Salaya campus. They were total 3,825 students consisting of 2408 female (63%) and 1417 male (37%) on 14 December 2006 according to the student registration of Mahidol University.

3.3 Sample Size Calculation

In order to determining the sample size, the following formula was used. (78)

$$n = \frac{Nz^2 pq}{d^2(N-1)+z^2pq}$$

when n = Estimated sample size

N = Total number of sample population; 3,825

d = Absolute precision value of the study, it was set at 0.06

z = Level of statistical significance in this study, set at 0.05,

Therefore z = 1.96

p = 0.5 Anticipated proportion of individual in the population possessing the characteristic of interest when known.

q = 1 – p

According to the above data calculated, the required sample size should be no less than 246 to analysis.

3.4 Sampling Technique

For the data collection, Central cafeteria and Social science cafeteria were selected by purposive selection as the two biggest cafeterias in Salaya campus. Then, by proportion sampling, the total number of required sample size were divided equally for each time of data collection in a day; morning, noon and evening (The data collection at Social science cafeteria was only morning and noon due to it closed in evening). At these cafeterias, respondents were approached randomly as for convenient sample. The sampling frame shown as below. (Figure 3)

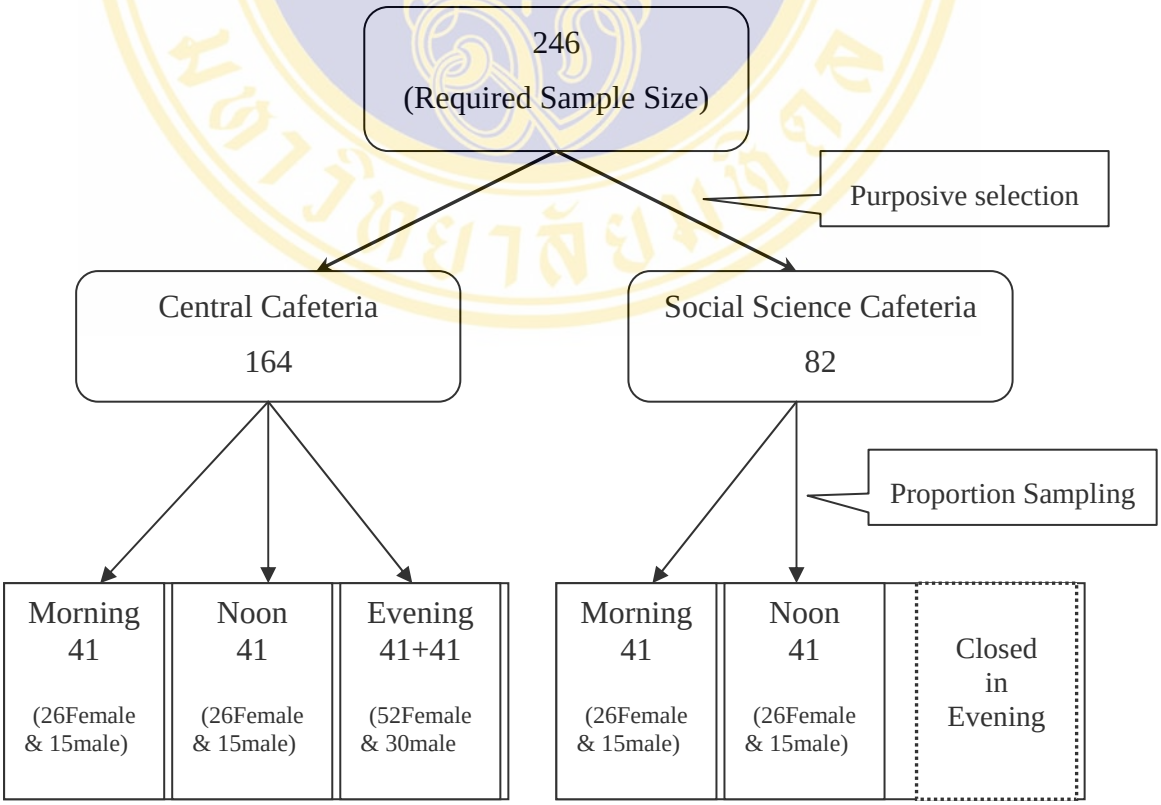


Figure 3 Sampling frame.

3.5 Research Instrument

3.5.1 Questionnaire

A structured self-administered questionnaire was used as the research instrument for data collection. Initially, the questionnaire was prepared in English by the researcher, and then translated into Thai for convenience of collecting data (The questionnaire was provided in Appendix A). The questionnaire mostly closed ended question, consisting from six parts. The data was collected from the response of students to the questions in the questionnaire and were then stratified.

Part1 Socio-demographic

Among quantitative data (e.g. age, monthly allowance), the number, percentage, mean and standard deviation were obtained. Among qualitative data, the number and percentage were obtained. Monthly allowance levels were categorized into three groups:

Less than 3,000 Baht

Equal or greater than 3,000 Bart, and equal or less than 5,000 Bart

Greater than 5,000 Baht

Part 2 Knowledge about Healthy Eating and Nutrition

Knowledge part consisted from 10 questions. The score was given for each question according to the answer either “true” or “false” or “don’t know”. Score “1” was given for correct answer and “0” was given for an incorrect answer and “don’t know”. The range of score is zero to ten. Total score was summarized and categorized. For descriptive analysis, student’s knowledge level was divided into three groups:

High	: Total score	equal or greater than Mean + 1 S.D.
Moderate	: Total score	less than Mean + 1 S.D. and greater than Mean – 1 S.D.
Low	: Total score	equal or less than Mean – 1 S.D.

Part3 Attitude toward Healthy Eating

The attitude part consisted of 12 questions. The score was given in positive statements, 2 scores for an agree answer, 1 scores for the answer undecided, and 0 score for disagree answer. In negative statements, 0 scores for an agree answer, 1 scores for the answer undecided, and 2 score for disagree answer. The score range was 0 to 24. Finally, the total scores were summarized. For descriptive analysis, level of attitude of students was divided into two groups:

Positive attitude : Total score equal or greater than Mean

Negative attitude : Total score less than Mean

Part4 Enabling Factors regarding on Healthy Eating

This part was consisted of five questions, availability food for healthy eating, availability of safe food, accessibility, affordability and ease of choosing food for healthy eating. The answer for each question was either “Yes” or “No”.

Part5 Healthy Eating Behaviors

The Behavior score was measured by using twenty summarized food frequency questions about student’s diet eaten in the past week. Questions were concerned about eating foods from five essential food groups, and eight out of nine sets of rule from Thai dietary guidelines (The ninth rule about alcoholic was excluded in this part5.).

The behavior score was given in statement of healthy eating, 2 scores for the answer “Regularly”, 1 scores for the answer “Sometimes”, and 0 score for “Occasionally or Never” answer. And in statement of unhealthy eating, 0 scores for “Regularly”, 1 scores for the answer “Sometimes”, and 2 score for “Occasionally or Never” answer. The score range was 0 to 40. Finally, the total scores were summarized. For descriptive analysis, the summarized total score of student’s behavior was divided into three groups:

Good: Total score equal or greater than Mean + 1 S.D.
Fair : Total score less than Mean + 1 S.D. and
equal or greater than Mean – 1 S.D.
Poor: Total score less than Mean – 1 S.D.

Part6-1 Reinforcing Factors: Information Resources about Healthy Eating

This part asked 11 kinds of sources of information including mass media and persons gave healthy eating information to respondents.

Part6-2 Reinforcing Factors: Health Related Behaviors

This part was consisted from four questions, regarding to a student's status of drinking, dieting, exercising and smoking. The answer for each question was either "Yes" or "No".

When the questionnaire was collected, 40 students (20 female and 20 male respectively) voluntary answered an open question "what is healthy eating for you?". Thai assistants wrote it down. Then, translated into English and summarized, to support data. (Summarized answers were provided in Appendix B)

3.5.2 Test of Reliability

Prior to the data collection, the questionnaire was pre-tested at Salaya campus on January 2007. The reliability coefficient for attitude questions was fair (Cronbach's Alpha= 0.610). Regarding on knowledge questions, 40 questionnaires provided for the first pretest and the reliability coefficient (The Kuder-Richardson Formula: KR21) was minus 2.0. Then the questionnaire was revised, the result of the second pretest was 0.03. Revised again for more appropriate questions and sequencing, the reliability coefficient for knowledge questions was 0.41 which was fair. The questionnaire was then, finalized for more suitable before collecting data.

3.6 Data Collection Procedure

The data collection carried out at Central cafeteria and Social science cafeteria in Salaya campus of Mahidol University for three times a day; morning, noon, and evening on each of 25 and 26 January 2007 as follows;

-Contact with cafeterias through MPHM office and Thai assistants in advance

-Orientate assistants

-Distribute questionnaires accidentally with brief explanation to respondents

-Collect questionnaire soon after a respondent finished filling in

3.7 Data Analysis Procedure and Statistical Used

The data was entered into computer using Epidata. Minitab version13 was used for analysis data. As this study was a cross-sectional, frequency and relative percentage were used to the distribution for all variables, mean and standard deviation, minimum, maximum to explain the study variables.

After frequency distribution, analysis was done along with Chi-square test and Fisher's exact test that assessed the relation ship between independent variables of interest and dependent variable. The critical significance of these statistical level worked at $\alpha = 0.05$.

CHAPTER 4
RESULTS

This study was conducted to identify predisposing factors, enabling factors and reinforcing factors influencing healthy eating behaviors among first year university students at the Salaya campus of Mahidol University. Pre-test with a sample of 40 first year university students at the Salaya Campus was done 2 times at cafeterias of Salaya Campus in January 2007.

The data collection was undertaken on 25 and 26 January 2007. Out of the total 283 questionnaires distributed randomly, three failed to return a questionnaire and further 12 questionnaires rejected due to missing data. The final sample therefore consisted of 268 subjects, 160 females and 108 males respectively. The response rate was 95%. It might be noted that female students formed a larger proportion in the sample since following on gender proportion of the total population. Within total respondents, forty students voluntary answered a question about what healthy eating was for them. (Summarized data was provided Appendix B.)

The study results were presented in five parts according to conceptual framework including;

1. Predisposing factors
2. Enabling factors
3. Reinforcing factors
4. Healthy eating behaviors
5. Association of dependent variable (Healthy eating behaviors) and independent variables (Predisposing factors, Enabling factors and Reinforcing factors).

4.1. Predisposing Factors

4.1.1 Socio-demographic characteristic of respondents

The socio-demographic characteristics include gender, age, type of accommodation and monthly allowance, though age was not included in predisposing factors (Table 4).

Gender proportion of total respondents was 59.7% of female and 40.3% of male respectively. Majority of respondents were 19 years (61.2%) and 18 years old (33.2%), and rest of them was 20 years old (5.6%). The mean age of respondents was 18.7 years old with the standard deviation of 0.559.

Regarding type of accommodation, most of the respondents (93.0%) lived in dormitory in Salaya campus, this applied to both males (91.7%) and females (93.8%). Fewer respondents lived with family (5.2%), or lived in dormitories outside Salaya campus (1.1%).

Respondent's monthly allowance fluctuated from the lower allowance category (4.5%) follow by the middle allowance category (79.1%) and the rest were in the higher allowance category (16.4%). The sample had an average monthly allowance of 4428.7 baht with the median of 4000.0. The range of monthly allowance was 1,000 to 12,000 Baht.

Table 4 Frequency distribution of socio-demographic characteristics.

Characteristics	Male (n = 108)		Female (n = 160)		Total (n =268)	
	n	%	n	%	n	%
Gender	108	40.3	160	59.7	268	100
Age (years)						
18	34	31.5	55	34.4	89	33.2
19	66	61.1	98	61.3	164	61.2
20	8	7.4	7	4.3	15	5.6
Mean = 18.7 S.D. = 0.559						
Accommodation type						
Dormitory in Salaya campus	99	91.7	150	93.75	249	93.0
Dormitory outside campus	3	2.8	0	0	3	1.1
Living with family	4	3.7	10	6.25	14	5.2
Others	2	1.8	0	0	2	0.7
Monthly Allowance (Baht)						
Less than 3,000	3	2.8	9	5.6	12	4.5
3,000 – 4,999	85	78.7	127	79.4	212	79.1
Greater than 5,000	20	18.5	24	15.0	44	16.4
Mean = 4,429 Median =4000.0 Max = 12,000 Min = 1,000						

4.1.2 Knowledge on healthy eating and nutrition

Ten items pertaining to healthy eating and nutrition knowledge were included in part 2 of the questionnaire.

Table 5 shows the level of knowledge. High level of knowledge was found among 13.1% of respondents, a moderate level was the majority (67.2%) and a low level was found 19.8%. The mean score was 5.929 with standard deviation of 1.557, with minimum score 2 and maximum score 9 among total number of respondents.

Frequency distribution of knowledge by question item showed that nearly 90% of respondents knew the necessity of Calcium intake for adults. More than 83% of respondents knew that one advantage of eating vegetables was decrease in the risk of obesity and coronary disease. The low rate of correct answers was found on the main nutrients of rice 35.1% (n=94). The details are provided in Appendix C.

Table 5 Frequency distribution of knowledge level toward healthy eating.

Knowledge level	Male (n = 108)		Female (n = 160)		Total (n = 268)	
	n	%	n	%	n	%
High	18	16.7	17	10.6	35	13.1
Moderate	63	58.3	117	73.1	180	67.2
Low	27	25.0	26	16.3	53	19.8
Mean=5.929	S.D.=1.557		Min=2		Max= 9	

4.1.3 Attitude toward healthy eating

Twelve items pertaining to attitude toward healthy eating were included in part 3 of the questionnaire.

Table 6 shows the level of attitude. A positive attitude was found in 56.3% of total respondents and negative attitude in 43.7%. The mean of score was 20.713 with standard deviation of 2.651, with minimum score 4 and maximum score 24.

Frequency distribution of attitude by item, 95.9% of respondents agreed with eating variety of food from each food group. Particularly, trying to eat plenty of

vegetables gained the highest agreement at 98.1%, while 47.4% disagreed with the importance of eating adequate amounts of rice or alternative carbohydrates as a staple food. The details were provided in Appendix D.

Table 6 Frequency distribution of attitude level toward healthy eating.

Attitude level	Male (n = 108)		Female (n = 160)		Total (n = 268)	
	n	%	n	%	n	%
Positive	53	49.1	98	61.3	151	56.3
Negative	55	50.9	62	38.8	117	43.7
Mean=21.179	S.D.=2,487		Min=4		Max= 24	

4.2 Enabling Factors

Figure 4 shows the frequency distribution of enabling factors among total number of respondents. Regarding availability, 87.3% of respondents agreed that healthy foods were easily available. Concerning availability of safe food, 63.4% (n=170) responded that it was easily available. Almost 80% agreed that food for eating healthily was easily accessible. Some 62% agreed that food for eating healthily was affordable, 76.9% agreed that choosing healthy foods was easy. The details of frequency distribution by genders were provided in Appendix E.

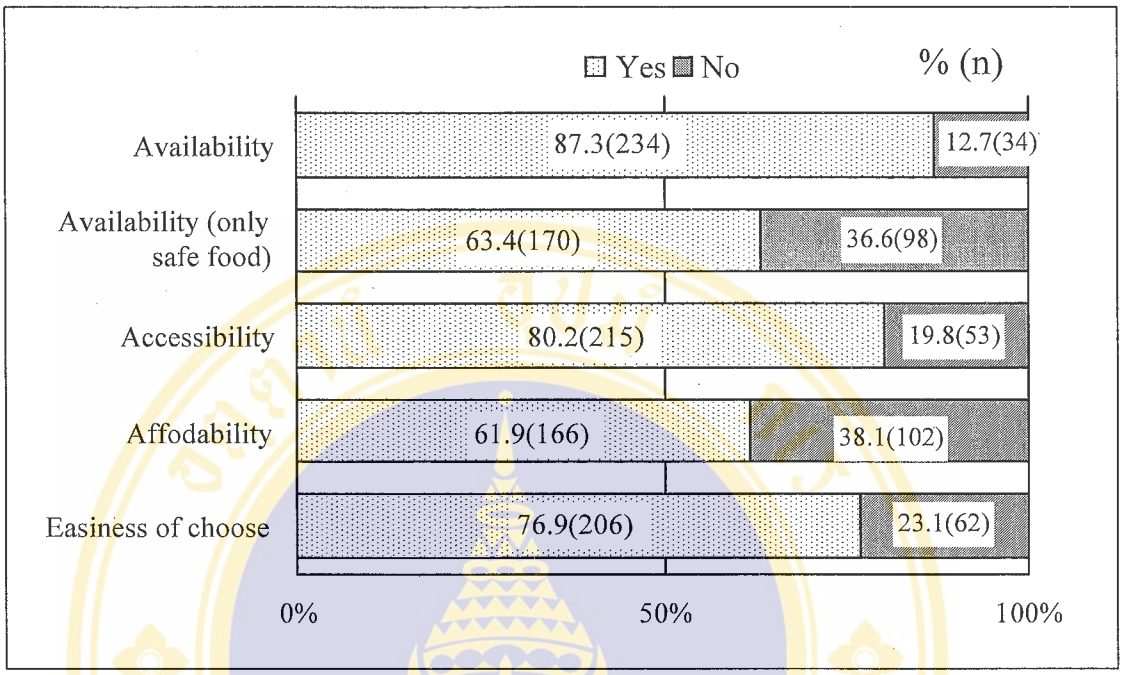


Figure 4 Frequency distribution of enabling factors for healthy eating by item among total number of respondents. (n = 268)

4.3 Reinforcing Factors

4.3.1 Information resources

Of the information sources, 91.4% of respondents got healthy eating information from television, followed by the family at 88.1% and the webpage on the internet came in third at 84.0%. The lowest percentage source of information named by respondents came from billboards, leaflets and radio, each only in the fiftieth percentile (Figure 5). The details of frequency distribution by genders were provided in Appendix F.

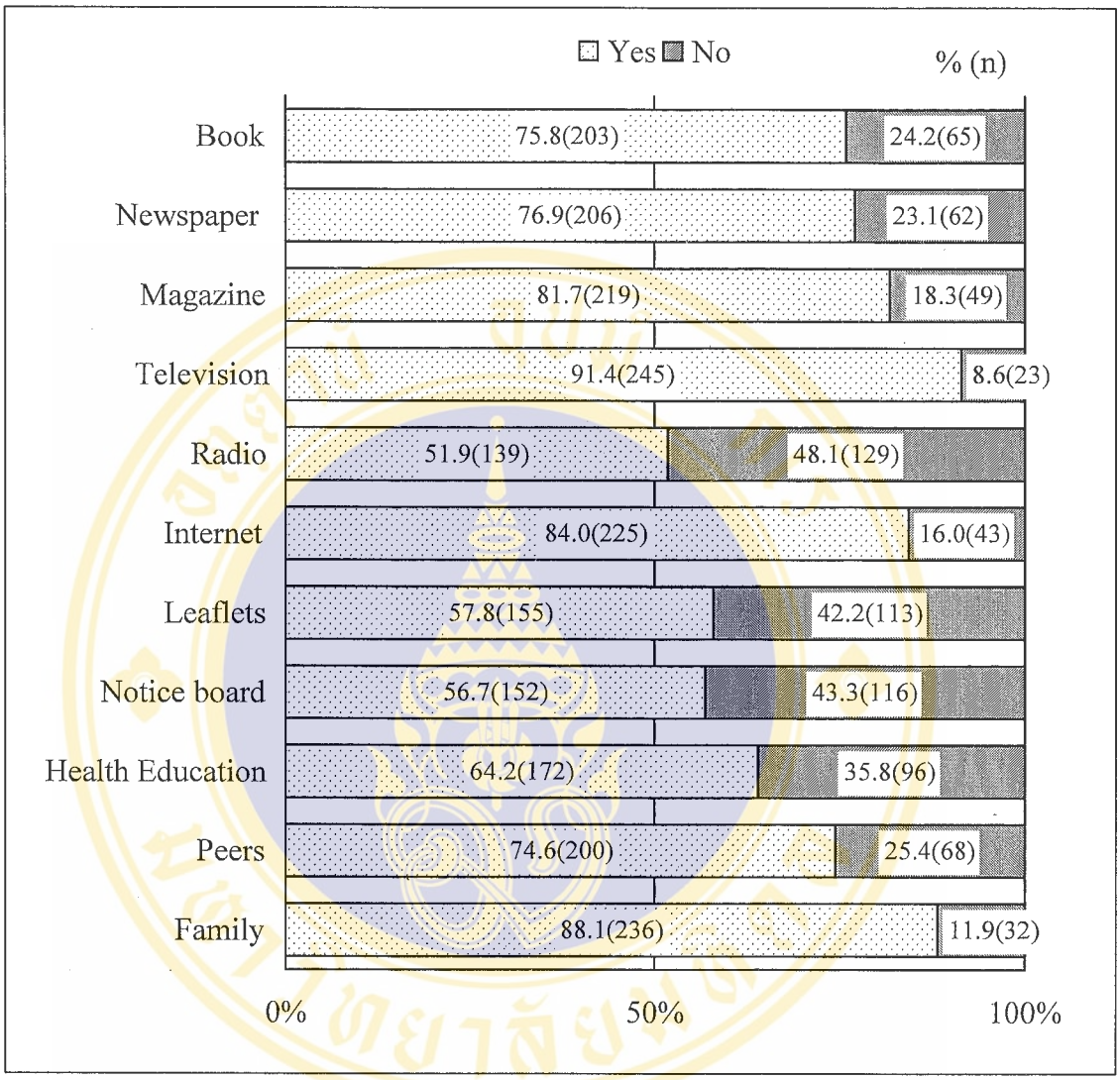


Figure 5 Frequency distribution of information sources about healthy eating by item among total number of respondents. (n =268)

4.3.2 Health related behaviors

Regarding drinking alcohol, 2.2% of respondents answered they drink alcohol two days a week or more than, while 97.8% did not. One of four (25%) respondents answered currently going on a diet by controlling diet. Thirty five percent of respondents had a habit of regular exercise. Smoking, 95.9% of respondents were non-smokers who never smoked (Table 7).

Table 7 Frequency distribution of status of health related behaviors.

Status of Health related behavior		Male (n=108)		Female (n=160)		Total (n-268)	
		n	%	n	%	n	%
Drinking alcohol	Yes	5	4.6	1	0.6	6	2.2
	No	103	95.4	159	99.4	262	97.8
Dieting	Yes	20	18.5	47	29.4	67	25.0
	No	88	81.5	113	70.6	201	75.0
Exercising	Yes	57	52.8	37	23.1	94	35.0
	No	51	47.2	123	76.9	174	64.9
Smoking	Non smoker	97	89.8	160	100	257	95.9
	Ex-smoker	7	6.5	0	0	7	1.5
	Smoker	4	3.7	0	0	4	2.6

4.3 Healthy Eating Behaviors

4.3.1 The level of healthy eating behaviors

Twenty items pertaining to healthy eating behaviors were included in the part 5 of the questionnaire. Answers to questions were recalled by respondents eaten during the past week of the data collection date.

Table 8 shows that the level of healthy eating behaviors. Good level was 16.0% of total number of respondents, Fair level was 68.3% and Poor level was 15.7%. The mean of score was 23.985 with standard deviation of 4.580, with minimum score 9 and maximum score 36 among total number of respondents.

Table 8 Frequency distribution by level of healthy eating behaviors.

Level of healthy eating behaviors	Male (n = 108)		Female (n = 160)		Total (n = 268)	
	n	%	n	%	n	%
Good	16	14.8	27	16.9	43	16.0
Fair	74	68.5	109	68.1	183	68.3
Poor	18	16.7	24	15.0	42	15.7
Mean=23.985	S.D.=4.580		Min=9		Max= 36	

4.3.2 Healthy eating behavior by item analysis

Figure 6 shows frequency distribution of healthy eating behaviors by question item. Concerning five food groups, it was found that 45.9% of respondents ate food from each five food groups regularly. The majority (95.5%) ate a variety of food without frequent repetition regularly (28.7%) or sometimes (66.8%).

Approximately 80% answered that they never or rarely eat unpolished rice. More than 40% eat 4 to 6 of rice-serving spoons of vegetable, and fruit regularly (41.8% and 44.0% respectively), while almost 9% never or rarely eat the vegetables or fruits. Nearly half (48.5%) of them drink 1 to 2 glasses of milk sometimes, 26.9% drunk regularly.

It was found that more than half of respondents never or rarely add sugar or salt respectively, while 14.6% regularly add sugar at every meal, 13.8% regularly add fish sauce at every meal.

Regarding snacking, nearly half (48.9%) of respondents rarely or never eat snacks or dessert, which is oily, fatty, or very sweet. For carbonated beverages, 28.7% rarely or never drink, and 20.9% drink regularly. For instant foods, 39.2% rarely or

never eat, and 13.8% eat regularly. The details of frequency distribution by genders were provided in Appendix G.

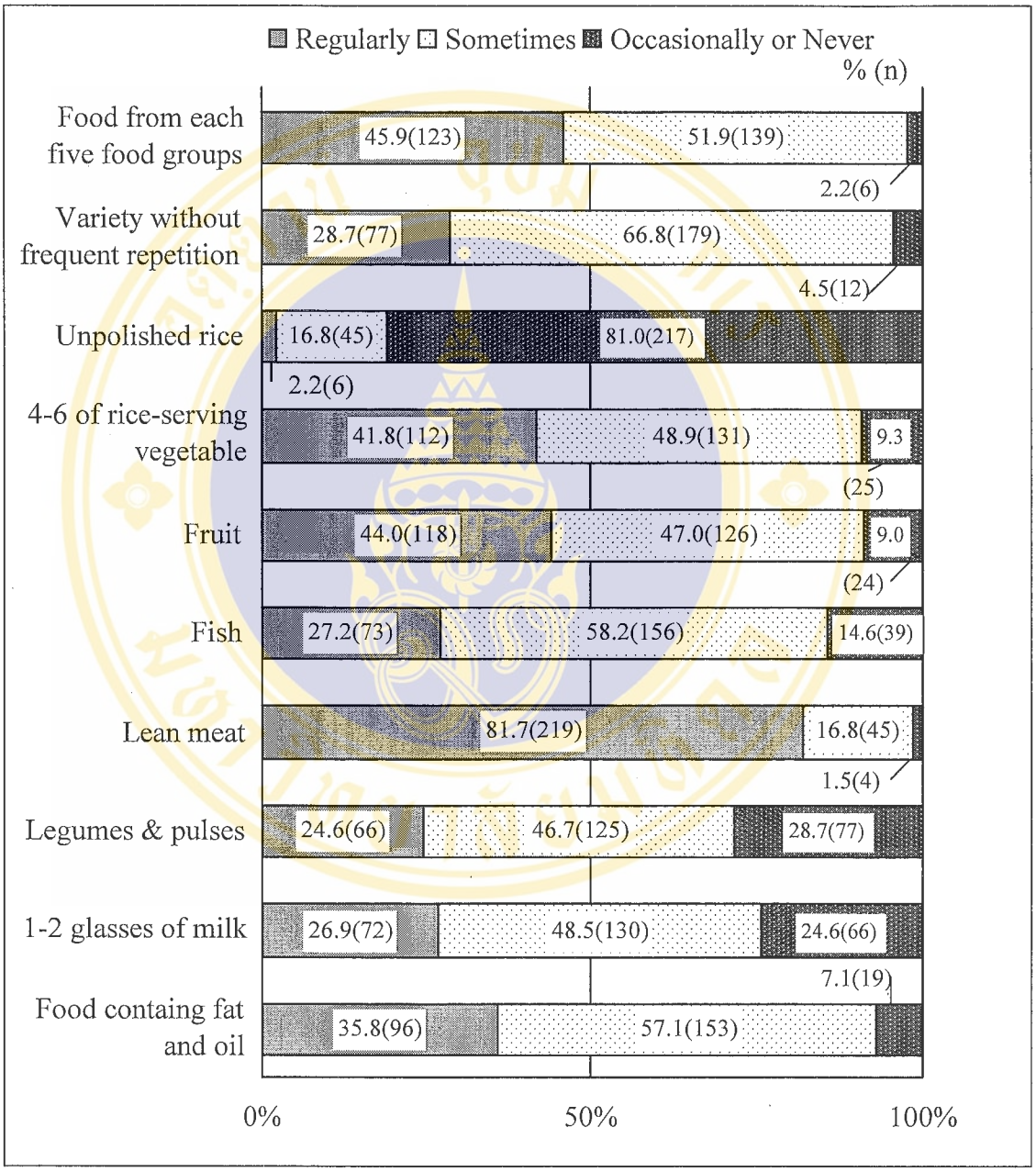


Figure 6 Frequency distribution of healthy eating behaviors by items among total number of respondents. (n=268)

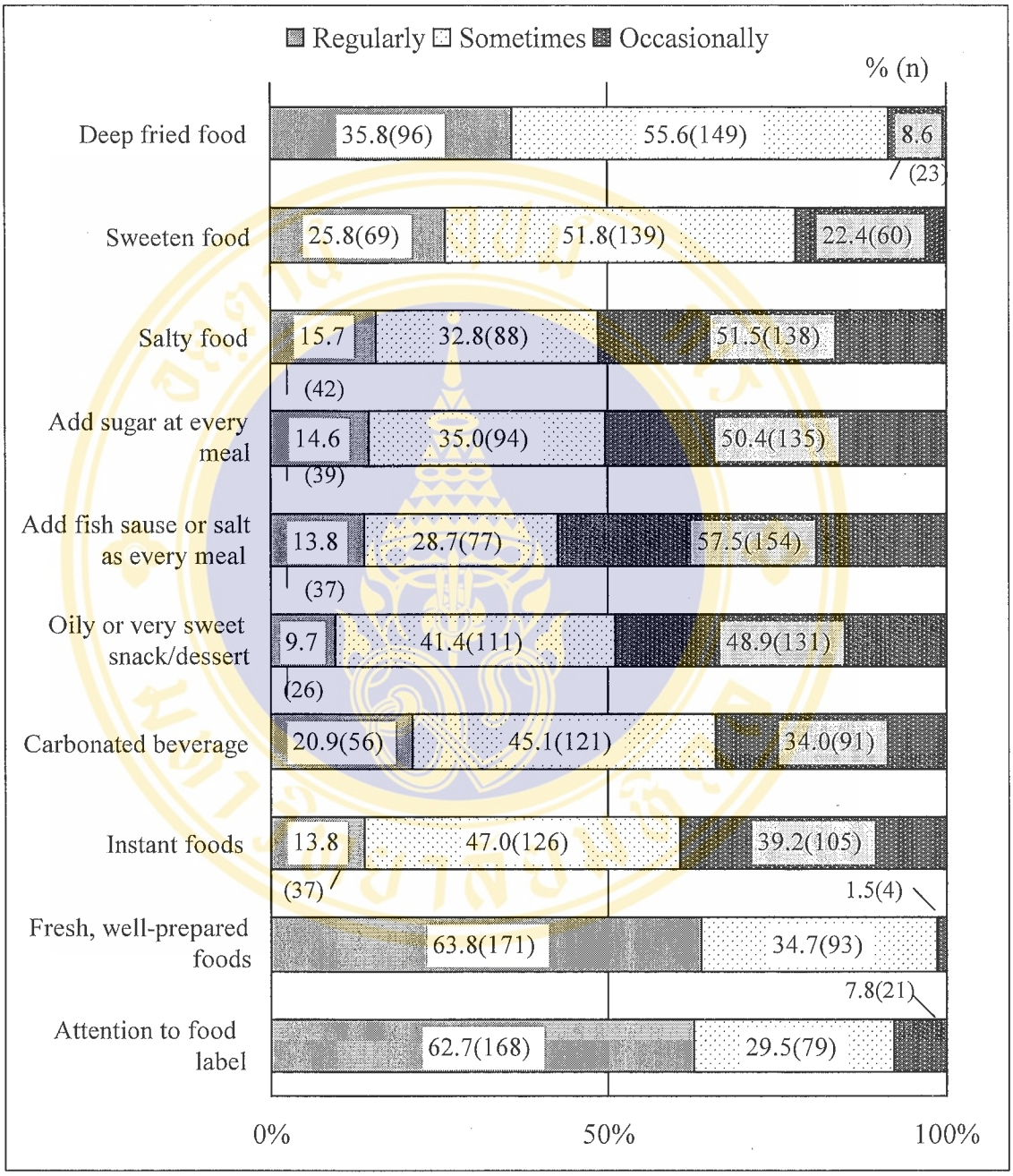


Figure 6 Frequency distribution of healthy eating behaviors by items among total number of respondents (cont.). (n=268)

4.5 Association of Healthy Eating Behaviors and Factors

4.5.1 Association of healthy eating behaviors and factors for total number of respondents

4.5.1.1 Association of healthy eating behaviors and predisposing factors

On study relationship between socio-demographic factors and healthy eating behaviors, independent variables were gender, accommodation type and monthly allowance, however, the results indicated that there were not statistically significant relation between each of those three factors and healthy eating behavior level respectively ($p > 0.05$). (Table 9)

Table 9 Association of healthy eating behaviors and predisposing factors among total number of respondents. (n=286)

Predisposing factors	Healthy eating behaviors				χ^2	p
	Good %	Fair %	Poor %	Total (n)		
Gender						
Male	14.8	68.5	16.7	(108)	0.286	0.867
Female	16.9	68.1	15.0	(160)		
Accommodation type						
Dormitory in campus	16.5	67.0	16.5	(249)	(a)	0.325
Dormitory outside campus	33.3	66.7	0	(3)		
Living with family	7.1	85.8	7.1	(14)		
Other	0	100.0	0	(2)		
Allowance group (Baht)						
< 3,000	15.1	77.4	7.5	(53)	1.487	0.475
3,001 – 4,999	17.4	65.7	16.9	(172)		
> 5,000	11.6	67.5	20.9	(43)		

(a): Fisher's exact

Table 9 Association of healthy eating behaviors and predisposing factors among total number of respondents. (n=286) (cont.)

Predisposing factors	Healthy eating behaviors				χ^2	p
	Good %	Fair %	Poor %	Total (n)		
Knowledge						
High	31.4	60.0	8.6	(35)	8.038	0.090
Moderate	16.0	68.3	15.7	180		
Low	15.1	66.0	18.9	53		
Attitude						
Positive	17.9	70.9	11.2	151	5.362	0.068
Negative	13.6	65.0	21.4	117		

4.5.1.2 Association of healthy eating behaviors and enabling factors

On study relationship between enabling factors toward food for healthy eating and healthy eating behaviors, independent variables were availability of food and safe food, accessibility, affordability and ease of choosing food for healthy eating.

The results of study revealed that availability of food for healthy eating was significantly associated to healthy eating behaviors level ($p< 0.001$). And ease of choosing food for eating healthily was also significantly associated to healthy eating behaviors level ($p=0.003$). Availability of safe food, accessibility and affordability were not found significant association. (Table 10)

Table 10 Association of healthy eating behaviors and enabling factors among total number of respondents. (n=286)

Enabling factors	Healthy eating behaviors				χ^2	p
	Good %	Fair %	Poor %	Total (n)		
Availability						
Yes	17.1	70.5	12.4	(234)	15.258	< 0.001*
No	8.8	52.9	38.2	(34)		
Availability (Safe food)						
Yes	17.6	67.7	14.7	(170)	1.048	0.592
No	13.2	69.4	17.4	(98)		
Accessibility						
Yes	17.2	69.3	13.5	(215)	4.391	0.111
No	11.3	64.2	24.5	(53)		
Affordability						
Yes	19.9	66.3	13.8	(166)	5.176	0.075
No	9.8	71.6	18.6	(102)		
Ease of choosing						
Yes	19.4	68.0	12.6	(206)	11.613	0.003*
No	4.8	69.4	25.8	(62)		

*: $p < 0.05$

4.5.1.3 Association of healthy eating behaviors and reinforcing factors

4.5.1.3.1 Association of healthy eating behaviors and information resources

On study relationship between information resource items and healthy eating behaviors, independent variables included book, newspaper, magazine, television, radio, leaflets, notice board, formal or non-formal health education in school, peers and family.

The results revealed that leaflet had significant association with healthy eating behaviors level (p=0.003). And formal or informal health education in school had also

significant association with healthy eating behavior level (p=0.034). Other factors had not significant association with healthy eating behaviors level (p > 0.05). (Table 11)

4.5.1.3.2 Association of healthy eating behaviors and health-related behaviors

On study relationship between health-related behaviors and healthy eating behaviors level, independent variables were drinking, dieting, exercising and smoking. The result found that there were no significant association between health-related behaviors and healthy eating behaviors level (p > 0.05). (Table 11)

Table 11 Association of healthy eating behaviors and reinforcing factors among total number of respondents (n=268)

Reinforcing factors	Healthy eating behaviors				χ^2	p
	Good %	Fair %	Poor %	Total (n)		
Book						
Yes	17.7	69.0	13.3	(203)	4.548	0.103
No	10.7	66.2	23.1	(65)		
Newspaper					0.866	0.648
Yes	16.0	69.4	14.6	(206)		
No	16.1	64.5	19.4	(62)		
Magazine						
Yes	17.3	67.6	15.1	(219)	1.640	0.440
No	10.2	71.4	18.4	(49)		
Television						
Yes	16.7	67.8	15.5	(245)	(a)	1.000
No	8.7	73.9	17.4	(23)		

(a): Fisher's exact, *: p< 0.05

Table 11 Association of healthy eating behaviors and reinforcing factors among total number of respondents. (n=268) (cont.)

Reinforcing factors	Healthy eating behaviors				χ^2	p
	Good %	Fair %	Poor %	Total (n)		
Radio						
Yes	15.8	69.1	15.1	(139)	0.093	0.955
No	16.3	67.4	16.3	(129)		
Internet						
Yes	14.7	70.2	15.1	(225)	2.713	0.258
No	23.3	58.1	18.6	(43)		
Leaflets						
Yes	22.6	63.2	14.2	(155)	11.677	0.003*
No	7.1	75.2	17.7	(113)		
Notice board						
Yes	15.1	69.8	15.1	(152)	0.356	0.837
No	17.2	66.4	16.4	(116)		
Health education in school						
Yes	19.8	67.4	12.8	(172)	6.740	0.034*
No	9.4	69.8	20.8	(96)		
Peers						
Yes	16.0	68.0	16.0	(200)	0.064	0.968
No	16.2	69.1	14.7	(68)		
Family						
Yes	16.5	67.8	15.7	(236)	0.353	0.838
No	12.5	71.9	15.6	(32)		

(a): Fisher's exact, *: $p < 0.05$

Table 11 Association of healthy eating behaviors and reinforcing factors among total number of respondents. (n=268) (cont.)

Reinforcing factors	Healthy eating behaviors				χ^2	p
	Good %	Fair %	Poor %	Total (n)		
Drinking alcohol						
Yes	100.0	0	0	(6)	(a)	0.5942
No	16.4	67.6	16.0	(262)		
Exercise						
Yes	22.4	61.2	16.4	(67)	2.930	0.231
No	13.9	70.7	15.4	(201)		
Dieting						
Yes	21.3	66.0	12.8	(94)	3.365	0.186
No	13.2	69.6	17.2	(174)		
Smoking						
Smoker	0.0	75.0	25.0	(4)	(a)	1.000
Non-smoker & Ex-smoker	16.3	68.2	15.5	(264)		

(a): Fisher's exact

4.5.2 Significant association of healthy eating behaviors and factors by genders

When analyzing among female and male respondents respectively, among female respondents, there found significant associations between healthy eating behaviors and factors, which were attitude level ($p = 0.021$), availability (Fisher's exact, $p < 0.001$), accessibility (Fisher's exact, $p=0.015$), book ($p = 0.026$) and leaflets ($p = 0.008$). On the other hands, among male respondents, factors which had significant association with healthy eating behaviors level was ease of choosing for food for eating healthily ($p = 0.006$). (Table 12)

Table 12 Significant association of healthy eating behaviors and factors found by genders analysis.

Factors	χ^2	p
Among female respondents		
Attitude level toward healthy eating	7.768	0.021*
Availability of food for eating healthily	(a)	0.003*
Accessibility of food for eating healthily	(a)	0.015*
Book as a healthy eating information source	7.284	0.026*
Leaflets as a healthy eating information source	9.549	0.008*
Among male respondents		
Ease of choosing food for eating healthily	10.395	0.006*

(a): Fisher's exact, *: $p < 0.05$

In summary, factors related to healthy eating behaviors among respondents in this study were availability of healthy food and formal or informal health education in school. Among female respondents, the relevant factors were attitude level toward healthy eating, availability, accessibility for food eating healthily, and books and leaflets as a healthy eating information source. Among male respondents, relevant factors included ease of choosing of food for eating healthily.

CHAPTER 5
DISCUSSION

A cross sectional study was conducted in order to identify the relationship between the healthy eating behaviors and the factors influencing healthy eating behaviors among first year students of Mahidol University at the Salaya Campus. Healthy eating is of immense importance, as one of the most negative consequences of unhealthy eating behaviors are NCDs, which constitute the leading causes of morbidity and mortality in Thailand, as described in earlier chapters.

The factors included in this study of those who were first year university students at the Salaya Campus of Mahidol University, healthy eating behaviors were predisponding factors such as gender, knowledge, attitude, enabling factors such as availability, affordability, and reinforcing factors such as information sources and health-related behavior.

The discussion as followed is from the finding of the study related to factors influencing healthy eating behaviors among 268 respondents of students, based on objectives as following;

5.2 Association between healthy eating behaviors and the factors among total number of students

5.2.1 Predisponding factors

5.2.2 Enabling factors

5.2.3 Reinforcing factors

5.2.4 Enabling factors

5.3 Significant association found by gender analysis

5.1 Association between Healthy Eating Behaviors and the Factors among Total Number of Respondents

5.1.1 Predisponding factors

5.1.1.1 Socio-demographic

The average age of respondents was 18.72 years old in this study. According to WHO classification, this age group is considered to be youth (11), or considered to be late adolescence. They are in the period of transition from childhood to adulthood may extend over variable periods of time, depending upon various factors, and they have a more longitudinal understanding of how their behaviors can affect their health than in early or middle adolescence (11,71).

This study did not find gender to be significantly associated with healthy eating behaviors (p=0.867). A previous study reported that females outside Thailand had healthier eating behaviors than men (48), however this study found that male respondents practiced healthy eating as well as female students.

Considering the student's accommodation types, most of the respondents (92.9%) lived in dormitory inside Salaya campus. Only 5.2 % live with their family and the number was not enough to analysis with Chi-square test. There was no significant association between accommodation type and healthy eating behavior level in this study (Fisher's exact, p= 0.325).

The data of present study suggests that most of them lived independently away from home. A previous study about body image and eating behavior suggested that the first year university students in Salaya were in transition from the home dinner table to the university cafeteria where meals were not prepared in the manner to which they are accustomed. There is also no one to monitor what they eat and whether or not they eat (25).

Previous studies indicated that Family meals are associated with better overall dietary quality among children and adolescents. Positive association was for example, parental presence at the evening meal adolescents' higher consumption of fruits, vegetables, and dairy foods (52). In contrast, negative association was if family members did not like healthy foods or did not have enough time to purchase and prepare healthy foods, the adolescent may not be available those foods at home (53).

On the other hands, it was reported that adolescents spend less time with family and more time with friends. As Adolescents become more independent, eating away from home increases for several reasons for not having family meals, including parent and teen schedules, desire for autonomy and dissatisfaction with family relations (16).

These studies shown above were in western countries, since cultural milieu are determinants of healthy eating that may be working "invisibly" to structure food choice (46), because among Thai population, the proportion of expenditure on food prepared at home and that expended on purchased, ready-to-eat food is shifting in both rural and urban areas (5).

Regarding on monthly allowance, there was a wide range for monthly allowance among the respondents. The lowest was 1,000 baht, which might not be enough if the student had to pay for their food, drinks and other necessities in student's life. A previous study reported that some students had to skip meals because of money constraints (22). The results of this study had no association with healthy eating behaviors level ($p=0.475$). This might be explained that greater allowance enables students to purchase any food they like. Therefore, the affluent allowance can facilitate for both healthy eating behaviors and unhealthy eating behaviors. In addition, there is a need to study, how much money students spend for food from total monthly allowance.

5.1.1.2 Knowledge

Knowledge level on healthy eating and nutrition did not have a significant association with healthy eating behaviors level among total number of students in this study (p=0.090).

A previous study found that adolescents have a significant amount of knowledge regarding good nutrition, healthy foods and health, but did not use their knowledge to make healthy food choices. Some scholars suggest that behavior may not change immediately in response to new knowledge, but the cumulative effects of heightened awareness, increased understanding, and greater command (recognition and recall) of facts will seep into the system of beliefs, values, attitudes, intentions, self-efficacy, health literacy, and eventually, behavior (72). The current study confirms that result and conclusion.

5.1.1.3 Attitude

The results of this study, attitude level toward healthy eating did not have a significant association with healthy eating behaviors level among total number of students (p=0.068).

The theory could be explained that predisposing factors are in the complex system other than attitudes, such as beliefs, values, intentions, self-efficacy, taste preference and so on. In addition, studies indicated that many adolescents feel that healthy eating is not a primary concern during the teenage years, because in relation to other concerns such as taste preferences, hunger, convenience and so on. Moreover, there were reported a lack of sense of urgency about personal health among them (16,58). Attitudes about food are often formed by adolescence and carried forward into later life (54), therefore, it should be concerned continuously.

5.1.2 Enabling factors

The result of this study, there found significant association between healthy eating behaviors level and two variables of enabling factors among total number of students; availability food for eating healthily ($p<0.001$), and ease of choosing food

for eating healthily (p=0.003). Respondents who responded food for eating healthily was available, more likely to practice healthy eating behaviors in good level than those who did not respond. Also those who responded choosing food for eating healthily was easy, more likely to practice healthy eating behaviors in good level. The theory in PRECEDE Model explain the results that mostly conditions of the environment, enabling factors facilitate the performance of an action by individuals. They were factors antecedent to behavior that allow a motivation or aspiration to be realized. The absence of adequate enabling conditions inhibits action (72).

Previous study reported that greater availability of nature foods or healthy foods at school and in young people's social spaces can facilitate their healthy eating behaviors (28,32). Example, better availability of healthy snacks, having a good selection of healthy options in canteens, can facilitate to improve their healthy eating (20,28).

Regarding the ease of choosing food for eating healthily, if the students had difficulties about choosing food for eating healthily, it might be also difficult to practice healthy eating, in contrast, if they feel choosing food for eating healthily is easy, it enable them to practice healthy eating easier than those who feel difficulties. However, why they had the ease or did not have ease, this research did not study the detail. There might be considerable reasons for example, 'lack of knowledge'. It was reported in a previous study that young persons understand the importance of limiting fat, cholesterol, and sodium in one's diet, but they do not know which foods are high in fat, cholesterol, and sodium, or fiber (19). Another considerable reason, lack of skills in appropriate selection of food such as conflicting with taste preference, or peer pressure and so on.

Regarding availability of safe food for eating healthily, which was not significantly associated to healthy eating behaviors level (p=0.592), there could not be found supportive studies reported about the relationship between availability of safe food and healthy eating behaviors. The data from an interview of this study that respondents voluntary answered about their idea toward healthy eating, could be

explained the result that there was no one who linked safe food to healthy eating among the respondents.

Concerning the accessibility of food for eating healthily, which was also not significantly associated to healthy eating behaviors level (p=0.111), which had not a significant association to healthy eating behaviors, could be explained that the place of their living was homogeneous, that most of respondents lived in dormitory inside the same campus.

5.1.3 Reinforcing factors

5.1.3.1 Information resources

The results of present study revealed that two information sources had a significant association with healthy eating behavior level, which were leaflets (p=0.003) and formal or informal health education in school (p=0.034). Respondents who obtained healthy eating information from leaflets or health education in school, more likely to practice healthy eating behavior in good level than those who did not obtain. Previous studies supported the results of present study that reported health education programs had a significant positive effect on improvement in knowledge and to modify students' eating behaviors. One of other consideration might be reliability of the information sources among students. One study in Ukrainia showed that the samples of adult cited health professionals as being more reliable than other information resources for healthy eating (67). Therefore, the leaflet made by professionals, or if student obtained the leaflet from health sector, or health education opportunity, the leaflet could be effective information resource for them. Moreover, one merit of leaflet is can be kept in hand, and read repeatedly when they want to.

Other information source items in the questionnaire included book, mass media, notice board, peers and family were not significantly associated to healthy eating behaviors (p>0.05), though the three highest percentage of information resources for healthy eating were, television, family and webpage on Internet.

Concerning about television, which was the highest percentage as a healthy eating information resource among respondents (91.4%), however, the result was not significant associated with healthy eating behaviors level. This could be explained that television is a source of healthy eating information, but at the same time it could facilitate unhealthy eating behaviors. It was reported that young person's food choice are influenced by commercial advertisements for low nutritive foods. Most of the foods advertisements are high in fat, sugar, or sodium; while almost no advertisements are for healthy foods such as fruits and vegetables (19). In addition, it was indicated that nowadays there was a lot of confusion surrounding what constitutes a healthy diet, a particular food is good or bad for health, the merits of diet or food which sometimes is not scientifically confirmed. Such conflicting nutrition messages can lead to confusion and misinterpretation, causing individual unhealthy eating patterns (9).

Family was the second highest source of information for healthy eating among respondents (88.1%). Previous studies reported that in young people, encouragement from the family was commonly mentioned as support mechanisms for healthy eating, though likewise it was also identified as a barrier (20,28).

5.1.3.2 Health-related behavior

The study shows that there was no significant association between each of health-related behaviors (drinking, dieting, exercising and smoking) and healthy eating behaviors level among total number of respondents ($p>0.05$).

Concerning drinking and smoking, they were not enough number of respondents who drink or smoke for chi-square analysis ($p=0.594$ with Fisher's exact for drinking, and $p=1.000$ with Fisher's exact for smoking).

Regarding dieting, the significant association with healthy eating behaviors level was not found in this study ($p=0.234$). This could be explained that dieting could have both positive and negative effect on healthy eating behaviors. If the dieting was healthy way, it gives positive effect on healthy eating behaviors (e.g more variety of

food with moderation in amount.), in contrast if the way of dieting was unhealthy way, it could be negative effect (e.g. cutting essential food from diet).

The present study shows no significant association between exercise and healthy eating behaviors (p=0.186). A previous study that those who engaged in moderate walking activity and vigorous sporting activity were significantly associated with healthy eating than those who engaged in no walking activity or light sporting activity (47). This result might be explained in that the purpose of doing exercise among students was not confirmed, therefore the purpose of exercise might be for improving health, or for pleasure, or for friendship, or for relaxing. They lacked of sense of urgency about personal health (58), since they are relatively healthy compared to other lifecycle groups, a lower prevalence of infection compared with under-five children, and of chronic disease compared with ageing people (11).

5.2 Significant Association found by Genders

The attitude level in this study was associated with healthy eating behaviors level among females (p=0.021), while it was not significant among male respondents (p=0.783). Female who had positive attitude more likely to practice healthy eating behaviors in good level than who had negative attitude. Book and leaflet as healthy eating information had also significant association with healthy eating behavior among female respondents (p=0.026, p=0.008 respectively). Female who obtained healthy eating information from book or leaflets more likely to practice healthy eating behaviors at a good level than who did not obtain.

One study reported that females are more health conscious than males. They tend to be more reflective about food and health issues in comparison to men who tend to have a more traditional and uncritical view of eating. Males seem to attach more importance to good taste and pleasure derived from food and less importance to health as a criterion in food choice compared to women (59). In addition, previous research suggested that females are sensitive to the way other people think they should eat in order to fulfill the standards and expectations regarding appropriate feminine behavior

and appearance (50). These could be explained the significant association the current study found among female respondents.

Accessibility of food for eating healthily was also associated to healthy eating behaviors level significantly among female respondents (p=0.015). Females who responded food for eating healthily was easily accessible, more likely to practice healthy eating behavior in good level than those who did not respond. The significant association here can be explained that the respondents' place of living was homogeneous. However, there was no supportive study to explain for this gender difference. Ease of choosing food for eating healthily was significantly associated with healthy eating behaviors level among male respondents (p=0.006), while it was not significant among females. Males who responded choosing food for eating healthily was easy, more likely to practice healthy eating behavior at a good level. The result could be explained that female had more knowledge about healthy eating and nutrition than male in present study (p=0.041). Higher knowledge contributes to wiser students choices for healthier diet. In addition, as already shown in this chapter, male seem to attach more importance to good taste and pleasure derived from food and less importance to health as a criterion in food choice compared to women (59).

CHAPTER 6
CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study identified factors influencing healthy eating behaviors among first year Mahidol University students at Salaya campus in Nakhon Pathom province, Thailand. It studied the predisponding factors related to healthy eating including socio-demographic characteristics, knowledge, attitudes, enabling factors, reinforcing factors and healthy eating behaviors. The subjects of this study were 268 first year students in the 2006 academic year. A structured self-administered questionnaire was administered on January 24–25, 2007.

Statistical analysis of the data showed frequencies, percentages, mean, and standard deviation. Chi-square analysis was applied to measure the association between respondents' behaviors in healthy eating (as dependent variable) and predisponding factors, enabling factors and reinforcing factors as independent variables. Based on the results of the study and interpretation, the conclusion concerning these factors are discussed below.

6.1.1 Healthy eating behaviors

The respondents demonstrated healthy eating behaviors at good (16.0%) or fair (68.3%) levels. They recalled eating behaviors for the past 6 to 7 days during the week prior to the data collection day. Those behaviors included respondents who ate from each of the five food groups (45.9%), vegetables (41.8%), fruit (44.0%), fish (27.2%), legumes and pulses (24.6%), milk (26.9%), not adding sugar at every meal (50.4%), not adding fish sauce at every meal (57.5%), paying attention to food labeling (63.8%). Also deep fried food (35.8%), carbonated beverages (20.9%), instant foods (13.8%), and foods that were not fresh or well-prepared (34.4%) were eaten 6 to 7 days in the week. There were few significant associations between

healthy eating behaviors and gender, in terms of fruit (p=0.013), legumes and pulses (p=0.043), and food containing fat and oil (p=0.021).

The healthy eating behaviors found among students ought to be encouraged, while their unhealthy eating behaviors could place students at higher health risk in both short and long term perspectives.

6.1.2 Predisponding factors

Of the total 268 respondents, 60% were female while 40% were male. A majority (94%) were either 19 or 18 years old. Approximately, 93% of sampled group lived in dormitories inside the campus. The average monthly allowance was 4429 baht. Concerning their knowledge about healthy eating and nutrition, 67.2% of respondents had a moderate level of knowledge. The attitude, 56.3% of the total respondents had positive attitudes toward healthy eating.

The result showed that there was no significant association among respondents between healthy eating behaviors level and independent variables of predisponding factors in this study. Among female respondents, attitude level was a significant factor toward healthy eating behaviors level (p=0.021).

6.1.3 Enabling factors

A majority of sample cited that the foods for eating healthily were easily available (87.3%), easily accessible (80.2%). As a result, availability (p<0.001) and ease of choosing food for eating healthily (p=0.003) were significantly associated to healthy eating behaviors level among the total number of respondents. Respondents who cited food for eating healthily was available, were more likely to practice healthy eating behaviors at a good level. Among female respondents, accessibility also showed the significant association to healthy eating behaviors at a good level in addition to the significance of availability. On the other hand, among male respondents, ease of choosing food for healthy eating showed significant association to healthy eating behaviors level.

6.1.4 Reinforcing factors

The most common information sources for healthy eating were cited as television (91%), family (88%) and internet (84%). Leaflet (p=0.003) and formal or non-formal health education in school (p=0.034) showed a significant association with healthy eating behavior levels among respondents. Respondents who obtained healthy eating information from those two sources, were more likely to practice healthy eating behaviors at a good level. Book as a healthy eating information source had significant association with healthy eating behaviors in good level among female respondents.

Regarding health-related behaviors, 97.8% of respondents were non-drinkers, 95.9% were non-smokers, 35% had regular exercise routines, and 25% were on a diet. The results did not find a significant association between healthy eating behaviors level and variables of health-related behavior (p>0.05).

6.2 Recommendations

6.2.1 Recommendations from result of study

From the results of this research, the author offers the following recommendations:

To encourage and enrich students' healthy eating behaviors, better availability of healthy food and meal should be continuously promoted in student's social ambience. In addition, better provision of nutritional information about food and drinks should be provided at locations where they are purchased by students.

The findings suggested the promotion of healthy eating behaviors should be considered especially by developing health education curriculums, aimed at improving the nutritional well being of individuals. The university students represent the final opportunity for nutritional education as they enter adulthood in society. The appropriate concept and practice of healthy eating should be developed though

methods such as attractive leaflets that are suitable for the students with consideration to gender differences.

6.2.2 Recommendations for further studies:

Further studies might examine students' understanding of what constitutes a healthy diet to better clarify factors related to healthy eating behaviors

There should be a research on barriers to enabling factors of healthy eating behaviors including availability, accessibility and ease of choosing healthy food on those enabling factors that had significant associations with the behaviors in the current study.

An experimental study is also suggested with launching a health education program or curriculum.

A study of factors related to healthy eating behaviors expanded to all campuses of Mahidol University in order to examine similar populations at different environment settings.

REFERENCES

1. Amine EK, Baba NH, Belhadj M. Diet, Nutrition and the prevention of chronic Diseases. Geneva: WHO; 2003. Technical Report Series 916.
2. Mathieson A. Addressing the socioeconomic determinants of healthy eating habits and physical activity levels among adolescents, WHO/HBSC FORUM 2006. Copenhagen: WHO Regional Office for Europe; 2006.
3. Barry M. Popkin, Sue Horton, Soowon Kim. The nutritional transition and diet related chronic diseases in Asia: Implications for prevention. Washington: Food Consumption and Nutrition Division, International Food Policy Research Institute; 2001. FCND DISCUSSION PAPER, No.105.
4. Prabhu Pingali. "Westernization of Asian Diets and the transformation of food systems: Implications for research and policy,". Rome: Agricultural and Development Economics Division of the Food and Agriculture Organization of the United Nations; 2004. ESA Working Papers No 04-17.
5. Vongsvat K. The nutrition and health transition in Thailand. Public Health Nutrition 2002; 5: 183-189.
6. WHO global strategy on diet, physical activity and health: South-East Asia regional consultation meeting report. Geneva: WHO; 2003
7. The challenge of obesity in the WHO European Region, Fact sheet EURO/13/05. Copenhagen: WHO Regional Office for Europe; 2005.
8. Chopra M, Gallbraith S, Darnton-Hill I. A global response to a global problem: the epidemic of over nutrition. Bulletin WHO. 2002; 80(12): 952-958.
9. Theobald HE. A whole diet approach to healthy eating. British Foundation Nutrition Bulletin 2004; 29 (1): 44-49.
10. Hiza H, Gerrior SA. Using the Interactive Healthy Eating Index to assess the quality of college students' diets - Research Articles. Family Economics and Nutrition Review. 2002 Wntr.

11. Helene D, V Chandra M, Bruno B. Should adolescents be specifically targeted for nutrition in developing counties? To address which problems, and how? WHO. [Online]. Available from: http//www.who.int/child-adolescent-health/publications/NUTRITION/ Adol_nutrition.htm [Accessed 2007 Mar 6]
12. Aekplakorn W, Chaiyapong Y, Neal B, Chariyalertsak S, Kunanusont C, Phoolcharoen W, Suriyawongpaisal P. Prevalence and determinants of overweight and obesity in Thai adults: results of the Second National Health Examination Survey. Journal of the Medical Association of Thailand. 2004; 87(6): 685-693.
13. Likitmaskul S, Kiattisathavee P, Chaichanwatanakul K, Punnakanta L, Angsusingha K, Tuchinda C. Increasing prevalence of type 2 diabetes mellitus in Thai children and adolescents associated with increasing prevalence of obesity. Journal of Pediatric Endocrinology & Metabolism. 2003; 16(1): 71-77.
14. Ministry of Public health, Thailand. Thailand Health Profile 2001-2004. [Online] Available from: http://www.moph.go.th/ops/health_48/index_eng.htm [Accessed 2007 Mar 6]
15. Promoting Lifelong Healthy Eating; An Overview, CDC's Guidelines for School Health Programs. Atlanta: Adolescent and School Health Division, Center for Chronic Disease prevention and Health Promotion; 2000.
16. Story M, Stang J. Guidelines for Adolescent Nutrition Services, Chapter2; Understanding Adolescent Eating Behaviors. Minneapolis: Center for Leadership, Education and Training in Maternal and Child Nutrition, Division of Epidemiology and Community Health, School of Public Health, University of Minnesota; 2005. [Online] Available from: http://www.epi.umn.edu/let/pubs/adol_book.shtm [Accessed 2007 Mar 6]
17. Gleason P, Suitor C. Children's diet in the mid-1990s: dietary intake and its relationship with school meal participation. Alexandria (VA): US Department of Agriculture; 2001. Report No.CN-01-CD1.

18. Lien N, Jacobs DR Jr, Klepp K-I. Exploring predictors of eating behavior among adolescents by gender and socio-economic status. Public Health Nutri. 2002; 5(5): 671-681.

19. Guidelines for School Health Programs to Promote Lifelong Healthy Eating. U.S. Department of health and human services, Public Health Service Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report 1996; 45 (RR-9); 1-33.

20. Shepherd J, Garcia J, Oliver S, Harden A, Rees R, Brunton G, Oakley A. Barriers to, and Facilitators of, the Health of Young people, A systematic review of evidence on young people's views and on interventions in mental health, physical activity and healthy eating, Report Oct, Volume1: Overview. London: EPPI- Centre, Social Science Research Unit, Institute of Education, University of London; 2002.

21. Chaosap T. Psychosocial and sensory factors associated with fruit and vegetable consumption among adolescents in Khon kaen province. [M.Sc. Thesis in Public Health] Bangkok: Faculty of graduate studies Mahidol university; 2002.

22. Pawaputanond Na Mahasarakam S. Body image, expected body size, and eating behavior of first year Mahidol university students. [M.A. Theisis in Health Social Science] Nakhon Pathom: Faculty of graduate studies Mahidol University; 2001.

23. Virunrach C. Factors affecting food consumption behavior among sixth-grade students, Bangkok metropolitan schools. [M.Sc. Thesis in Public Health] Bangkok: Faculty of Graduate Studies Mahidol University; 2004.

24. Areekul W, Viravathana N, Aimpun P, Watthanakijthavongkul K, Khruacharooen J, Awaiwanont A, Khumtuikhrua C, Silsrikul P, Nilrat P, Saksoong S, Watthanatham J, Suwannahitatorn P, Sirimaneethum P, Meeprom N, Somboonruangsri W, Pongmanee K, Rangsin R. Dietary behaviors and nutritional status of adolescents in a remote rural area of Thailand. J Med Assoc Thai. 2005; 88(3): S240-246.

25. Kelder SH, Perry CL, Klepp K-I, Lytle LL. Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. Am J Public Health. 1994; 84(7): 1121-6.

26. WHO official website. [Online] Available from: http://www.who.int/about/en/ [Accessed 2007 Mar 6]

27. Gurung RAR. Health Psychology: A Cultural Approach. CA: Thomson Wadsworth; 2006.

28. Shepherd J, Harden A, Ress R, Brunton G, Garcia J, Oliver S, Oakley A. Young people and healthy eating, A systematic review of research on barriers and facilitators. London: EPPI- Centre, Social Science Research Unit, Institute of Education, University of London.; 2001. Report Oct. [Online] Available at http://eppi.ioe.ac.uk/EPPIWebContent/hp/reports/health_eating01/healthy_eating_yp.pdf [Accessed 2007 Mar 6]

29. U.S. Department of Health and Human Services, U.S. Department of Agriculture. Dietary guidelines for Americans, 2005. Washington: U.S. Department of Health and Human Services, U.S. Department of Agriculture; 2005.

30. Martinez-Gonzalez MA, Lopez-Azpiazu I, Kearney J, Kearney M, Gibney M, Martinez JA. Definition of healthy eating in the Spanish adult population: a national sample in a pan-European survey. Public Health. 1998; 112(2): 95-101.

31. Margetts BM, Martinez JA, Saba A, Holm L, Kearney M, Moles A. Definitions of 'healthy' eating: a pan-EU survey of consumer attitudes to food, nutrition and health. Eur J Clin Nutr 1997; 51(l2): S23-9

32. Croll JK, Neumark-Sztainer D, Story M. Healthy eating: what does it mean to adolescents?. Journal of Nutrition Education. 2001; 33(4): 193-8.

33. Stefanie A Fila, Chery Smith. Applying the Theory of Planned Behavior to healthy eating behaviors in urban Native American youth. Int J Behav Nutr Phys Act. 2006; 3: 11.

34. House J, Su J, Levy-Milne R. Definitions of healthy eating among university students. Canadian Journal of Dietetic Practice and Research. 2006; 67: 14-18.

35. Akamatsu R, Maeda Y, Hagihara A, Shirakawa T. Interpretations and attitudes toward healthy eating among Japanese workers. Appetite 2004; 44: 123-129.
36. Falk LW, Sobal J, Bisogni CA, Cnnors M, Devine CM. Managing Healthy Eating: Definitions, Classifications, and Strategies. Health Education & Behavior. 2001; 28 (4): 425-39.
37. Paquette MC. Perceptions of healthy eating: state of knowledge and research gaps. Can J Public Health. 2005; 96(3):S15-9, S16-21.
38. Povey R, Conner M, Sparks P, James R, Shepherd R. Interpretations of healthy and unhealthy eating, and implications for dietary change. Health Educ Res. 1998; 13(2): 171-83.
39. Working Group on Food Based Dietary Guideline For Thai. Food Based Dietary Guideline For Thai. Institute of Nutrition, Mahidol University and Nutrition Division, Department of Helath, Ministry of Public Health. 1998.
40. Puwastien P, Raroengwichit M, Sungpuag P, Judprasong K. Thai Food Composition Table. Institute of Nutrition Mahidol University; 1999.
41. Sakata K, Matumura Y, Yoshimura N, Tamaki J, Hashimoto T, Oguri S, Okayama A, Yanagawa. Relationship between skipping breakfast and cardiovascular disease risk factors in the national nutrition survey data. Nippon Koshu Eisei Zasshi 2001; 48(10): 837-41.
42. Ortega RM, Redondo MR, Lopez-Sobaler AM, Quintas ME, Zamora MJ, Andres P, Encinas-Sotillos A. Associations between obesity, breakfast-time food habits and intake of energy and nutrients in a group of elderly Madrid residents. Journal of the American College of Nutrition 1996; 15(1): 65-72.
43. Mcgartland C, Robson PJ, Murray L, Cran G, Savage MJ, Watkins D, Rodney M, Boreham C. Carbonated soft drink consumption and bone mineral density in adolescence: The Northern Ireland Young Hearts Project. Journal of bone and mineral research. 2003; 18(9): 1563-69.
44. Jahns L, Siega-Riz AM, Popkin BM. The increasing prevalence of snacking among US children from 1977 to 1996. J Pediatr 2001; 138(4): 493-98.

45. Pratt BM, Woolfenden SR. Interventions for preventing eating disorders in children and adolescents. John Wiley and Sons, Ltd. The Cochrane Database of Systematic Review 2007; issue1 [Online] Available from http://www.cochrane.org/reviews/en/ab002891.html [Accessed 2007 Mar 6]
46. Raine KD. Determinants of healthy eating in Canada: an overview and synthesis. Can J Public Health. 2005 Jul-Aug; 96(3): S8-14, S8-15.
47. Shelton NJ. What not to eat: inequalities in healthy eating behavior, evidence from the 1998 Scottish Health Survey. Journal of Public Health. 2005; 27 (1): 36–44.
48. Johansson L, Thelle DS, Solvoll K, Bjorneboe GE, Drevon CA. Healthy dietary habits in relation to social determinants and lifestyle factors. Br J Nutr 1999; 81(3): 211-20.
49. Abel T, McCqueen DV. Determinants of selected unhealthy eating behaviours among male and female adults. The Eur J of Public Health 1994; 4(1): 27-32.
50. Roininen K. Evaluation of food choice behavior: Development and validation of health and taste attitude scales. Helsinki: Helsinki University Press; 2001. [Online] Available from https://oa.doria.fi/dspace/bitstream/10024/3097/1evaluati.pdf [Accessed 2007 Mar 6]
51. Nanakorn S, Osaka R, Chusilp K, Tsuda A, Maskasame S, Ratanasiri A. Gender differences in health-related practices among university students in northeast Thailand. Asia Pac J Public Health. 1999; 11(1): 10-5.
52. Videon TM, Manning CK. Influences on adolescent eating patterns: The importance of family meals. Journal of adolescent health 2003; 32(5): 365-73.
53. Giskes K, Patterson C, Turrell G, Newman B. Health and nutrition beliefs and perceptions of Brisbane adolescents. Nutrition & Dietetics 2005; 62(2-3): 69-75.
54. Gallagher K. Dietary practices and nutrition knowledge of adolescents from contrasting social backgrounds. Journal of Consumer Studies and Home Economics 2000; 22 (4): 207–11.

55. Hearty AP, McCarthy SN, Kearney JM, Gibney MJ. Relationship between attitudes towards healthy eating and dietary behaviour, lifestyle and demographic factors in a representative sample of Irish adults. Appetite. 2007; 48(1): 1-11.

56. Martens, MK; van Assema, P; Brug, J. Why do adolescents eat what they eat? Personal and social environmental predictors of fruit, snack and breakfast consumption among 12–14-year-old Dutch students. Public Health Nutrition 2005; 8(8): 1258-65.

57. Margetts BM, Thompson RL, Speller V, McVey D. Factors which influence 'healthy' eating patterns: results from the 1993 Health Education Authority health and lifestyle survey in England. Public Health Nutr. 1998; 1(3): 193-8.

58. Neumark-Sztainer D, Story M, Perry C, Casey MA. Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. J Am Diet Assoc. 1999; 99(8): 929-37.

59. Adams L, Geuens M. Healthy or unhealthy slogans: That's the question.... Belgium: Management School Working Paper Series Nov 2005; 345. [Online] Available from http://www.feb.urgent.be/fac/research/WP/Papers /wp_05_345.pdf [Accessed 2007 Mar 6]

60. Lappalainen R, Saba A, Holm L, Mykkanen H, Gibney MJ, Moles A. Difficulties in trying to eat healthier: descriptive analysis of perceived barriers for healthy eating. Eur J Clin Nutr. 1997; 51(2): S36-40.

61. Neumark-Sztainer D, Story M, Ackard D, Moe J, Perry C. The "family meal": views of adolescents. J Nutr Educ 2000; 32(2):1-6.

62. Nash M. Conference on adolescent nutritional disorders: prevention and treatment - Conferences, Symposia, and Reports. Nutrition Today 1996; Mar-Apr.

63. Post-Skagegård M, Samuelson G, Karlström B, Mohsen R, Berglund L, Bratteby L-E. Changes in food habits in healthy Swedish adolescents during the transition from adolescence to adulthood. Euro J. of Clini Nutr. 2002; 56(6): 532-538.

64. Perry CL, Klepp K-I, Halper A, Dudovitz B, Golden D, Griffin G, Smyth M. Promoting healthy eating and physical activity patterns among adolescents: a pilot study of 'Slice of Life'. Health Education Research, Oxford University Press 1987; 2 (2): 93-103.

65. Klepp K-I, Wilhelmsen BU. Nutrition education in junior high schools: incorporating behavior change strategies into home economics courses. Health Educ Res 1993; 8(4): 547-54.

66. Taylor JP, Evers S, McKenna M. Determinants of healthy eating in children and youth. Can J Public Health 2005; 96(3): S20-6.

67. Biloukha O, Utermohlen V. Healthy eating in Ukraine: attitudes, barriers and information sources. Public Health Nutr 2001; 4(2): 207-15.

68. Carroll SL, Lee RE, Kaur H, Harris KJ, Strother ML, Huang TT. Association of physical activity and dietary behaviours in relation to the body mass index in a national sample of Iranian children and adolescents: CASPIAN Study. J Am Coll Nutr 2006; 25(4): 348-53.

69. Kijboonchoo K. Energy balance and physical activity. Biomedical and Environmental Sciences. 2001; 14(1-2): 130-6.

70. Kelishadi R, Ardalan G, Gheiratmand R, Gouya MM, Razaghi EM, Delavari A, Majdzadeh R, Heshmat R, Motaghian M, Barekati H, Mahmoud-Arabi MS, Riazi MM. Smoking, weight loss intention and obesity-promoting behaviors in college students, CASPIAN Study Group. Bull WHO 2007; 85(1): 19-26.

71. Neinstein LS. Adolescent Health Care, a Practical Guide 4th ed. Philadelphia: Lippincott Williams & Wilkins; 2002.

72. Green LW,.Kreuter MW. Health Program Planning: an educational and ecological approach. 4th ed. NY: McGraw-Hill Companies; 2005.

73. Green, Eriksen, Schor, Mirand, et al. Physician predisposing, enabling, and reinforcing factors predict their practice much as such factors predict patient behavior; [s.l:s.n.]; 2003

74. Ajzen I. Fishbein M. Understanding Attitudes and Predicting Social Behaviour. NJ: Prentice Hall; 1980.

75. Bertakis A, et al. Underrepresentation of men in health care visits. By convention, the National Disease and Therapeutic Index employs the term mentions (including refills and renewal of prescriptions) to reflect drug usage, The term should not be interpreted as equivalent to number of patients, visits, or prescriptions; 2000.

76. Daniel WW. Biostatistics: a foundation for analysis in the health sciences 8th ed. NY: John Wiley & Sons; 2004. P.189

APPENDIX

APPENDIX A
QUESTIONNAIRES

Part 1 Socio-demographic

1. Age……years old.
2. Sex [ ] 1. Female, [ ] 2. Male
3. How much is your current monthly allowance?.....B.
4. Which type is your living situation during the semester on weekday?
   [ ] 1. Dormitory in MU [ ] 2. Dormitory outside MU
   [ ] 3. Living with family [ ] 4. Other…….

Part 2 Knowledge about nutrition and healthy eating

Question	True	False	don't know
1. Soft drinks and desserts are included in the 5 major food groups.			
2. The main nutrients in rice are carbohydrate and protein.			
3. Eating a wide variety of vegetables on a regular basis is one way to reduce the risk of obesity and coronary disease.			
4. A well balanced diet consists mostly of vegetables, and smaller amounts of meat, and dairy products.			
5. Normal adult should eat one egg a day.			
6. Taking calcium is not necessary after stopping growth of bones when young.			
7. Fat content of food cannot be changed by a method of cooking.			
8. Eating vegetable such as *kanaa, pattbung*, and spinach may promote bone health.			
9. Fish and vegetable oils are rich in saturated fat.			
10. Taking more vitamins is always benefit for health.			

Part 3 Attitude

Question	Agree	Undecided	Disagree
1. It is important for my good health to enjoy eating variety of food.			
2. I make conscious effort to try eating variety of food from each food group.			
3. It is important for my good health to eat 3 meals a day without skipping.			
4. It is important to eat adequate amount of rice or alternative carbohydrate food as a staple food.			
5. I make conscious effort to try eating a plenty of vegetables.			
6. I make conscious effort to try drinking milk.			
7. I try to keep the amount of fatty meat I eat to a healthy amount.			
8. I try to keep the amount of sugar I eat to a healthy amount.			
9. I make conscious effort to try drinking un-carbonated beverages.			
10. I do not need to make changes to my diet, as it is healthy enough.			
11. I pay attention to a label on a food or drink package when I purchase.			
12. Eating healthily is just another fashion.			

Part 4 Enabling Factors

Question	YES	NO
1. Foods for eating healthily are easily available.		
2. Safe foods are easily available.		
3. It is easy to access foods for eating healthily around.		
4. Foods for Eating healthily are affordable.		
5. It is easy to choose foods for eating healthily.		

Part 5 Healthy eating behaviors

Please tick in accordance with your eating behaviors in the past week.

Question	Regularly 6-7days/week, at least 1time/day	Sometimes 3-5days/week, at least 1time/day	Occasionally or Never 0-2days/week, at least 1time/day
1. I ate food from following each group, protein group, carbohydrate group, vegetable group, fruits group, and oils and fats group.			
2. I ate variety of food, without frequent repetition.			
3. I ate unpolished rice.			
4. I ate 4-6 of rice-serving spoons of vegetables.			
5. I ate fruits.			
6. I ate fish.			
7. I ate lean meat.			
8. I ate legumes and pulses or food items made from them such as Tofu and soymilk.			
9. I drunk 1-2 glasses of milk in a day.			
10. I ate foods containing fat and oils.			
11. I ate deep fried food.			
12. I ate sweetened foods.			
13. I added sugar at every meal.			
14. I ate salty food or eat all soup in a noodle bowl.			
15. I added fish sauce or salt at every meal.			

16. I ate snack or dessert, which was oily or fatty or very sweet.			
17. I drunk carbonated beverages such as soft drinks, syrup juice, sweetened teas, coffee, smoothie etc.			
18. I ate instant foods.			
19.I ate fresh, well-prepared foods.			
20. When I bought ready-to-eat foods, I paid attention to the label of food written about main ingredients, production date, expiry date etc.			

Part 6 Reinforcing factors

1. Information resources

Do you receive information about healthy eating from following resources?

Information source;	YES	NO
1. Book		
2. Newspaper		
3. Magazine		
4. TV		
5. Radio		
6. Webpage on internet		
7. Leaflet		
8. Notice board		
9. Formal or informal health education in a school		
10. Friend		
11. Family		
12. Other……		

2. Health related behaviors

1. Do you drink alcohol two times a week or more than?

   [ ]Yes [ ]No

2. Are you currently dieting by controlling your diet?

   [ ]Yes [ ]No

3. Do you have a habit of regular exercise? Regular exercise refers exercise which workout lasts “for 20-30 minutes at least and 3-5 times per week”.

   [ ]Yes [ ]No

4. Are you currently a smoker?

   [ ]Yes [ ]Never [ ]Ex-smoker

APPENDIX B

Response about healthy eating

Healthy eating is;

- -good for health.
- -eat 3 meals with 5 food groups.
- -eat variety of food in proper amount.
- -eat enough food, but no too much.
- -eat vegetable at least once a day.
- -eat more nutritious foods.
- -eat food in various cooking.
- -eat healthy food for healthy body.
- -healthy body.
- -toxic elimination.
- -poor taste.
- -a fashion.
- -very rare to find.
- -know that it is good, but never practice.

APPENDIX C: Frequency distribution of students' correct response of knowledge on healthy eating and nutrition by item analysis.

Knowledge about healthy eating and nutrition	Male (n = 108)		Female (n = 160)		Total (n =268)	
	n	%	n	%	n	%
1. Soft drinks and desserts are included in the 5 major food groups.	79	73.2	119	74.4	198	73.9
2. The main nutrients in rice are carbohydrate and protein.	42	39.8	51	31.9	94	35.1
3. Eating a wide variety of vegetables on a regular basis is one way to reduce the risk of obesity and coronary disease.	89	82.4	135	84.4	224	83.6
4. A well balanced diet consists mostly of vegetables, and smaller amounts of meat, and dairy products.	78	72.2	100	62.5	178	66.4
5. Normal adult should eat one egg a day.	42	38.9	72	45.0	114	42.5
6. Taking calcium is not necessary after stopping growth of bones when young.	92	85.2	148	92.5	240	89.6
7. Fat content of food cannot be changed by a method of cooking.	67	62.0	107	66.9	174	64.9
8.Eating vegetable such as *kanaa, pattbung*, and spinach may promote bone health.	36	33.3	59	36.9	95	35.5
9. Fish and vegetable oils are rich in saturated fat.	66	61.1	107	66.9	173	64.6
10.Taking more vitamins is always benefit for health.	37	34.3	60	37.5	97	36.2

Mean = 5.824	S.D. = 1.712	Min = 2 Max = 9	for male
Mean = 5.988	S.D. = 1.445	Min = 2 Max = 9	for female

APPENDIX D: Frequency distribution of attitude toward healthy eating by item analysis. n = 268 (Total), n= 108 (Male), n= 168 (Female)

Attitude toward healthy eating		Agree		Not sure		Disagree	
		n	%	n	%	n	%
1. It is important for my good health to enjoy eating variety of food.	Total	184	68.7	47	17.5	37	13.8
	Male	73	67.6	15	13.9	20	18.5
	Female	111	69.4	32	20.0	17	10.6
2. I make conscious effort to try eating variety of food from each food group.	Total	257	95.9	9	3.4	2	0.8
	Male	101	93.5	7	6.5	0	0
	Female	156	97.5	2	1.3	2	1.3
3. It is important for my good health to eat 3 meals a day without skipping.	Total	250	93.3	12	4.5	6	2.2
	Male	96	88.9	8	7.4	4	3.7
	Female	154	96.3	4	2.5	2	1.3
4. It is important to eat adequate amount of rice or alternative carbohydrate food as a staple food.	Total	127	47.4	67	25.0	74	27.6
	Male	54	50.0	24	22.2	30	27.8
	Female	73	45.6	43	26.9	44	27.5
5. I make conscious effort to try eating a plenty of vegetables.	Total	263	98.1	4	1.5	1	0.4
	Male	105	97.2	3	2.8	0	0
	Female	158	98.8	1	0.6	1	0.6
6. I make conscious effort to try drinking milk.	Total	253	94.4	8	3.0	7	2.6
	Male	99	91.7	4	3.7	5	4.6
	Female	154	96.3	4	2.5	2	1.3
7. I try to keep the amount of fatty meat I eat to a healthy amount.	Total	212	79.1	35	13.1	21	7.8
	Male	83	76.9	17	15.8	8	7.4
	Female	129	80.6	18	11.3	13	8.1
8. I try to keep the amount of sugar I eat to a healthy amount.	Total	247	79.1	35	13.1	21	7.8
	Male	99	91.7	8	7.4	1	0.9
	Female	148	92.5	9	5.6	3	1.9
9. I make conscious effort to try drinking un-carbonated beverages.	Total	227	84.7	29	10.8	12	4.5
	Male	84	77.8	16	14.8	8	7.4
	Female	143	89.4	13	8.1	4	2.5

APPENDIX D (cont.)

10. I do not need to make changes to my diet, as it is healthy enough.	Total	25	9.3	79	29.5	164	61.2
	Male	17	15.7	27	25.0	64	59.3
	Female	8	5.0	52	32.5	100	62.5
11. I pay attention to a label on a food or drink package when I purchase.	Total	255	95.1	10	3.7	3	1.1
	Male	101	93.5	6	5.6	1	0.9
	Female	154	96.3	4	3.8	2	1.3
12. Eating healthily is just another fashion.	Total	9	3.4	37	13.8	222	82.8
	Male	7	6.5	18	16.7	83	76,9
	Female	2	1.3	19	11.9	139	86.9

Mean = 20.713 S.D.= 2.651 Min = 11 Max = 24 for male

Mean = 21.494 S.D.= 2.326 Min = 11 Max = 24 for female

APPENDIX E: Frequency distribution of enabling factors by genders.

Enabling factors for eating healthily		Male (n = 108)		Female (n = 160)	
		n	%	n	%
Availability of food	Yes	94	87.0	140	87.5
	No	14	13.0	20	12.5
Availability of safe food	Yes	79	73.2	91	56.9
	No	29	26.9	69	43.1
Accessibility of food	Yes	80	74.0	135	84.4
	No	28	25.9	25	15.6
Affordability of food	Yes	65	60.2	101	63.1
	No	43	39.8	59	36.9
Ease of choosing food	Yes	74	68.5	132	82.5
	No	34	31.5	28	17.5

APPENDIX F: Frequency distribution of information sources about healthy eating by genders.

Information source	Male (n = 108)		Female (n = 160)	
	n	%	n	%
Book	74	68.5	129	80.6
Newspaper	80	74.1	126	78.8
Magazine	82	75.9	137	85.6
TV	98	90.7	147	91.9
Radio	62	57.4	77	48.1
Webpage on internet	90	83.3	135	84.4
Leaflet	66	61.1	89	55.6
Notice board	62	57.4	90	56.3
Health Education in school	70	64.8	102	63.8
Peers	76	70.4	124	77.5
Family	90	83.3	146	91.3
Other	1	0.9	4	2.5

APPENDIX G: Frequency distribution of healthy eating behaviors by genders.

Healthy eating behaviors		Regularly		Sometimes		Occasionally or Never	
		n	%	n	%	n	%
Food from each five food groups	Male	50	46.3	56	51.9	2	1.9
	Female	73	45.6	83	51.9	4	2.5
Variety without frequent reputation	Male	36	33.3	69	63.9	3	2.8
	Female	41	25.6	110	68.8	9	5.6
Unpolished rice	Male	1	0.9	20	18.5	87	80.6
	Female	5	3.1	25	15.6	130	81.3
4-6 of rice-serving spoon of vegetable	Male	36	33.3	60	55.6	12	11.1
	Female	76	47.5	71	44.4	13	8.1
Fruits	Male	38	35.2	55	50.9	15	13.9
	Female	80	50.0	71	44.4	9	5.6
Fish	Male	28	25.9	66	61.1	14	13.0
	Female	45	28.1	90	56.3	25	15.6
Lean meat	Male	87	80.6	21	19.4	0	0
	Female	132	82.5	24	15.0	4	2.5
Legumes and pulses	Male	35	32.4	43	39.8	30	27.8
	Female	31	19.4	82	51.3	47	29.4
1-2 glasses of milk	Male	35	32.4	44	67.6	29	26.9
	Female	37	23.1	86	53.8	37	23.1
Food containing fat and oil	Male	49	45.4	51	47.2	8	7.4
	Female	47	29.4	102	63.8	11	6.9
Deep fried food	Male	41	38.0	62	57.4	5	4.6
	Female	55	34.4	87	54.4	18	11.3

APPENDIX G (cont.)

Healthy eating behavior		Regularly		Sometimes		Occasionally or Never	
		n	%	n	%	n	%
Sweeten food	Male	34	31.5	57	52.8	17	15.7
	Female	35	21.9	82	51.3	43	26.9
Salty food	Male	16	14.8	38	35.2	54	50.0
	Female	26	16.3	56	35.0	78	48.8
Add sugar at every meal	Male	16	14.8	38	35.2	54	50.0
	Female	23	14.4	56	35.0	81	50.6
Add fish sauce or salt at every meal	Male	14	13.0	28	25.9	66	61.1
	Female	23	14.4	49	30.6	88	55.0
Oily or very sweet snack /dessert	Male	9	8.3	48	44.4	51	47.2
	Female	17	10.6	63	39.4	80	50.0
Carbonated beverage	Male	26	24.1	51	47.2	31	28.7
	Female	30	18.8	70	43.8	60	37.5
Instant foods	Male	12	11.1	50	46.3	46	42.6
	Female	25	15.6	76	47.5	59	36.9
Fresh, well-prepared foods	Male	70	64.8	38	35.2	0	0
	Female	101	63.1	55	34.4	4	2.5
Attention to food label	Male	72	66.7	26	24.1	10	9.3
	Female	96	60.0	53	33.1	11	6.9

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