



**NUTRITIONAL STATUS OF ADOLESCENTS
ATTENDING SECONDARY SCHOOL IN SISATTANAK
DISTRICT, VIENTIANE, LAO PDR**

BY

MISS SONEMANY KEOLANGSY

**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF PUBLIC HEALTH
HEALTH SERVICE MANAGEMENT
FACULTY OF PUBLIC HEALTH
THAMMASAT UNIVERSITY
ACADEMIC YEAR 2017
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INDEPENDENT STUDY

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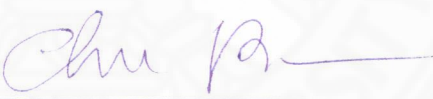
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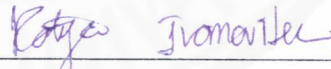
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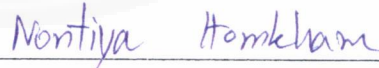
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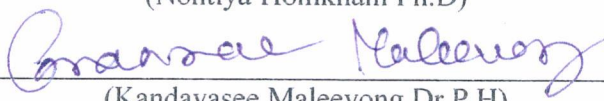
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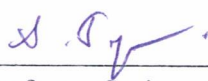
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Independent Study Title	NUTRITIONAL STATUS OF ADOLESCENTS ATTENDING SECONDARY SCHOOL IN SISATTANAK DISTRICT, VIENTIANE, LAO PDR
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ABSTRACT

Dietary patterns and lifestyle behavior are of crucial importance for adolescents' physical, psychosocial and cognitive development. The objective of this cross-sectional study was to assess the nutritional status, and factors related to the nutritional status of adolescents attending secondary schools in the Sisattanak District of the Lao PDR. A total of 300 adolescents, aged 15-19 years, were surveyed by means of a self-administrated questionnaire during the period of April 01-30, 2018. Pearson's chi-square test, univariate and multivariate logistic regressions were applied in the course of the statistical analysis.

Among 300 adolescents, aged 15-19 years, 10.3% were underweight and 23.3% were overweight. A poor eating habit was noted in 67.0% of adolescents, even though 78.0% of them had a good knowledge of nutrition. Factors significantly associated with the nutritional status were low physical activities (AOR=18.5, 95% CI=5.57-61.63), and adolescents living with their parents (AOR=3.8, 95% CI=1.22-11.77). The study also found that teachers, acting as a source of health and nutrition information, can prevent the risk of adolescents' overweight and obesity by 53.1% (AOR=0.47, 95% CI=0.25-0.87).

(2)

In order to improve adolescents' nutritional status, there is a need to include nutrition and physical education programs in school curricula, and to raise the awareness of families and communities about the health benefits of proper dietary behaviors and physically active lifestyles.

Keywords: Nutritional Status/ Adolescents/ Secondary School



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Miss Sonemany Keolangsy

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CHAPTER 1

INTRODUCTION

1.1 Rationale and justification

Adolescents experience a period of transition a rapid physical growth, psychological development and social maturation from childhood to adulthood. World Health Organization (WHO) defines adolescents as persons aged 10-19 years ⁽¹⁾. The 2016 Global Nutrition Report highlights a really important issue: worldwide, millions of kids are eating too much of unhealthy foods, while millions more aren't getting enough of foods to let them grow and thrive. The report shows that access to good, nutritious food is not simply a matter of personal choices, it's a matter of government responsibility. It's time for our world leaders to step up and make bold, brave decisions to tackle all forms of malnutrition ⁽²⁾. The recent studies conducted around the world indicated that the nutrition education interventions on school children have significantly improved their healthy eating habit and informed food choice practices ⁽³⁾.

Adolescences in developing countries facing to undernourished, in the results of that foster them vulnerable to disease and early death. Conversely, overweight and obesity appears to be increasing alarmingly among young people in both low, middle and high-income countries. Over-nutrition represents a big issue, especially in the Pacific island countries, where the prevalence of overweight adolescents was 50% ⁽¹⁾. It is known to be associated with substantial loss of quality of life and social stigmatization that may trigger depression, anxiety, low self-esteem, feelings of guilt and chronic diseases' development in the crop of individuals that may constitute a higher percentage of the world labor force in few years to come ⁽⁴⁾. Knowing that overweight and obesity are the major risk factors of non-communicable disease in later life, it is thus crucial to understand the potential factors associated with body weight status in adolescents ⁽⁵⁾.

Eating habits of adolescents tend to skipping meal, thereby increasing the level of snacking during the day. Lacking of time to prepare food, lack of parental guidance on what to eat and laziness are all reported as reasons for skipping breakfast, thus resulting in malnutrition ⁽⁶⁾. Snack consumption between meals, with no

consideration of the quality and nutrient content of the food is a common practice amongst teenagers ⁽⁷⁾. The most favorite snacks are food rich in sugar and fat and this leads to a poor balanced diet consumption ⁽⁶⁾. Adolescents from resource constrained communities have limited access to and availability of healthy foods and health care services, which puts them at higher risk for poor nutritional health. They encounter numerous health risks, many of which will affect the length and quality of their adult lives ⁽⁸⁾.

According to the International Obesity Task Force (IOTF) in 2011, one in 10 children are overweight with at least 155 million school-age children worldwide being affected. About 30-45 million of the overweight children are classified as obese and account for 2-3% of the world's children aged 5-17 years ⁽⁹⁾. In 2017, The world health organization reported that any low and middle income countries are facing a "double burden" of disease because of the increasing prevalence of overweight and obesity among adolescent aged 5-19 has risen dramatically from just 4% in 1975 to just over 18% in 2016 ⁽¹⁰⁾ and suggested that developing countries should pay close attention to this persistent epidemic of overweight and stunted children since these are risk factors for chronic disease in adulthood ⁽⁶⁾.

In context of Laos, there is very limited data available on the nutritional status of adolescents in general. Only Lao Social Indicator Survey (LSIS) 2011-12 is a major source of nutrition related data in the country although the LSIS explicitly gather nutrition related focusing on the information of mothers and under-5 children. According to the LSIS 2011-12, 44% of children under five years of age are stunted, and 27% are underweight. These findings provide an assumptive severity of the adolescent nutritional problem in Laos ⁽¹¹⁾. A recent study conducted by Vathsana Phouapanya, 2015 reporting the prevalence of overweight and obesity of the secondary school students age 15-19 years in Saysettha district of Vientiane capital of Lao PDR to be 12.8 % (BMI for age ≥ 23.0 kg/m²) ⁽¹²⁾.

The government of the Lao PDR has laid out the National Nutrition Policy (NNP) to promote nutrition with a focus on reducing malnutrition in Lao children and integrated the national Nutrition Strategic plan in "The 8th five years national economic strategic development plan" (Fiscal year 2016-2020) of the Lao government and is one of three challenging MDG targets and is seriously off track aim to achieve SDG 2 "End

hunger, achieve food security and improved nutrition and promote sustainable agriculture,” and contributes directly to several others ⁽¹³⁾.

Sisattanak district is located in Vientiane capital of Lao PDR. It is one of district that join the Sam Sang pilot project called “The building of provinces as strategic units, district as the comprehensively strengthened units, and villages as development units”. Regarding to this policy, the government need to focused on developing the infrastructure, especially economically and socially diverse place that can improve the living conditions of the people in that area. In contrast, the changing rapidly can be affect to the health of people such as decreased physical activity levels, changing eating behavior (fast foods with high in fat, sugar and sodium). As a result of increasing sedentary lifestyles, it can caused overweight in all ages especially in adolescents. Furthermore, there is a lack of information of health status of adolescents in this developing area.

Thus, with the reasons mentioned above, the researcher would like to study the current situation regarding nutritional status of adolescents attending secondary school in Sisattanak District, Vientiane capital of LAO PDR and the related factors. The results of this study would provide a crucial information for those who work with nutritional education which they will integrate into the school curriculum for adolescents and strengthen interventions to improve appropriate public health nutrition for adolescents in Lao PDR.

1.2 Research questions

1. What is nutritional status of adolescents attending secondary school in Sisattanak District, Vientiane capital of LAO PDR?

2. What are the predisposing factors, enabling factors and reinforcing factors associated with the nutritional status of adolescents attending secondary school in Sisattanak District, Vientiane capital of LAO PDR?

1.3 The objectives

1.3.1 General objectives

To assess the nutritional status and factors related to the nutritional status of adolescents attending secondary school in Sisattanak District, Vientiane Capital of LAO PDR.

1.3.2 Specific objectives

- 1) To assess the nutritional status of adolescents attending secondary school in Sisattanak District, Lao PDR.
- 2) To assess the predisposing factors, enabling factors, and reinforcing factors in Sisattanak District, Lao PDR.
- 3) To identify the relationship between the predisposing factors, enabling factors, reinforcing factors and nutritional status.

1.4 Hypotheses

- 1) There is a relationship between the predisposing factors and the nutritional status.
- 2) There is a relationship between the enabling factors and the nutritional status.
- 3) There is a relationship between the reinforcing factors and the nutritional status.

1.5 Variables of the study

1.5.1 Independent Variables

1.5.1.1 Predisposing factors

– General characteristics

- Level of study
- Gender
- Age
- Birth Order

- Number of siblings in family
- Number of household members
- Daily allowance
- **Knowledge towards nutrition**
- **Attitude towards nutrition**
- **Eating habits**
- **Physical activity**

1.5.1.2 Enabling factors

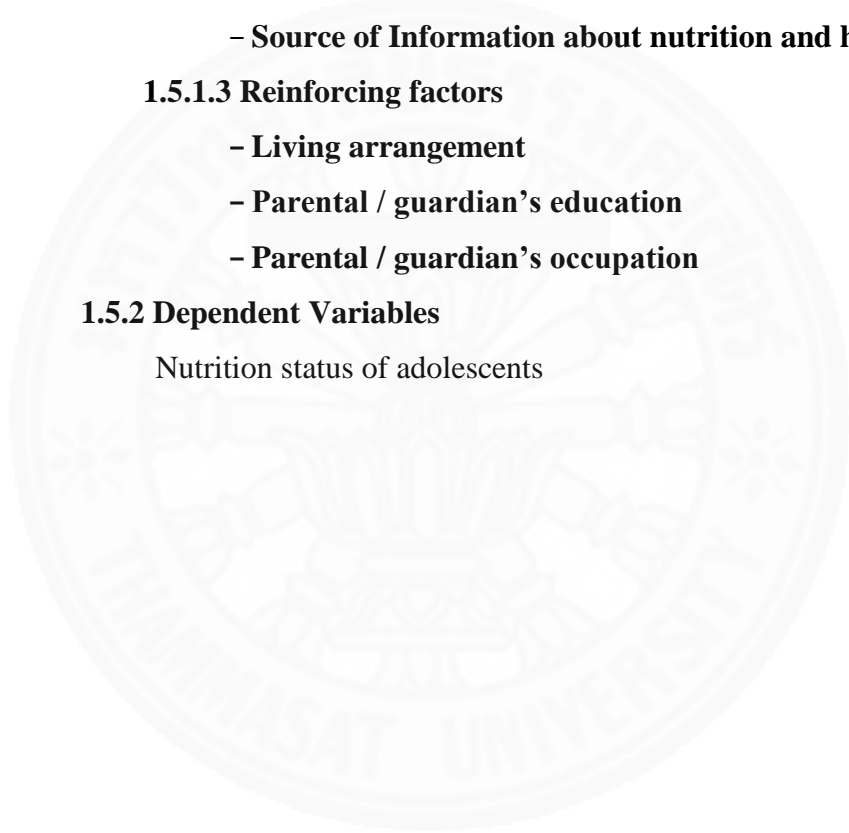
- **Source of Information about nutrition and health**

1.5.1.3 Reinforcing factors

- **Living arrangement**
- **Parental / guardian's education**
- **Parental / guardian's occupation**

1.5.2 Dependent Variables

Nutrition status of adolescents



1.6 Conceptual Framework

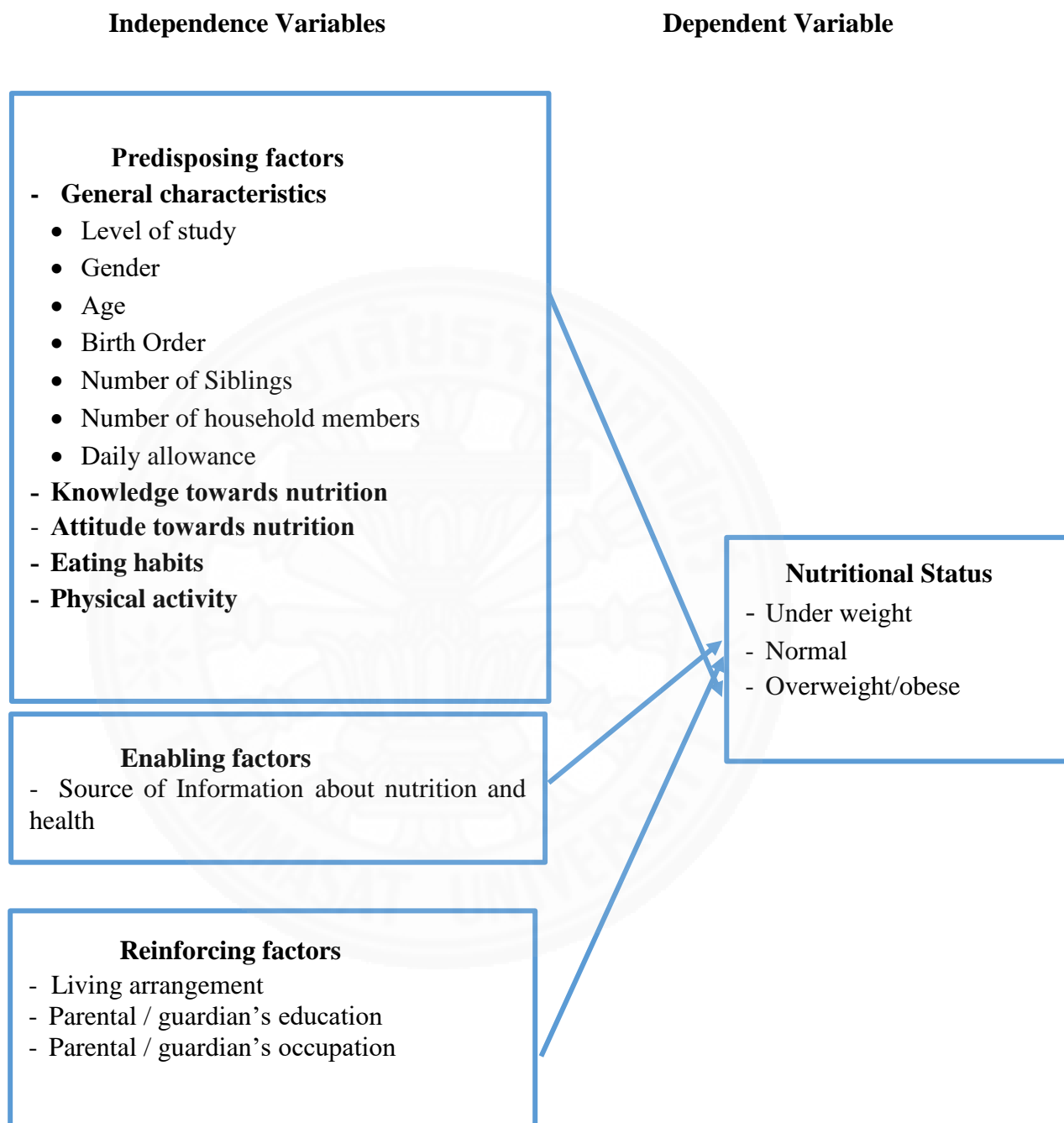


Figure 1.1 The conceptual framework

1.7 Operational definitions

- **Adolescent at secondary school:** refers to student aged between 15 and 19 years and who attending between grade 5 and 7 of secondary school in Sisattanak District, Vientiane Capital, Lao PDR in 2018.

- **Nutritional status:** refers to the current body status of children, be calculated the body mass index by using a child's height and weight and classified as following ⁽¹⁴⁾. Body mass index was calculated by height (meter) divide by weight (kilogram) square.

- Underweight: means a child whose has BMI z-score less than -2SD.

- Normal: means a child whose has BMI z-score from -2SD to +1SD.

- Overweight/obese: means a child whose has BMI z-score from $>+1SD$ to $+2SD$.

- Obese: as a child whose has BMI z-score at least $> +2SD$.

- **Level of study** refers to the grade of the class which student attends.

- **Gender** refers to sex of the student as male or female.

- **Age** refers to the number of years from the year of birth reported by subjects until year at time of interview.

- **Birth order** refers to position of target child in the family, which order the child was born among sibling.

- **Number of siblings** refers to total number of brothers or sisters living under one roof or in the same house.

- **Number of household members** refers to total number of people living together in same house.

- **Daily allowance** refers to daily money given by family members of children.

- **Knowledge towards nutrition** refers to understanding about nutrition in the area of macronutrients, water intake, diet and disease.

- **Attitude towards nutrition** refers to the feeling that positively or negatively influence the behavior or practice of an individual on nutrition.

- **Eating habits** refers to the action to individuals that could affect their nutrition such as eating pattern, drinking pattern.

▪ **Physical activities** refers to daily activities of individuals' participation in activity at school, travel and recreational activities.

▪ **Enabling factors in this study** refers to source of information toward nutrition and health. **Source of information on nutrition and health** refers to information resources about health which students received such as text book, newspaper/magazine, television, radio, family members, teachers, friends, social media, health learning program activities in school, health learning program activities in school.

▪ **Reinforcing factor** refers to parental/guardian's education and parental/guardian's occupation, and family income.

– **Living arrangement** refers to person who take care for the children e.g. Parents, relatives, and orphanage.

– **Parental/Guardian's education** refers to the highest education level of respondent's father/mother/ guardian.

– **Father/Mother/Guardian's occupation** refers to main job of father/mother/ guardian as they reported.

CHAPTER 2

REVIEW OF LITERATURE

Literature Review is composed of the following items:

2.1 The important of proper nutrition for adolescents

2.2 Nutrition Status

2.2.1 Definition of Nutrition

2.2.2 Classification and Assessment of Nutritional Status

2.2.3 Problem with Malnutrition (Obesity, Underweight)

2.2.4 Nutritional status in adolescents

2.3 Theoretical Model PRECEDE PROCEED Model

2.4 Factor Effecting Nutritional Status (Related studies)

2.1 The important of proper nutrition for adolescents

Adolescent is a transitional period during which is becoming, but is not yet an adult and can be a golden period of time for nutritional promotion as it is a vital phase of physical growth and development during this period often influence behaviors in adulthood ⁽¹⁵⁾. An adolescent is at a cross-road of changes rapidly where emotion, hormone, judgment, society, behaviors, identity and the physical body are so in flux that parents and even experts struggle to full understand ⁽¹⁶⁾.

The manifest gulf in experience that separates younger and older adolescents makes it useful to consider this second decade of life as two parts: early adolescence (10–14 years) and late adolescence (15–19 years) ⁽¹⁷⁾. Early adolescence might be broadly considered to stretch between the ages of 10 and 14. It is at this stage that physical changes generally commence, usually beginning with a growth spurt and soon followed by the development of the sex organs and secondary sexual characteristics. They become more keenly aware of their gender than they were as younger children, and they may make adjustments to their behavior or appearance in order to fit in with perceived norms. They may fall victim to, or participate in, bullying, and they may also feel confused about their own personal and sexual identity. Given the social taboos often surrounding puberty, it is particularly important to give early

adolescents all the information they need to protect themselves from malnutrition. For too many children, such knowledge becomes available too late, if at all, when the course of their lives has already been affected and their development and well-being undermined.

Late adolescence encompasses the latter part of the teenage years, broadly between the ages of 15 and 19. The major physical changes have usually occurred by now, although the body is still developing. The brain continues to develop and reorganize itself, and the capacity for analytical and reflective thought is greatly enhanced. Girls in late adolescence tend to be at greater risk than boys of negative health outcomes, including depression, and these risks are often magnified by gender-based discrimination and abuse. Girls are particularly prone to eating disorders such as anorexia and bulimia; this vulnerability derives in part from profound anxieties over body image that are fueled by cultural and media stereotypes of feminine beauty. These risks notwithstanding, late adolescence is a time of opportunity, idealism and promise. It is in these years that adolescents make their way into the world of work or further education, settle on their own identity and world view and start to engage actively in shaping the world around them ⁽¹⁷⁾.

In addition to dietary practices of children and adolescents affect their risk for a number of health problems, including malnutrition, micronutrient malnutrition, obesity and other nutrition-related malnutrition. Inadequate nutrition also lowers resistance to infectious disease, and may adversely affect the ability to function at peak mental and physical ability ⁽¹⁾. On the other hand, excess intake of energy-dense foods may result in additional fat and cause health problems such as obesity. Relative to both obesity and undernutrition problems, some attitudes and practices that are related to cultural values might result in some health problem such as high blood pressure, type 2 diabetes (T2D), metabolic syndrome, sleep disturbances, orthopedic problems, and psychosocial problems ⁽¹⁸⁾. Behavior patterns acquired during adolescence are likely to be continued to adulthood and ‘adolescence period could prevent the prevalence of nutrition-related chronic diseases in adult life’. This could be achieved by optimal nutrition and healthy eating practices that decrease young people’s risk of a number of health problems such as iron deficiency anemia, obesity, eating disorders, and dental

caries. This may also protect them from long-term health problems, such as chronic heart diseases, cancer, stroke, hypertension and osteoporosis ⁽¹⁹⁾.

Globally, an estimated 20% of the total world population are adolescents ⁽²⁰⁾. More than half of all teenagers live in Asia. In absolute numbers, Laos is home to more adolescents (23%) than other countries in Southeast Asia region ⁽²¹⁾.

2.2 Nutrition Status

2.2.1 Definition of Nutrition

Nutrition is science that examines the relationship between diet and health, as the result of the processes whereby the body takes in and uses food for growth, development, and the maintenance of health. These processes include digestion, absorption, and metabolism. One's physical condition as determined by the diet is called nutritional status. Nutritional science is the investigation of how an organism is nourished, and incorporates the study of how nourishment affects personal health, population health, and planetary health. Nutritional science covers a wide spectrum of disciplines ⁽²²⁾.

In nutrition, the diet is the sum of food consumed by a person or other organism. Dietary habit are the habitual decisions an individual or culture make when choosing what foods to eat. Although humans are omnivores, each culture hold some food preferences and some food taboos. Individual dietary choices may be more or less healthy. Proper nutrition requires the proper ingestion and equally important, the absorption of vitamins, minerals, and fuel in the form of carbohydrates, proteins, and fats. Dietary habits and choice play a significant role in health and mortality, and can also define culture and play a role in religion ⁽²³⁾.

2.2.2 Classification and Assessment of Nutritional Status

(1) Anthropometric Assessment

It is the physical measurement of the human body and is commonly uses to estimate the nutritional status of children. Anthropometry measures have been extensively used for identification and classification of children suffering from protein-energy malnutrition (PEM). Different anthropometric measurements are

combined as ratios or indices such as weight-for-age, weight for height and height for age ⁽²⁴⁾.

(2) Body Mass Index (BMI)

Body mass index is defined as the individual's body weight divided by the square of their height and applies to most adult men and women aged 20 and over. For children aged 2 and over, BMI percentile is the best assessment of body fat. The formulas universally used in medicine produce a unit of measure of kg/m². Body mass index may be accurately calculated using the formulas below.

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height}^2 \text{ (m)}^2}$$

BMI can also be determined using a BMI chart, which displays BMI as a function of weight (horizontal axis) and height (vertical axis) using contour lines for different values of BMI or color for different BMI categories ⁽²⁵⁾.

Body Mass Index Classification. A frequent use of the BMI is to assess how much an individual's body weight departs from what is normal or desirable for a person of his or her height. Asian people bodies rank along the index from around 18.5 kg/m² (underweight) to over 30 kg/m² (Obese). This statistical spread is usually described in broad categories: underweight, normal weight, overweight and obese. Regard a BMI of less than 18.5 kg/m² as underweight and may indicate malnutrition, an eating disorder, or other health problems, while a BMI greater than 23 kg/m² is considered overweight and above 30 kg/m² is considered obese. These ranges of BMI values are valid only as statistical categories when applied to adults, and do not predict health ⁽²⁶⁾.

WHO Body Mass Index Classification for adult ⁽²⁷⁾

- Underweight : from 15 to 18.5 kg/m²
- Normal : from 18.5 to 22.99 kg/m²
- Overweight : from 23.00 to 24.99 kg/m²
- At risk obese : from 25.00 to 29.99 kg/m²
- Obese : >30kg/m²

(3) Body Mass Index (BMI) for children

BMI is a calculation that uses a child's height and weight to estimate how much body fat, and is used differently for children. It is calculated the

same way as for adults, but then compared to typical values for other children of the same age. Instead of set thresholds for underweight and overweight, the BMI percentile allows comparison with children of the same sex and age. A BMI that is less than the 5th percentile is considered underweight and above the 95th percentile is considered overweight. Children with a BMI between the 85th and 95th percentile are considered to be at risk of becoming overweight ^(28, 29).

The following classification was used Body Mass Index (BMI) for children Graph (aged 5-19 years) from WHO and will get Percentile BMI and z score with following classification like ⁽²⁷⁾

BMI Percentile BMI classification

- BMI percentile < 5 : Underweight
- BMI percentile ≥ 5 and < 85 : Normal
- BMI percentile ≥ 86 : Overweight/Obese

BMI z-score classification

- BMI z-score < -2 SD : Underweight
- BMI z-score - 2 SD to +1 SD : Normal
- BMI z-score > +1SD to +2SD : Overweight
- BMI z-score > +2SD : Obese

2.2.3 Problem with Malnutrition (Obesity, Underweight)

(1) Underweight or malnutrition

Defining underweight as a BMI is less than 16 and BMI or Weight/Height, Z- Score is less than -2. The overall incidence was 32% and 9%, respectively. When albumin was less than 3.2 g/l., malnutrition was observed in 12% of the population. When comparing these result to normal values (which are dependent on age, gender, and ethnic origin), the researchers believe that the Weight/Height z-score for ages 0 to 10 years and the BMI z score for ages 10 to 18 years are the preferred indices ⁽²⁴⁾.

United Nations World Health Organization, more than starvation the real challenge in developing nations today is malnutrition ⁽²³⁾. Malnutrition has been defined as a pathological condition of varying degrees of severity, and diverse clinical manifestations, resulting from the deficient assimilation of the component of the nutrient complex. This disease affects the physicochemical pattern of the tissues,

reduces the defensive capacity to environmental aggressions, lowers both the deficiency and the ability for work and shortens life ^(24, 30).

Presently the adequate food resources, underweight is generally the result of mental or physical disease. There are hundreds of possible medical causes for excessive weight loss or a person being underweight. Some of the more prevalent include: poverty, famine, torture, anorexia nervosa, bulimia nervosa, cancer treatment, tuberculosis, hyperthyroidism, type 1 diabetes, anxiety and depressive disorders, drug abuse, inflammatory bowel disease, malfunctioning digestive organs, dental pain, obsessive over-training, HIV/AIDS, genetics, stimulant use ⁽³¹⁾. SEAMED-TROPED regional center for community Nutrition University of Indonesia in 2007 studied describe that the prevalence of wasting (low weight-for-height) for all children was 11.4% with district-level prevalence figures ranging from 6.7 to 17.2%, while the overall prevalence of underweight (low weight-for-age) was 43.0% and stunting (low height-for-age) affected 38.1%. The prevalence of anemia among preschool children, defined as a hemoglobin connect ration <11 g/dl, was 48.2% with significant variation between districts from 23.6% to 70.7%. The prevalence of global acute malnutrition (GAM), defined as less than -2SD scores weight-for-height with or without edema was 12.2% among children under five years of age. There were no significant between genders and the prevalence of under nutrition ⁽³²⁾.

(2) Obesity in children and adolescents

Obesity is defined as an excessive accumulation of body fat. Obesity is present when total body weight is mortal 25 percent fat in boys and more than 32 percent fat in girls. Obesity can defined by BMI >30 kg/m² ($>20\%$ from BMI normal). Although, childhood obesity is often defined as a weight-for-height in excess of 120 percent of the ideal, skinfold measures are more acute determinants of fatness ⁽³³⁾.

Not all obese infants become obese children, and not all obese children become obese adults. However, the prevalence of obesity increases with age among both males and females, and there is a greater likelihood that obesity beginning even in early childhood will persist through the life span ⁽³⁴⁾.

Obesity presents numerous problems for the child. In addition to increasing the risk of obesity in adulthood, childhood obesity is the leading cause of

pediatric hypertension, Type II diabetes mellitus, coronary heart disease, and stress on the weight-bearing joints, lowers self-esteem, and affects relationships with peers. Some authorities feel that social and psychological problems are the most significant consequences of obesity in children. These risk factors present in childhood can lead to serious adult medical conditions like heart disease, heart failure, and stroke. Preventing or treating obesity in children may reduce the risk of developing these conditions as they get older ⁽³⁵⁾.

(3) Causes of Childhood Obesity

Childhood obesity was caused various causes centering on an imbalance between energy in (calories obtained from food) and energy out (calories expended in the basal metabolic rate and physical activity). Childhood obesity most likely results from an interaction of nutritional, psychological, familial, and physiological factors.

Population-wide changes in genetics take a great deal of time to manifest themselves and so the recent increase in the prevalence of obesity in the UK and around the world is much more likely to be due to environmental, rather than genetic, changes. However, within any given environmental, some people appear to be more susceptible to becoming obese than others. Indeed, there is evidence from studies of families, adoptees and twins that shows that heritable factors may be responsible for 45-75% of inter-individual variation in BMI ⁽³⁶⁾.

(4) Treatment of Childhood Obesity

Physical Activity. Adopting a formal exercise program, or simply becoming more active, is valuable to burn fat, increase energy expenditure, and maintain lost weight. However, exercise has additional health benefits. Even when children's body weight and fatness did not change following 50 minutes of aerobic exercise three times per week, blood lipid profiles and blood pressure did improve ⁽³³⁾. Physical activity in adolescence may contribute to the development of healthy adult lifestyles and help to reduce chronic diseases' incidence in adulthood ⁽³⁷⁾.

Scientific evidence shows that physical activity provides fundamental health benefits for children and youth. Appropriate levels of physical activity contribute to the development of healthy musculoskeletal tissues (i.e. bones, muscles and joints), healthy cardiovascular system (i.e. heart and lungs), neuromuscular

awareness (i.e. coordination and movement control) and it also facilitates maintenance of a healthy body weight. Moreover, physical activity has been associated with psychological benefits in young people by improving their control over symptoms of anxiety and depression and assisting in social development by providing opportunities for self-expression, building self-confidence, social interaction and integration ⁽³⁸⁾.

Diet Management. Fasting or extreme caloric restriction is not advisable for children. Not only is this approach psychologically stressful, but it may adversely affect growth and the child's perception of "normal" eating. Balanced diets with moderate caloric restriction, especially reduced dietary fat, have been used successfully in treating obesity ⁽³³⁾. Nutrition education may be necessary. Diet management coupled with exercise is an effective treatment for childhood obesity ⁽³⁵⁾.

Behavior Modification. Many behavioral strategies used with adults have been successfully applied to children and adolescents: self-monitoring and recording food intake and physical activity, slowing the rate of eating, limiting the time and place of eating, and using rewards and incentives for desirable behaviors. Particularly effective are behaviorally based treatments that include parents ⁽³⁹⁾.

Prevention of Childhood. Obesity is easier to prevent than to treat, and prevention focuses in large measure on parent education. In infancy, parent education should center on promotion of breastfeeding, recognition of signal of satiety, and delayed introduction of solid foods. In early childhood, education should include proper nutrition, selection of low-fat snacks, good exercise/activity habits, and monitoring of television viewing. In cases where preventive measures cannot totally overcome the influence of hereditary factors, parent education should focus on building self-esteem and address psychological issues ⁽³⁹⁾.

2.2.4 Nutritional status in adolescents

Globally, Most of the world's population lives in countries where overweight and obesity kills more people than underweight. Many low- and middle-income countries are now facing a "double burden" of disease because of the increasing prevalence of overweight and obesity among adolescent began to nearly triple between 1975 and 2016. The prevalence of overweight and obesity among children and adolescents aged 5-19 has risen dramatically from just 4% in 1975 to just over 18% in 2016. The rise has occurred similarly among both boys and girls: in 2016 18% of girls

and 19% of boys were overweight. Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings. In Africa, the number of overweight children under 5 has increased by nearly 50 per cent since 2000. Nearly half of the children under 5 who were overweight or obese in 2016 lived in Asia ⁽¹⁰⁾.

In Thailand, part of the increase in the prevalence of obesity is due to economic growth, and, like most fast developing countries, obesity and associated chronic diseases like heart problems are on the increase. The prevalence of overweight and obesity in adolescents aged 3-18 years were 7.6% and 9.0%, respectively, was higher among boys than girls ⁽⁴⁰⁾. Meanwhile, in Lao PDR the pattern is almost the same with Vathsana Phouapanya ⁽¹²⁾ reporting the prevalence of overweight and obesity among secondary school students age 15-19 years to be 12.8 % (BMI for age ≥ 23.0 kg/m²) however they also have the high prevalence of wasting to be 34% (BMI for age < 18.5 kg/m²).

The government of Lao PDR recognized the problem of malnutrition in Lao children and integrated the national Nutrition Strategic plan in "The 8th five years national economic strategic development plan" (Fiscal year 2016-2020) of the government of Lao PDR (GOL). Reduction of malnutrition is one of three challenging MDG targets and is seriously off track in the Lao PDR. As we are all aware, the MDG timeframe is in its final stages and unmet and ongoing challenges worldwide have been encapsulated in 17 Sustainable Development Goals (SDGs) that build on the foundation laid by the MDGs4. This National Nutrition Strategy and Plan of Action (NNSPA) first and foremost aim to achieve SDG 2 "End hunger, achieve food security and improved nutrition and promote sustainable agriculture," and contributes directly to several others. It is increasingly clear that SDG 2 – as well as various other SDGs – will not be achieved without decisive and integrated action among all stakeholders in the LPDR ⁽⁵⁾.

2.3 Theoretical model PRECEDE PROCEED Model

In the present study, the researcher used the PRECEED-PROCEED MODEL, where Green LW et al ⁽⁴¹⁾. Green provided concepts for evaluation and planning of health education programs. These concepts are applied in the evaluation of supportive factors affecting nutritional status of secondary school adolescents. The central idea is that people's behaviors are caused by multiple factors. The process where one attempts to change, or encourage, a certain behavior has to operate on many factors before one is able to identify the key factors affecting the behavior one wants to change or encourage.

The PRECEDE-PROCEED model was chosen for this study because it offers the most relevant conceptual framework for changing behavior by evaluating all the factors under considerable (PRECEED-PROCEED MODEL stands for "Predisposing, Reinforcing, and Enabling causes in Educational Diagnosis and Evaluation" by Green LW, et al.)

PRECEDE-PROCEED MODEL: the Eight Phases

Phase I: Social Assessment, Participatory Planning, and Situational Analysis.

The focus of this phase is to identify and evaluate the social problems which impact the quality of life of target population. This requires program planners expand their understanding of the community of the social problems which affect the quality of life of the patient, or community, and then the link between the problems and specific health problems which may become the focus of health education with the following methods: social Assessment is that the application of objective and subjective sources of information designed to expand the mutual understanding of people regarding their aspirations for the common good.

Phase II: Epidemiological assessment, behavioral determinants, and environmental determinants.

This procedure helps to determine health issues associated with the quality of life. It helps to identify behavioral and environmental factors related to the quality of life issues.

– **Epidemiological Assessment:** Identifies the health problems, issues, or aspirations upon which the program will focus. Uncovers the behavioral and environmental factors most likely to influence the identified priority health issues. Translates priorities into measurable objectives for the program being developed

– **Behavioral Determinants:** Behaviors or lifestyles that contribute to the occurrence and severity of a health problem. The behavior of others who can directly affect the behavior of the individuals at risk. The action of decision makers whose decisions affect the social or physical environment that influences the individuals at risk.

– **Environmental Determinants:** Those social and physical factors external to the individual, often beyond his or her personal control, that can be modified to support the behavior or influence the health outcome. At this phase in the program planning process, community organizing theories and principles are still relevant, as are interpersonal and individual theories of behavior change such as Social Cognitive Theory.

Phase III: Educational and Ecological Assessment

This phase focuses on the systematic identification of health and other factors which seem to be linked to health problems defined in Phase II. Planners identify the following factors that influence the likelihood that behavioral and environmental change will occur.

Predisposing factors. These are any characteristics of a person or population that motivate behavior prior to occurrence of that behavior, such as knowledge, belief, values and attitudes.

Enabling factors. These factors are defined as characteristics of the environment that facilitate action and skill or resource required to attain specific behavior, such as accessibility, availability, skills and laws (local, state, and federal).

Reinforcing factors. This group consists of rewards and punishment following, or anticipated as a consequence of, a behavior. These factors serve to strengthen the motivation of a particular behavior and include family, peers, teachers, etc.

All three levels of change theories can be useful at this stage.

- Individual-level theories- most appropriate to address predisposing factors.
- Interpersonal-level theories: most appropriate for reinforcing factors; suggest indirect communication channels and methods.
- Community-level theories: most appropriate for enabling factors; suggest environmental changes and methods such as grassroots organizing and advocacy.

Phase IV: Administrative and Policy Assessment and Intervention Alignment.

This phase assesses the program's components with priority determinants of change previously identified to discover resources, organizational barriers and facilitators, and policies needed for implementation and sustainability. The planner must look at macro and micro levels of alignment between the assessment of determinants and the selection of interventions:

- Macro level: Consider the organizational and environmental systems that can affect the desired outcomes.
- Micro level: Focus on individual, peer, family, and others who can influence the intended audience's health behaviors more directly.

Methods for building a comprehensive program

- Matching the ecological levels to broad program components.
- Mapping specific interventions based on theory and prior research and practice to specific predisposing, enabling, and reinforcing factors.
- Pooling prior interventions and community-preferred interventions that might have less evidence to support them.
- Patching those interventions to fill gaps in the evidence-based best practices.

The mapping of interventions to predisposing, reinforcing, and enabling factors is mainly influenced by community-level theories.

Phase V to VIII: Implementation and evaluation

This phase focuses on the data collection plans that should be in place for evaluating the process, impact, and outcome of the program. Process evaluation determines the extent to which the program was implemented according to protocol. Impact evaluation assesses change in predisposing, reinforcing,

and enabling factors, as well as in the behavioral and environmental factors. Outcome Evaluation determines the effect of the program on health and quality of life indicators.

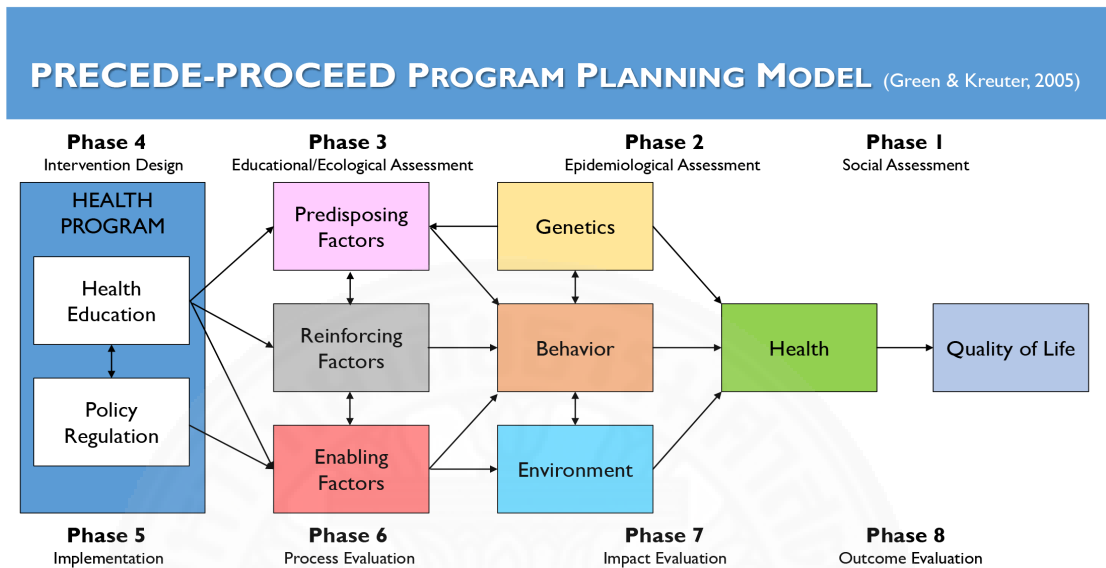


Figure 2.1 Conceptualization of the precede model of health promotion ⁽⁴²⁾

In this study only PRECEDE PROCEED MODEL will be used, because this model can provide a framework for such an examination by positioning that there are three types of factors that provided a collective influence nutrition status.

2.4 Factor effecting nutritional status (related studies)

The following will examine research into nutrition status in worldwide, in the following section, various studies will discussed according to the study variables of this present study.

2.4.1 Predisposing factors

Level of study: Maryam Zarei et al. ⁽⁵⁾ studied the factors affects to the nutritional status of adolescents attending the Iranian Secondary School. The sample covered 296 and the data were analyzed by Chi-square test. The study found that there

was significant association between body weight status and grade (level in school) (p -value < 0.05)

Gender: Maryam Zarei et al. ⁽⁵⁾ studied Nutritional Status of Adolescents Attending the Iranian Secondary School. The sample covered 296 and the data were analyzed by Chi-square test. The study found that 16.4% of females were overweight compared to 12.7% in males. In contrast, 20% of males were severely thin compared to 17.1% of the females. In addition, there was a significant association between gender and BMI (p -value < 0.01). Significantly more females were overweight/obese than males (p -value < 0.05). Badrialaily et al. ⁽³²⁾ studied the factors affecting nutritional status among elementary school students. The study was conducted in Nanggroe Aceh Darussalam Province of Indonesia and found that boys had prevalence of underweight 20.59% than 24.53% among girls.

Age: Esimai OA ⁽⁴³⁾ studied nutrition and health status of adolescents in a private secondary school. This study found that there was significant difference in the mean BMI by gender and age group of adolescent. The association between early adolescence and the prevalence of underweight was higher while the early adolescence had the prevalence of stunting was higher (p -value =0.02). There was a significant association between low BMI and gender (p -value < 0.001); low BMI and period of adolescence (p -value =0.014).

In another research conducted in Adolescent nutrition survey Nepal was found that 71% of male adolescents and 59% of female adolescents were undernourished. In addition, 35% of adolescents were anemic at the time of study. The figure is slightly higher among early adolescents 33% and 27% among late adolescent. The prevalence of anemia was 27% among male whereas almost double 42% among female ⁽⁴⁴⁾.

Birth order: Birth order and the size of one's childhood family influence environment, thereby potentially affecting future achievement this article investigates the hypothesis that they do, presenting two major empirical findings. First, neither birth order nor childhood family size significant influence the level or growth rate of wage, a result that is consistent with previous research. Second, family size is both a statistically and economically significant determinant of women's employment status: women from small families work less than women from large families when

they are young and more than women from large families when they are mature ⁽⁴⁵⁾. The study of Lokeesan V. et al. ⁽⁴⁶⁾ found that there were no association between underweight and birth order. Birth order was statistically not significantly affect the nutritional status among the adolescents.

Number of siblings and number of household members: The study of Himashree B. ⁽⁴⁷⁾ was observed that the number of household member are influenced on the nutritional status of children. There was founded that 36.5% of girls with stunting belonged to families with more than 5 members (p -value=0.009). Moreover, a statistically significant difference was also observed with respect to thinness, where 31.72% of girls belonged to families with more than 5 members (p -value =0.001).

Daily allowance: the recent study of Mirzawati Latifah ⁽⁴⁸⁾ about effect of soft drink, electronic media exposure, family income, pocket money, and nutritional status, on age at menarche among adolescents in Surakarta stated that there was relationship between the pocket money and nutritional status ($b=0.24$; $SE= 0.29$; p -value =0.0401). In another research conducted in the relationship between the nutritional status of secondary school student in 2011, Bangkok of Thailand and average allowance received from parents or guardians per day. This study showed that there was a significant association between the pocket money per day towards the body shape of student (p -value = 0.024) at 0.05 level of significance and significantly higher percentage of overweight and obese children (80%) received Bath 150 or more when compared to underweight children (20%) and normal children (0%) ⁽⁴⁹⁾.

Knowledge toward nutrition: Dietary knowledge and access to resources are critical to improve health and nutrition in a sustainable way. Nutrition promotion and education should be a continual effort to raise public awareness of the importance of good nutritional status in children. According to Vathsana Phouapanya ⁽¹²⁾ focused research on investigating the association between knowledge, attitude toward nutrition and nutritional status. The research found that there was no association, coefficients were 0.0434 (p -value >0.05) and -0.0245 (p -value >0.05), respectively. Conversely, the another research of Kinyua L.W. ⁽⁵⁰⁾ about the Association of Nutrition Knowledge and attitude with dietary practices and Nutritional Status of female undergraduate students attending University Colleges within nairobi metropolis found

that there was association of nutrition knowledge and nutrition status was negative and not significant at ($r = -0.032$, (p -value= 0.549).

Attitude toward nutrition: A study conducted by Kinyua L.W. ⁽⁵⁰⁾ about the Association between Attitude with Dietary Practices and Nutritional Status of Female Undergraduate Students Attending University Colleges within Nairobi Metropolis. The Spearman's rank order correlation between attitude and nutritional status showed a positive relationship but not significant ($r = 0.03$, (p -value= 0.566) and it means that students with positive attitude did not necessary have good nutrition status.

Eating habits: Saimuang S. 2015 ⁽⁵¹⁾ the study focused research on the factors correlated with the incidence of obesity among children in primary schools Kamphaengphet district. This study found that there was a significant association between food behaviors towards obesity among children in early elementary school (p -value = 0.026) at 0.05 level of significance. The another study was designed to assess the snacking habits of both English and French children aged 9-10 years, using a snacking diary administered to school classes over a 4 day period. The result shown that French children ate significantly (p -value<0.05) fewer snacks than British children. British children ate significantly (p -value<0.001) more of their snacks at meal times than their French counterparts ⁽⁵²⁾.

Physical activities: Yvonne ⁽⁵²⁾ Wake studied cultural and lifestyle-related factors that affect obesity in school-aged children living in England and France. The study found that there were significant differences (p -value< 0.01) in the levels of out-of-school physical activity undertaken by the French children and that of the English children.

Desalew A. et al. ⁽⁵³⁾ was studied that the factors are influenced on the nutritional status of primary school children in dire dawa, eastern Ethiopia 2017. They found that children had not engaged in regular physical exercise (AOR = 3.8, 95% CI: 1.5, 9.8) were significant associated with overweight/obesity risk.

2.4.2 Enabling factors

Enabling Factors are factors that rewards or incentives; they contribute to repetition or persistence of behaviors include information and social support, might all be enabling factors ^(54, 55).

Source of information toward nutrition and health: Mundie D. ⁽⁵⁶⁾

studied the correlation between demographic, socio-economic factors and the knowledge, attitude and practice of primary care given. The research found that the sources of nutrition information relied on by the respondents were community health workers (41%), media (29%), school feeding program (24%), health facilities and seminars (6%). Those results were showed that no association between the source of nutrition information and the knowledge level at the 0.05 level of significance (p -value =0.14). Majority (64%) of the respondents with low nutrition knowledge level relied on CHWs while 36% relied on media.

2.4.3 Reinforcing factors

Reinforcing factors are that make it possible for individuals to change behavior. Mostly condition of the environment, enabling factor facilitates motivation to change behavior of students. They were factors antecedence to behavior that allow a motivation or aspiration to be realized ⁽⁵⁴⁾.

Living arrangement: Badrilalaily, 2008 ⁽³²⁾ studied the association between nutritional status and related factors among elementary school students in Indonesia. The result found that accommodation type and people taking care students were significant associated to nutritional status (p -value <0.05).

Parents/guardians' education: A recent study conducted by Roba KT, et al, ⁽⁵⁷⁾ concluded the lower level of parents' education was a significant determinant with under nutrition. Adolescent girls who were from an illiterate father were more likely to develop under nutrition (thinness) compared to those born from fathers of college level training (aOR=3.06, 95% CI=1.67-5.63, p -value<0.001). In addition, those adolescent girls from daily laborer fathers were twice more likely to be undernourished compared to those adolescent girls from merchant fathers (aOR=2.67, 95%, CI: 1.48-4.8, p -value<0.001). As similar of the research of Silabutra & Ramosoota ⁽³²⁾ studied in the supportive factors affecting the nutritional status of adolescents. This study can be found the guardian was significantly association with nutritional status (p -value <0.05) and who taking care student was also significantly associated to nutrition status (p -value <0.05). This previous research has shown that education level of parents are influenced directly to the nutritional status of children because higher education tent to have more knowledge and understanding about their children than those who are not

highly educated. Also a high level of education is related to high income of parents, which means that mothers in this social category can purchase wider variety of food.

Parents/guardians' occupation: According to the research of Lola Adekunle ⁽⁵⁰⁾ studied the effect of family structure on a sample of malnourished urban Nigerian children. The research found that the prevalence of malnutrition was strongly related to the father's occupation (p -value < 0.05). In addition, the research of Roba KT et al ⁽⁵⁷⁾ evaluated the factors associated with nutritional status of the school adolescents, this study can be shown that adolescent girls who have daily laborer fathers were twice more likely to be undernourished compared to adolescent girls from merchant fathers (aOR=2.67, 95%, CI: 1.48-4.8, p -value <0.01). From these related researches, it can be seen that parents' occupation had an important influence on the nutrition status of children. That is the reason why this study had chosen parents' job as one of the variables affecting the nutritional status of adolescent.

Summary of the review of literature

In this chapter, the researcher reviewed the literature which is relevant to the subject matter of the study, i.e., all the predisposing factors, enabling factors and reinforcing factors that affecting the nutritional status of adolescents. All the studies reviewed indicate the factors may affect to the nutritional status of children in positive and also negative sites. There are also warnings with regard to foods children should avoid or not take too much at all. Recommendations for establishing healthy eating habits are given as well.

This study is based on the PRECEDE model developed by Green LW, et al. That model provides a conceptual framework for the analysis of predisposing, enabling and reinforcing factors affecting nutritional status of adolescents attending secondary school. Predisposing factors referred to in this study are general characteristics (level of study, gender, age, birth order, number of siblings in family, number of household members, daily allowance), Knowledge toward nutrition, attitude toward nutrition, eating habits and physical activity. Enabling factors are source of Information about nutrition and health. Reinforcing factors consists of take care, education of parents /guardians, occupation of parents/guardians.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study design

This study was a self-administrated cross sectional study to investigate nutritional status of adolescents attending secondary school in Sisattanak district, Vientiane Capital, LAO PDR.

3.2 Study site

Five secondary schools in Sisattanak district, Vientiane Capital, LAO PDR under the authority of the Ministry of Education included Phanmanh School, Phiawat School, Chanthaviphone School, Vitaya School and Sisattanak School were study sites.

3.3 Study Population

The target population of the study include school-going adolescents aged between 15 and 19 years who were in grade 5 to grade 7 attending five secondary schools in Sisattanak district, Vientiane Capital, LAO PDR.

3.3.1 Inclusion Criteria

Inclusion of adolescents in the study was followed criteria to be eligible participation in the study:

- Adolescents who were from 15 to 19 years and grade 5-7 at the five schools that were considered eligible for this study.
- Adolescents who could answer the questions, agree to measure the anthropometric appearances and sign an inform consent.

3.3.2 Exclusion Criteria

Adolescents who met any of the following criteria will be excluded from participating in the study

- Adolescents unwilling and/or unable to provide informed consent.

- Adolescents who had deformed anthropometric appearances
- Adolescents who were pregnant at the time of data collection
- Adolescents who were absent from school at time of data collection.

3.4 Sampling Technique

3.4.1 Sample Size

Total adolescents attending secondary school in Sisattanak district, Vientiane Capital, LAO PDR was 1,811. The prevalence of overweight and obesity of the secondary school students age 15-19 years was 13 % (BMI for age ≥ 23.0 kg/m²)⁽¹²⁾

The sample size was estimated and calculated by using following formula⁽⁵⁸⁾

$$n_{srs} = \frac{Z^2 \frac{\alpha}{1-\alpha} P(1-P)}{d^2}$$

where

n_{srs} = number of sample size of simple random sampling

Z = Value from normal distribution associated with 95% confidence level = **1.96**

d = Relative different of proportion of overweight

defined as 30%. $d = \lambda P = (0.3)(0.13) = 0.039$

P = sample proportion of overweight for adolescent 15-19 years (BMI for age ≥ 23.0 kg/m²) defined as P = 0.13⁽¹²⁾

N = Total population of students in grade 5-7 in five school were 1,811 students.

n_f = estimated sample size after adjusted for size of population

On the basis of this equation, the sample size of the study were found to be as follows:

$$n_{srs} = \frac{(1.96)^2 * (0.13) * (1-0.13)}{(0.039)^2} = 285.65 = 286$$

$$n_f = \frac{n_{srs}}{1 + \frac{n_{srs}}{N}} = \frac{286}{1 + \frac{286}{1811}} = 250$$

This means that the sample size of this study could not be less than 250 to ensure the validity of the findings. To avoid the dropout subjects, we increased the attrition rate by 10 % of total sample size. So we got the final sample size were **300**

3.4.2 Sampling Technique

The sample size was allocated to sex, study level and schools according to the number of students. The calculated sample size was distributed with equally number of student in each school (i.e., Phanmanh School, Phiawat School, Chanthaviphone School, Vitaya School and Sisattanak School). Finally, the study participants were selected by using systemic random sampling from the prepared sampling frame or student ID. If students selected students absent or unavailable in the day at data collection, these students were collect in the next day.

3.5 Duration of data collection

Duration of data collection was 3 weeks after obtaining ethical approval from the Lao National Ethics Committee for Health Research

3.6 Research instrument and data collection

3.6.1 Questionnaire

A self-administrated questionnaire was used for data collection. Initially, the questionnaire was prepared in English by the researcher, then translated into Lao language. The questionnaire mostly was including multiple choice question, and some like snacking habit, daily allowance, we provided by open ended questionnaire.

The questionnaire consisted of 7 parts as follows:

Part 1 General characteristics

This part contained with 9 questions including grade, gender, age, birth order, number of siblings, number of household members, and daily allowance, history chronic disease and food supplements.

Part 2 Knowledge toward nutrition

This part consisted of the 15 items including understanding about nutrition term of good health, water intake, diet and disease. For a score-based indicator of knowledge, each respondent was given a score based on the number of correct responses provided and ranked from 0-15 points ⁽⁵⁹⁾.

2.1 For item 1, 5, 6, 7, 8, 11, 14 and 15 each respond was scored as follows:

“Yes”	=	1 point
“No”	=	0 point

This mean that the sequencing of these items were related to food that the adolescent should eat and be recommended to do.

2.2 For item 2, 3, 4, 9, 10, 12 and 13 each respond were scored as follows:

“Yes”	=	0 point
“No”	=	1 point

This mean that the sequencing of these items were related to understanding about nutrition that the adolescents should not eat and not be recommended to do.

The criterion of knowledge level was based on the percentage of knowledge score and classified into three groups following Bloom’s criteria ⁽⁶⁰⁾

– Score 0-8 (<60%)	:	Poor knowledge
– Score 9-12 (60-80%)	:	Moderate knowledge
– Score 13-15 (>80%)	:	Good knowledge

Part 3 Attitude toward nutrition

The attitude part consisted with 15 items including positively or negatively influence the behavior or practice of an individual. Likert scale ranging from strong agree to strong disagree will be applied. A questionnaire with five points Likert scale attitude statements was used to determine strength of the attitude toward nutrition by students ⁽⁶¹⁾. Each respondent was given a score based on the number of responses provided and ranked from 15-75 points.

3.1 For the positive questions were in items 1, 2, 5, 7, 9, 11, 13, 14 and 15 with five answers to choices and got scores as:

“Strong disagree”	=	1 points
“Disagree”	=	2 points
“Uncertain”	=	3 points
“Agree”	=	4 points

“Strong agree” = 5 points

3.2 For the negative questions were in items 3, 4, 6, 8, 10 and 12 with five answers to choices and got scores as:

“Strong disagree” = 5 points

“Disagree” = 4 points

“Uncertain” = 3 points

“Agree” = 2 points

“Strong agree” = 1 points

Using attitude score guide, the scored assigned were summed up. The higher the score was 75. Then the score was modified on Bloom’s criteria ⁽⁶⁰⁾ and classified into three groups as following:

- Score < 51 (<60%) : Poor attitude
- Score 51-63 (60-80%) : Moderate attitude
- Score > 63 (>80%) : Good attitude

Part 4 Eating habits toward nutrition

This part contains 20 items that was asked about the action to individuals that could affect their nutrition such as eating pattern, drinking pattern. Nutrient estimates from the Frequency Food Questionnaire data was calculated using the product-sum method ⁽⁶²⁾

1. For the positive questions were in items 3, 6, 7, 9, 11 and 13 with nine answers to choices and got scores as:

“Never” = 1 points

“1-3 times per month” = 2 points

“1 times per week” = 3 points

“2-4 times per week” = 4 points

“5-6 times per week” = 5 points

“1 times per day” = 6 points

“2-3 times per day” = 7 points

“4-5 times per day” = 8 points

“≥ 6 times per day” = 9 points

2. For the negative questions were in items 1, 2, 4, 5, 8, 10, 12, 14, 15, 16, 17, 18, 19, and 20 with nine answers to choices and got scores as:

“Never”	= 9 points
“1-3 times per month”	= 8 points
“1 times per week”	= 7 points
“2-4 times per week”	= 6 points
“5-6 times per week”	= 5 points
“1 times per day”	= 4 points
“2-3 times per day”	= 3 points
“4-5 times per day”	= 2 points
“≥ 6 times per day”	= 1 points

Means and standard deviations (SD) was calculated for nutrient intakes assessed by the semi-FFQs. The scores of attitude ranked from 15-75 points and the scores of eating habits was classified into three groups as following modified on Bloom’s criteria ⁽⁶⁰⁾

- Score < 100 (<50%) : Poor eating habit
- Score 100-132 (50-70%) : Moderate eating habit
- Score > 132 (>70%) : Good eating habit

Part 5 Physical activities regarding on nutrition status

This part contained 16 items that asked about information on physical activity (PA) participation in three settings (or domains) and sedentary behavior of individuals including activities at school, traveling to places, recreational activities.

Using Global Physical Activities Questionnaire (GPAQ) score guide, items was coded and summed up the score for each items (Metabolic Equivalent (METs)) was defined as 1 kcal/kg/hour and was equivalent to the energy cost of sitting quietly ⁽⁶³⁾.

MET values was calculated by

Domain	METS value
Work	<ul style="list-style-type: none"> • Moderate MET value = 4.0 • Vigorous MET value = 8.0
Transport	Cycling and walking MET value = 4.0
Recreation	<ul style="list-style-type: none"> • Moderate MET value = 4.0 • Vigorous MET value = 8.0

Total PA. MET-minutes/week = the sum of the total MET minutes of activity computed for each setting

$$\text{Total PA.} = [(P2 * P3 * 8) + (P5 * P6 * 4) + (P8 * P9 * 4) + (P11 * P12 * 8) + (P14 * P15 * 4)]$$

It was classified into three groups as following:

Level of total physical activity	Physical activity cutoff value
High	<ul style="list-style-type: none"> • IF: $(P2 + P11) \geq 3$ days AND Total PA. MET minutes per week is ≥ 1500 OR • IF: $(P2 + P5 + P8 + P11 + P14) \geq 7$ days AND total PA. MET minutes per week is ≥ 3000
Moderate	<ul style="list-style-type: none"> • IF: $(P2 + P11) \geq 3$ days AND $((P2 * P3) + (P11 * P12)) \geq 60$ minutes OR • IF: $(P5 + P8 + P14) \geq 5$ days AND $((P5 * P6) + (P8 * P9) + (P14 * P15)) \geq 150$ minutes OR • IF: $(P2 + P5 + P8 + P11 + P14) \geq 5$ days AND Total physical activity MET minutes per week ≥ 600
Low	IF: the value does not reach the criteria for either high or moderate levels of physical activity

Part 6 Enabling factors regarding on nutrition status

This part consisted of 2 questions, regarding to the source of information about nutrition and health.

Part 7 Reinforcing factors regarding on nutrition status

This part consisted of 7 questions, regarding about the information of parents/caregiver's education and occupation.

3.6.2 Anthropometric Measurement

Anthropometric measurement was used to measure weight and height of adolescent using bathroom weight scale. The Tanita UM-070 weight had ability to measure weight from 0 to 140 kg in light clothing without shoes using a bathroom scale weight was measured within a ± 0.5 kg tolerance by bathroom scale and after every 10 measurements, the accuracy of the scale was checked by recalibrating it with a standard weight ⁽⁶⁴⁾.

Height measurements was carried out with an accuracy of ± 0.5 cm with a non-flexible plastic measuring rod. For measuring their height, the students was asked to stand on a flat surface with their heads up, their shoes off, and their feet placed together so that their knees, pelvis, shoulders, and back would lie along a straight line according to a standard procedure and eye was looking straight ahead ⁽⁶⁵⁾.

Body Mass Index (BMI) was analyzed based on weight-for-height (kg/m^2), then compare with Body Mass Index (BMI) children Graph for age from WHO-NCHS and got Z-score BMI (see figure 1 and 2 on appendix part) with following classification ⁽¹⁴⁾.

- BMI Z-score $< -2\text{SD}$	:	Underweight
- BMI Z-score $-2 \text{SD to } +1\text{SD}$	:	Normal
- BMI Z-score $> +1 \text{SD to } +2\text{SD}$	:	Overweight
- BMI Z-score $> +2\text{SD}$	:	Obese

3.6.3 Data Collection

After taking the permission of school authorities and the students, data for each subject was collected on separate questionnaires. All respondents were given an identity number. Their name, age and their anthropometric measurements were noted and coded to facilitate entry of data into the computer.

The survey was conducted as self-administrated questionnaire (Data collector was explained the purpose of the study)

Questionnaire was translated into Lao language with the help of advisors.

3.7 Test of Validity

Before data collection, the instruments were first submitted to the committee for examination to ensure the validity of their content and language. They were pre-tested for validity and reliability. The content validity of instruments was conducted with expert's panel to review, edit, and double-check the questionnaire, to ensure the validity of the initial and translation of the questionnaire. Panel members were recruited as experts from the field of public health nutrition.

The weight scale was standardized every ten measurements and the accuracy of the scale was recalibrated it with a standard weight.

3.8 Data Analysis

3.8.1 Data Entry

Data was coded, entered into Epidata3.1 software. Before transferring to analyze by SPSS after rechecking of data, cleaning for errors and missing values, coding, scoring and recoding had been carried out for the following parts of the questionnaire.

3.8.2 Statistical Techniques

After data collection and data entry completed, data analysis took place in the following manner:

– Descriptive statistics was used to describe the demographic characteristics of the subjects. Categorical variables were presented as frequency and percentages while continuous variables were presented as mean and standard deviation.

– Chi-square test were used to compare individual-level characteristics according to nutrition status (i.e., underweight, normal weight and overweight). Univariate and multivariate logistic regression analyses were used to identify any association between independent variables (i.e., individual characteristics, predisposing factors, enabling factors and reinforcing factors) and nutrition status (underweight versus normal weight groups and overweight versus normal weight groups). Univariate logistic regression was performed to calculate crude odds ratio (OR) with corresponding 95% confidence interval. Independent variables associated (p -value <0.10) with nutrition status (model 1: underweight versus normal weight groups and model 2: overweight versus normal weight groups) in a univariate analysis were included into multiple logistic regression (multivariate analysis) (66). Multiple logistic regression was performed to calculate adjusted odds ratio (aOR) with corresponding 95% confidence interval by using SPSS. Backward stepwise selection was applied with the level of significance for variables to remain in the final model set at 0.05. A p -value <0.05 was considered statistically significant. In addition, education

caregiver was excluded from logistic regression analyses, because the number of subjects including in under college level of overweight category was zero.

3.9 Ethical consideration

Data collection performed after obtaining the Certificate of Ethical Clearance from the National Ethics Committee for Health Research of Lao PDR (No 040/NECHR). This study was conducted according to the rules and principles of human research ethics. This study was completely voluntary and we were obtaining informed consent before data collection due to paying respect to the respondents. Participants had right to end participation in research at any time and any uncomfortable condition.

According to protection of confidentiality of participants, name of respondents were not be included in all questions, and information was collected from respondents were kept strictly confidential. The research objectives, methodology usefulness and potential risk were informed to each respondent before interview.

CHARTER 4

RESULTS AND DISCUSSION

This study was conducted with the aim of investigation nutritional status of 300 adolescents of 15-19 years, attending secondary school in Sisattanak district of Vientiane, the capital of the Lao PDR. The study also aimed to evaluate the association between the predisposing, enabling and reinforcing factors and the nutritional status of this particular group of adolescents. Adolescents are often thought of as healthy and strong, but many studies identified that many adolescents were underweight and overweight/obese. In so doing, a descriptive cross sectional study was conducted in 5 secondary schools in Sisattanak district representing the total schools in this area. A self-administrative questionnaire, using a structured questionnaire, was carried out to gather information related to general characteristics, knowledge toward nutrition, attitude toward nutrition, eating habits, physical activity, source of information on nutrition, living arrangement, education parents/guardians and occupation parents/guardians were also examined. Data obtained from anthropometric measurement was used to determine the prevalence of malnutrition.

The results and discussion of this study were presented as the following.

4.1 Results

4.1.1 Predisposing Factors

- (1) General characteristics
- (2) Knowledge towards nutrition
- (3) Attitude towards nutrition
- (4) Eating habits
- (5) Physical activity

4.1.2 Enabling Factors

4.1.3 Reinforcing Factors

4.1.4 Nutritional status of adolescents

4.1.5 Factors related to nutritional status

- (1) Association between predisposing, enabling, reinforcing factors and nutritional status.

(2) Univariate logistic regression analysis

(3) Multivariate logistic regression analysis

4.2 Discussion

4.2.1 Discussion of research methodology

4.2.2 Discussion of research findings

(1) Nutritional status of adolescents

(2) Predisposing Factors

General characteristics

Knowledge towards nutrition

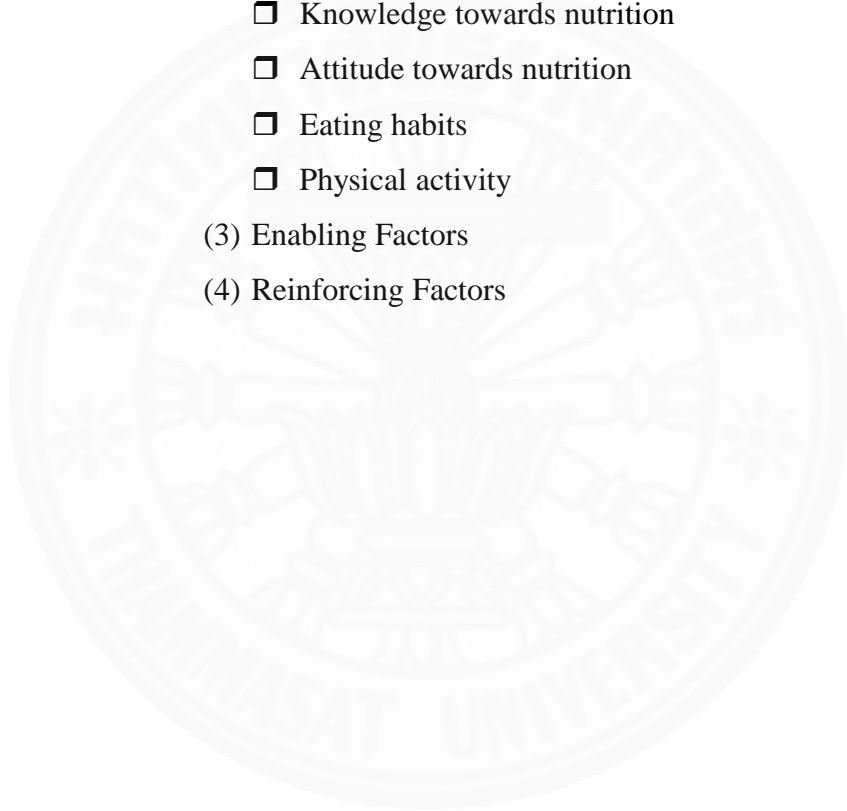
Attitude towards nutrition

Eating habits

Physical activity

(3) Enabling Factors

(4) Reinforcing Factors



4.1 Results

4.1.1 Predisposing Factors

(1) General characteristics

A total of 300 adolescents were enrolled into the study. As regards to adolescents, there were the same proportion of sex and grade among adolescents in each schools. Mean age was 16.93 ± 1.00 years. As the results of the general characteristics were showed in Table 4.2. Almost half of adolescents were 17 years old (41.3%), followed by the 18-years age group (23.3%). Nearly one-half of them (46.0%) were the first-born, and one-third were second-born (33.3%).

Approximately one-half of adolescents (45.3%) had 2 siblings, including themselves, 28.7% had 3 siblings and 16.0% had more than 3 siblings. The largest proportion of household members (45.0%) had between 2 and 4 people, nearly one-third had 5 people (30.3%), and about one-quarter more than 5 people (24.7%). The mean and the standard deviation were 5.02 and 1.58, respectively.

Almost one-half of adolescents (48.3%) had an average daily allowance between 10,001 and 20,000 kips, followed by 29.3% with an average daily allowance of less than 10,000 kips. The mean was 19,193 kips per day.

Most adolescents (92.7%) reported no chronic disease; only 7.3% reported such a disease. Among those suffering from chronic disease, 5.3% had anemia, 0.7% had asthma, 0.3% had hypertension, and 1.0% had allergies. More than two-thirds (73.7%) of adolescents did not take food supplements. Those who took supplements (26.3%) used multivitamins (11.7%), calcium (6.7%), Vitamin C (5.3%). Additional supplements, such as glutathione, L-carnitine, whey protein and collagen, were used by 13.7% of study participants.

Table 4.1 General characteristics of 300 adolescents

Characteristics	Number	Percent
Grade		
Grade 5	100	33.3
Grade 6	100	33.3
Grade 7	100	33.3
Gender		
Boy	150	50.0
Girl	150	50.0
Age (years)		
15	27	9.0
16	65	21.7
17	124	41.3
18	70	23.3
19	14	4.7
Mean \pm SD=16.93 \pm 1.00, Median=17, Min=15, Max=19		
Birth order		
1 st Birth	138	46.0
2 nd Birth	100	33.3
>2 nd Birth	62	20.7
Number of Siblings		
1	30	10.0
2	136	45.3
3	86	28.7
>3	48	16.0
Mean \pm SD=2.65 \pm 1.27, Median=2, Min=1, Max=9		
Household member		
2-4	135	45.0
5	91	30.3
>5	74	24.7
Mean \pm SD=5.02 \pm 1.58, Median=5, Min=2, Max=14		

Table 4.1 General characteristics of 300 adolescents (Cont.)

General characteristics	Number	Percent
Daily Allowance (kip) (1\$=8000kip)		
≤10,000	88	29.3
10,001-20,000	145	48.3
>20,000	67	22.3
Mean ± SD=19,193 ± 9386.67, Median=20,000, Min=5,000, Max=50,00		
History of Chronic Diseases		
No	278	92.7
Yes	22	7.3
Type of Chronic disease		
<i>Anemia</i>	16	5.3
<i>Allergy</i>	3	1.0
<i>Asthma</i>	2	0.7
<i>Hypertension</i>	1	0.3
Food supplement		
No	221	73.7
Yes	79	26.3
Type of food supplement		
<i>Multivitamin</i>	35	11.7
<i>Calcium</i>	20	6.7
<i>Vitamin C</i>	16	5.3
<i>Collagen</i>	13	4.3
<i>Wey Protein</i>	12	4.0
<i>L-Carnitine</i>	10	3.3
<i>Glutathione</i>	5	1.7
<i>Contraceptive drug</i>	1	0.3

(2) Knowledge towards nutrition

Based on 15 items, the knowledge on health and nutrition, reported in Table 4.2, mean of nutritional knowledge score was 13.35 ± 1.48 and the knowledge nutrition was categorized into three groups. More than one-thirds of adolescents (78.0%) was at level of good knowledge on nutrition.

Table 4.2 Level of knowledge among 300 adolescents on nutrition

Level of knowledge	Number	Percentage
Poor knowledge	4	1.3
Fair knowledge	62	20.7
Good knowledge	234	78.0
Mean \pm SD= 13.35 ± 1.48 , Median=14, Min=8, Max=15		

The knowledge on nutrition as in detail for 300 adolescents were showed in Table 4.3. Frequency distributions of knowledge by question items showed that more than half (55.3%) of the subjects did not know that having breakfast can prevent them from gaining weight. More than one-fourths (27%) of the subjects did not know that processed foods with a high salt which was a risk of hypertension. In addition, as it was shown that more than four-fifths (83.3%) of them believed that potato chips are the best source of energy that can keep you healthy, and nearly One-fifths (16.7%) of the subjects thought that Potato chips is the best resource of energy that can keep them healthy.

Table 4.3 Each item measuring the knowledge of nutrition of 300 adolescents classified by correct answers

Statement	Number	Percent
• Fruits and vegetables are rich in vitamins and minerals that are good for health	298	99.3
• Milk contains which is good for bone development	293	97.7
• Eating a lot of sweet food can keep healthy	289	96.3
• Fried foods and fats that can keep you fit	288	96.0
• Protein-rich foods are important for muscle building and tissues repairing	288	96.0
• Eating burnt animal meat can cause cancer	285	95.0
• Eating a variety of vegetables regularly can reduce obesity risk	284	94.7
• Drinking at least 8 glasses of water per day can help metabolism to work well	275	91.7
• Ice cream and Coca-Cola are a healthy source of energy	272	90.7
• Not necessary for overweight people to have more physical activity	272	90.7
• Eating raw meat can help to strengthen immune system	268	89.3
• Fried foods contain high fat that protects from illnesses	258	86.0
• Potato chips are the best sources of energy that can keep you healthy	250	83.3
• Processed foods have high salt content and a risk of hypertension	219	73.0
• Having breakfast can prevent gaining weight	166	55.3

(3) Attitude towards nutrition

Attitude of a person is an important influencing factor affecting nutrition behavior. The results of this study concerning nutrition attitude are reported in Table 4.4 and Table 4.5.

Table 4.4 shown the level of attitude. There were 15 questions related to attitude. A fair level of nutrition attitude was found among 73% of study participants. However, good attitude had only 6.3% of respondents. The mean and standard deviation of nutritional attitude score was 55 ± 5.58 .

Table 4.4 Level of attitude among 300 adolescents on nutrition

Level of attitude	Number	Percentage
Poor attitude	62	20.7
Fair attitude	219	73.0
High attitude	19	6.3

Mean \pm SD= 55 ± 5.58 , Median=55, Min=41, Max=71

On questions measuring adolescents' attitude on nutrition in Table 4.5, more than four-fifth of adolescent (84.0%) agreed that eating the adequate food and doing physical exercise can help them to be healthy. More than a half of them (62.3%) agreed that eating a variety of foods in moderation is key to balanced nutrition. Almost half of study subjects (49.3%) strongly disagreed that skipping meals was a good way to maintain healthy, and 33.7% strongly disagreed that a balanced diet was not essential for adolescents (Shown in Table 4.5).

Table 4.5 Number and percentage of 300 adolescents to each items measuring attitudes toward nutrition

Statement	Strong Disagree	Disagree	Uncertain	Agree	Strong Agree
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
• Eating the adequate food and exercise can help us to be healthy	1 (0.3)	0 (0.0)	2 (0.7)	45 (15.0)	252 (84.0)
• Drinking milk every day can help bone growing	4 (1.3)	3 (1.0)	17 (5.6)	83 (27.6)	193 (64.3)
• Diet and exercise is the best way to lose weight	12 (4.0)	19 (6.3)	40 (13.3)	85 (28.3)	144 (48.0)
• Unhealthy diet is a risk for various diseases	53 (17.6)	42 (14)	49 (16.3)	72 (24.0)	84 (28.0)
• Eating a variety of foods in moderation is key to balance nutrition	8 (2.6)	23 (7.6)	82 (27.3)	108 (36.0)	79 (26.3)
• It's not easy to achieve a balanced diet if having unhealthy foods	19 (6.3)	34 (11.3)	40 (13.3)	135 (45.0)	72 (24.0)
• It's necessary to eat main meals to lose weight	19 (6.3)	56 (18.6)	100 (33.3)	69 (23.0)	56 (18.6)
• Fast food like fried chicken is not good to eat every day	30 (10.0)	51 (17.0)	88 (29.3)	77 (25.7)	54 (18.0)
• Eating vegetarian can help to lose weight*	6 (2.0)	47 (15.7)	105 (35.0)	100 (33.3)	42 (14.0)
• Slim person looks more beautiful than fat person	27 (9.0)	56 (18.6)	145 (48.3)	49 (16.3)	23 (7.6)
• Balanced diet is not essential for adolescents*	101 (33.7)	103 (34.3)	49 (16.3)	29 (9.7)	18 (6.0)
• Eating more fruits is good way to gain weight*	31 (10.3)	86 (28.7)	138 (46.0)	32 (10.7)	13 (4.3)
• Replacing normal diet with junk food has no health effect*	86 (28.7)	87 (29.0)	85 (28.3)	31 (10.3)	11 (3.7)
• Deep fried food is healthier than boiled or steamed*	89 (29.7)	104 (34.7)	67 (22.3)	30 (10.0)	10 (3.3)
• Skipping meal is good to maintain your weight*	148 (49.3)	81 (27.0)	60 (20.0)	6 (2.0)	5 (1.7)

* Negative attitude

(4) Eating habits

The results reported in Table 4.6 showed that the mean score was 93.86 ± 15.51 score. A poor level of eating habits found 67.0% of adolescents, while a good level of eating habits had only 1.7% of them.

Table 4.6 Level of eating habits among 300 adolescents

Level of eating habit	Number	Percentage
Poor eating habit	201	67.0
Fair eating habit	94	31.3
Good eating habit	5	1.7
Mean \pm SD= 93.86 ± 15.51 , Median=94, Min=56, Max=146		

The results reported in Table 4.7 show that only half of adolescents consumed fresh vegetables and fresh fruits more than 5-6 times per week (51.7% and 41%), less than half of them (48.3%) drank milk less than once a week, 53% had papaya salad and noodle salad with fermented fish more than once a week, and 49% had instant noodles more than once a week. Particularly noteworthy is that most adolescents (74%) had sticky rice at least once a day.

Table 4.7 Frequency of eating particular food items among 300 adolescents

Food items	Never	1-3	Once a	2-4	5-6	Once a	2-3	4-5	> 5
	Number (%)	Time/month Number (%)	week Number (%)	Time/wk Number (%)	Time/wk Number (%)	day Number (%)	Times/day Number (%)	Times/day Number (%)	Times/day Number (%)
1.Ice-cream, Choc ice	41 (13.7)	70 (23.3)	84 (28.0)	77 (25.7)	6 (2.0)	15 (5.0)	6 (2.0)	1 (0.3)	41 (13.7)
2.Fried chicken, potato chips	60 (20.0)	104 (34.7)	76 (25.3)	39 (13.0)	8 (2.7)	9 (3.0)	2 (0.7)	2 (0.7)	0 (0.0)
3.Yogurt's drink/ milk	48 (16.0)	48 (16.0)	49 (16.3)	73 (24.3)	28 (9.3)	37 (12.3)	14 (4.7)	1 (0.3)	2 (0.7)
4.Pickled fruit/ vegetable	171 (57.0)	58 (19.3)	39 (13.0)	15 (5.0)	3 (1.0)	9 (3.0)	3 (1.0)	1 (0.3)	1 (0.3)
5.Bakery, cake (chocolate, milk)	78 (26.0)	136 (45.3)	39 (13.0)	26 (8.7)	9 (3.0)	7 (2.3)	5 (1.7)	0 (0.0)	0 (0.0)
6. A bottle of fizzy drinks (sugar free)	43 (14.3)	47 (15.7)	49 (16.3)	74 (24.7)	16 (5.3)	43 (14.3)	19 (6.3)	6 (2.0)	3 (1.0)
7.Eggs boiled, fried	8 (2.7)	29 (9.7)	53 (17.7)	103 (34.3)	32 (10.7)	51 (17.0)	17 (5.7)	4 (1.3)	3 (1.0)

Table 4.7 Frequency of eating particular food items among 300 adolescents (Cont.)

Food items	Never	1-3	Once a	2-4	5-6	Once a	2-3	4-5	> 5
	Time/month	Time/month	week	Time/wk	Time/wk	day	Times/day	Times/day	Times/day
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
8. Cracker, crisps snack (potato, popcorn)	82 (27.3)	77 (25.7)	48 (16.0)	42 (14.0)	20 (6.7)	15 (5.0)	8 (2.7)	6 (2.0)	2 (0.7)
9. Fresh vegetables	12 (4.0)	25 (8.3)	28 (9.3)	80 (26.7)	45 (15.0)	62 (20.7)	32 (10.7)	10 (3.3)	6 (2.0)
10. Pizza, hamburger	143 (47.7)	111 (37.0)	25 (8.3)	14 (4.7)	3 (1.0)	1 (0.3)	2 (0.7)	1 (0.3)	0 (0)
11. Fresh fruits	12 (4.0)	34 (11.3)	37 (12.3)	94 (31.3)	41 (13.7)	51 (17.0)	24 (8.0)	4 (1.3)	3 (1.0)
12. High fat foods (beef, pork belly)	33 (11.0)	57 (19.0)	69 (23.0)	74 (24.7)	23 (7.7)	29 (9.7)	10 (3.3)	2 (0.7)	3 (1.0)
13. Low fat foods: chicken, fish	9 (3.0)	37 (12.3)	61 (20.3)	106 (35.3)	33 (11.0)	38 (12.7)	11 (3.7)	3 (1.0)	2 (0.7)

Table 4.7 Frequency of eating particular food items among 300 adolescents (Cont.)

Food items	Never	1-3 Time/month	Once a week	2-4 Time/wk	5-6 Time/wk	Once a day	2-3 Times/day	4-5 Times/day	> 5 Times/day
	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)
14.Papaya salad, noodle salad with fermented fish	17 (5.7)	53 (17.7)	71 (23.7)	76 (25.3)	29 (9.7)	28 (9.3)	19 (6.3)	3 (1.0)	4 (1.3)
15.Sticky rice	8 (2.7)	10 (3.3)	4 (1.3)	21 (7.0)	35 (11.7)	50 (16.7)	130 (43.3)	20 (6.7)	22 (7.3)
16.Instant noodle	28 (9.3)	50 (16.7)	75 (25.0)	79 (26.3)	12 (4.0)	42 (14.0)	8 (2.7)	2 (0.7)	4 (1.3)
17.Tea/ coffee	193 (64.3)	38 (12.7)	36 (12.0)	19 (6.3)	4 (1.3)	8 (2.7)	2 (0.7)	0 (0.0)	0 (0.0)
18.Chocolate or candy bar	72 (24.0)	65 (21.7)	66 (22.0)	46 (15.3)	13 (4.3)	24 (8.0)	7 (2.3)	4 (1.3)	3 (1.0)
19.Fried hot dogs, meat balls	35 (11.7)	72 (24.0)	82 (27.3)	63 (21.0)	8 (2.7)	29 (9.7)	9 (3.0)	1 (0.3)	1 (0.3)
20.Uncooked food (Larb, som mou)	166 (55.3)	81 (27.0)	32 (10.7)	11 (3.7)	4 (1.3)	5 (1.7)	1 (0.3)	0 (0.0)	0 (0.0)

(5) Physical activity

According to the IPAQ short form (International Physical Activity Questionnaire) criteria, more than two-thirds of adolescents (62.7%) reported a low level of physical activity, while the moderate and high levels of physical activity were reported by 24.3% and 13.0 %, respectively (Table 4.8).

Table 4.8 Level of physical activity among 300 adolescents according to IPAQ criteria

Level of physical activity	Number	Percentage
Low	188	62.7
Moderate	73	24.3
High	39	13.0

Sedentary behavior was reported by 17.3% of adolescents, with 6 hours of sitting each day (Table 4.9).

Table 4.9 Sedentary behavior of 330 adolescents classified by hour per day of sitting

Sitting time	Number	Percentage
< 6 hrs.	248	82.7
More than 6 hrs.	52	17.3

Mean \pm SD=3.85 \pm 2.604, Median=3, Min=0.5, Max=12.5

Half of adolescents reported that they engaged in physical activities, and 30% undertook intensive and moderate physical activity less than 5 days per week. Students were usually involved in moderate physical activity, but during sport time at school they liked intensive activity such as playing football (Table 4.10). More than half of the respondents (53.7%) reported about engaging in vigorous exercise, while 43.3% preferred to participate in moderate physical activities.

Table 4.10 Level of Physical Activity among 330 adolescents classified by days

Physical Activities	Frequency of physical activities							
	None		1-3 days		4-5 days		6-7 days	
	Number	Percent	Number	Percent	Number	Percent	Number	Number
Activities in school								
Vigorous intensity	154	51.3	122	40.7	24	8.0	0	0.0
Moderate intensity	139	46.3	128	42.7	33	11.0	0	0.0
Traveling	229	76.3	29	9.7	42	14.0	0	0.0
Leisure activities								
Vigorous intensity	170	56.7	90	30.0	40	13.3	0	0.0
Moderate intensity	162	54.0	108	36.0	21	7.0	9	3.0

4.1.2 Enabling Factors

Sources of information on healthy eating were presented in Table 4.11. The main source of nutrition information were social media (88.3%), followed by television (65.0%) and teachers (47.3%). The lowest sources of information were radio (11.3%), community program (11.3%) and school programs (23.0%).

Table 4.11 Main source of information about nutrition and health among 300 adolescents

Source of information	Number	Percent
Social Media	265	88.3
Television	195	65.0
Teachers	142	47.3
Friends	140	46.7
Family members	136	45.3
Newspaper or Magazine	90	30.0
Textbook	76	25.3
Health program activities in School	69	23.0
Radio	34	11.3
Health program activities in community	34	11.3

4.1.3 Reinforcing factors

Reinforcing factors included participants' living arrangements, education level of mother/father/guardians, and occupation of mother/father/guardians (Table 4.12).

Most adolescents (76.3%) lived with their parents and only 9.3% lived with either mother or father.

Father' education level was higher than mothers. More than half of fathers had a college/university degree (55.3%), but only 34.4% of mothers had the same academic credentials. Mothers and fathers with high school diplomas were 52% and 35%, respectively, while only 1.3% of fathers and 3.2% of mothers had no education at all.

Most of the fathers were employed as government officers (39.7%), and 39.6% of mothers were unemployed housewives. Fathers in 30.8% of cases were self-employed, more than one-third (34.4%) of mothers were business owners, 18.8% were government officers and 6% were farmers or simple workers.

Among the guardians, 62.8% had college degrees, 30.2% had high-school diplomas, and 7% finished the primary school. Most of guardians (41.9%) were government officers, and 34.9% were business owners (Table 4.12).

Table 4.12 Reinforcing factors among 300 adolescents

Reinforcing Factor	Number	Percent
Caretakers^a		
Parents	229	76.3
Mother or father	28	9.3
Guardians	43	14.3
Mother's education^b		
No school	8	3.2
Primary school	26	10.4
Secondary school	130	52.0
College/university	86	34.4
Father's education^c		
No school	3	1.3
Primary school	20	8.4
Secondary school	83	35.0
College/university	131	55.3
Guardian's education^d		
Primary school	3	7.0
Secondary school	13	30.2
College/university	27	62.8
Mother's occupation^b		
Private employee	3	1.2
Farmer	6	2.4
Own Business	86	34.4
Government officer	47	18.8
Worker	9	3.6
Housewife	99	39.6
Father's occupation^c		
Unemployment	5	2.1
Farmer	7	3.0
Own Business	73	30.8
Government officer	94	39.7
Worker	45	19.0
Private employee	13	5.5
Guardian's occupation^d		
Unemployment	3	7.0
Own Business	15	34.9
Government officer	18	41.9
Worker	5	11.6
Private employee	2	4.7

^a 300 valid cases, ^b 250 valid cases, ^c 237 valid cases, ^d 43 valid cases

4.1.4 Nutritional status of adolescents

Nutritional status of adolescents was determined by using the Body Mass Index (BMI) to classify them as underweight (BMI z-score $< -2SD$ on the growth chart), healthy or normal weight (BMI z-score from $-2SD$ to $+1SD$ on the growth chart), overweight (BMI z-score $> +1SD$ to $+2SD$ percentiles on the growth chart) and obese (BMI z-score $> +2SD$ percentiles on the growth chart)

From a total of 300 adolescents attending school, 66.3% had normal weight, while those at risk of overweight/obesity and underweight were 23.3% and 10.3%, respectively (Table 4.13).

Table 4.13 Nutritional status among 300 adolescents

Nutritional status	Number	Percent
Z-score		
Underweight ($< -2 SD$)	31	10.3
Normal weight ($- 2 SD$ to $+1 SD$)	199	66.3
Overweight / Obese ($> +1SD$ to $+2SD$)	42	14.0
Obese ($>+2SD$)	28	9.3

4.1.5 Factors related to nutritional status

In order to examine factors related to the nutritional status, variables such as age, birth order, number of siblings, household member, daily allowance (kip), knowledge of nutrition, attitude toward nutrition, eating habits, level of physical activity, sources of nutrition information, caregivers, education of caregivers, and occupation of caregivers were used for frequency analysis. The relationship between the nutritional status and predisposing, enabling and reinforcing factors was determined by means of Chi-square tests with statistical significant at p -value < 0.05 .

(1) The relationship between the predisposing, enabling and reinforcing factors and the nutritional status

The Table 4.14 shows the relationship between predisposing factors and the adolescents' nutritional status. A significant association between the

physical activities and nutrition status (p -value <0.001) was found a total of 21.9% underweight adolescents were likely to engage in moderate physical activity, while 76.7% of those having normal weight were practicing highly intensive physical activities. As expected, overweight adolescents had very little physical exertion. In addition, there was a significant association between the eating habits and nutritional status (p -value=0.034). Respondents with a poor level of eating habits had a higher percentage of overweight/obesity. However, the students having moderate and good eating habits had a high proportion of underweight.

Other predisposing factors were not significantly associated with the nutritional status. However, the proportion of adolescents at grade 7 had larger prevalence of underweight and overweight/obesity than other grades. Boys were more likely to be underweight and overweight/obese than girls, especially the case of a single-boy family. The number of siblings and the family size also showed some differences the proportions of adolescents classified as underweight or overweight but they were not found significant.

Respondents with daily allowance of 5,000-10,000 kip were more likely to be underweight than those with higher daily allowance. Adolescents with chronic diseases were more underweight than overweight, and those taking daily food supplements were more overweight than participant who did not do that. Surprisingly, students who had a good level of nutrition knowledge showed higher prevalence of overweight and obesity compared to those who had poor and fair level of nutrition knowledge. Also, adolescents who had fair and good level of attitude toward nutrition had higher prevalence of overweight/obesity when compared to those who had poor level of attitude.

Results reported in Table 4.15 showed that sources of nutrition information were a significant enabling factor determining the nutritional status, especially when such information came from teachers (p -value <0.007). The study found that underweight (7.0%), normal-weight (75.4%) and overweight/obese (17.6 %) adolescents received nutritional information from teachers. Other sources of nutrition information were not significantly associated with nutritional status.

The living arrangement revealed significant association (p -value=0.049) with nutritional status of them. The adolescents who lived with their

parents were underweight (10.5% vs 9.3%) and overweight rather than who did live with their parents (25.7% vs 9.3%). adolescents living with their parents were more likely to experience malnutrition than those who did not live with their parents (Table 4.16). adolescents whose parents/guardians had higher education (college/university) were underweight, normal weight and over weight in, respectively, 9.9%, 65.5% and 24.6% of the cases – but these results were not significantly associated with the nutritional status (p -value= 0.246). As for the occupation of parents/guardians, more than half of them worked for non-government organizations and accounted for 10.8% in underweight group, 66.5% for normal weight group and 22.8 percent for those who were overweight/obese.

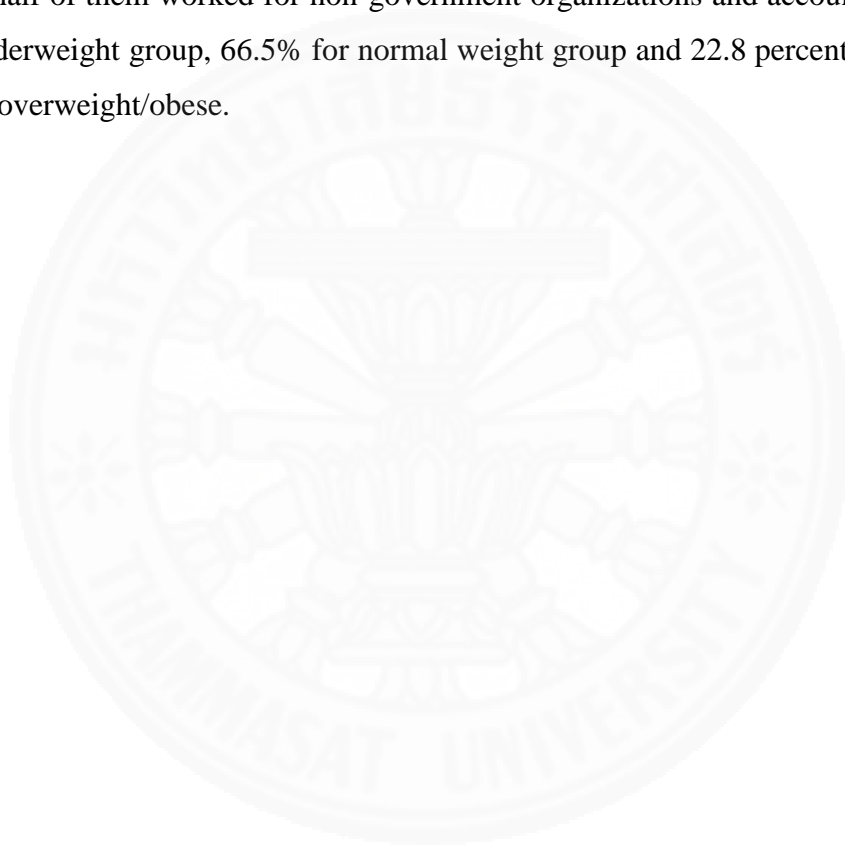


Table 4.14 The nutritional status and its predisposing factors among 300 adolescents

Predisposing factors	Total	Nutritional status						p-value ^a
		Underweight		Normal		Overweight /obese		
		Number	Percent	Number	Percent	Number	Percent	
General characteristics								
Grade								0.102
Grade 5	100	9	9.0	75	75.0	16	16.0	
Grade 6	100	8	8.0	66	66.0	26	26.0	
Grade 7	100	14	14.0	58	58.0	28	28.0	
Gender								0.682
Boy	150	17	11.3	96	64.0	37	24.7	
Girl	150	14	9.3	103	68.7	33	22.0	
Age (Years)								0.428
15	27	3	11.1	18	66.7	6	22.2	
16	65	3	4.6	49	75.4	13	20.0	
17	124	13	10.5	82	66.1	29	23.4	
18	70	10	14.3	44	62.9	16	22.9	
19	14	2	14.3	6	42.9	6	42.9	
Birth order								0.884
1 st Birth	138	14	10.1	90	65.2	34	24.6	
2 nd Birth	100	9	9.0	67	67.0	24	24.0	
>2 nd Birth	62	8	12.9	42	67.7	12	19.4	
Number of siblings								0.820
1	30	4	13.3	18	60.0	8	26.7	
2	136	12	8.8	90	66.2	34	25.0	
>2	134	15	11.2	91	67.9	28	20.9	

^a p-value by Chi-square test

Table 4.14 The nutritional status and its predisposing factors among 300 adolescents
(Cont.)

Predisposing factors	Total	Nutritional status						p-value ^a
		Underweight		Normal		Overweight		
		Number	Percent	Number	Percent	Number	Percent	
General characteristics								
Household members								0.635
2-4	135	135	17	12.6	85	63.0	33	
5	91	91	8	8.8	65	71.4	18	
>5	74	74	6	8.1	49	66.2	19	
Daily allowance (kip) (1\$=8,000kip)								0.725
5,000-10,000	88	11	12.5	60	68.2	17	19.3	
10,001-20,000	145	13	9.0	94	64.8	38	26.2	
>20,000	67	7	10.4	45	67.2	15	22.4	
History of chronic diseases								0.317
No	278	27	9.7	184	66.2	67	24.1	
Yes	22	4	18.2	15	68.2	3	13.6	
Food supplement								0.440
No	221	24	10.9	142	64.3	55	24.9	
Yes	79	7	8.9	57	72.2	15	19.0	
Level of knowledge on nutrition								0.584
Poor & fair	66	9	13.6	43	65.2	14	21.2	
Good	234	22	9.4	156	66.7	56	23.9	
Level of attitude								0.239
Poor	62	10	16.1	39	63	13	21	
Fair & good	238	21	8.8	160	67	57	24	
Level of eating habit								0.034*
Poor	201	17	8.5	129	64.2	55	27.4	
Fair & good	99	14	14.1	70	70.7	15	15.2	

*p-value is significant at <0.05, ^a p-value be Chi-square test

Table 4.14 The nutritional status and its predisposing factors among 300 adolescents
(Cont.)

Predisposing factors	Total	Nutritional status						p-value ^a
		Underweight		Normal		Overweight		
		Number	Percent	Number	Percent	Number	Percent	
Level of eating habit								<0.001*
Low	188	13	6.9	108	57.4	67	35.6	
Moderate	73	16	21.9	56	76.7	1	1.4	
High	39	2	5.1	35	89.7	2	5.1	

*p-value is significant at <0.05, ^a p-value be Chi-square test

Table 4.15 The nutritional status and enabling factors among 300 adolescents

Source of information	Total	Nutritional status						p-value ^a
		Underweight		Normal weight		Overweight		
		Number	Percent	Number	Percent	Number	Percent	
Social Media								0.924
No	35	4	11.4	22	62.9	9	25.7	
Yes	265	27	10.2	177	66.8	61	23	
Television								0.289
No	105	11	10.5	75	71.4	19	18.1	
Yes	195	20	10.3	124	63.6	51	26.2	
Teacher								0.007*
No	158	21	13.3	92	58.2	45	28.5	
Yes	142	10	7	107	75.4	25	17.6	
Friends								0.393
No	160	20	12.5	105	65.6	35	21.9	
Yes	140	11	7.9	94	67.1	35	25	
Family members								0.846
No	164	16	9.8	111	67.7	37	22.6	
Yes	136	15	11	88	64.7	33	24.3	

*p-value is significant at <0.05, ^a p-value be Chi-square test

Table 4.15 The nutritional status and enabling factors among 300 adolescents (Cont.)

Source of information	Total	Nutritional status						<i>p</i> -value ^a
		Underweight		Normal weight		Overweight		
		Number	Percent	Number	Percent	Number	Percent	
Newspaper or Magazine								0.688
No	210	22	10.5	142	68	46	21.9	
Yes	90	9	10	57	63.3	24	26.7	
Textbook								0.149
No	224	24	10.7	142	63.4	58	25.9	
Yes	76	7	9.2	57	75	12	15.8	
Health program activities in School								0.955
No	231	24	10.4	152	65.8	55	23.8	
Yes	69	7	10.1	47	68.1	15	21.7	
Radio								0.277
No	266	30	11.3	176	66.2	60	22.6	
Yes	34	1	2.9	23	67.6	10	29.4	
Health program activities in community								0.265
No	266	30	11.3	173	65	63	23.7	
Yes	34	1	2.9	26	76.5	7	20.6	

^a *p*-value be Chi-square test

Table 4.16 The nutritional status and reinforcing factors among 300 adolescents

Reinforcing factors	Total	Nutritional status						<i>p</i> -value ^a
		Underweight		Normal weight		Overweight		
		Number	Percent	Number	Percent	Number	Percent	
Living arrangement								0.049*
Parents	257	27	10.5	164	63.8	66	25.7	
Guardian	43	4	9.3	35	81.4	4	9.3	
Parents/guardians education								NA
Under college	16	3	18.8	13	81.3	0	0.0	
College/University	284	28	9.9	186	65.5	70	24.6	
Parents/guardians Occupation								NA
Government	116	12	10.3	77	66.4	27	23.3	116
Non-government	167	18	10.8	111	66.5	38	22.8	167
Unemployed	17	1	5.9	11	64.7	5	29.4	17

**p*-value is significant at <0.05. ^a*p*-value by Pearson Chi-Square Test.

NA= Chi-square could not be applied

(2) Univariate logistic regression analysis

Age as a predisposing factor was classified into two groups <18 years old (15-17 years old), and ≥ 18 years old (18-19 years old). Based on the family planning in Laos, it is recommended to have only two children. Consequently, birth order consists of two groups: < 3 birth order (1 to 2 birth order) and ≥ 3 birth order. Number of siblings are in two groups: <3 siblings (1 to 2 siblings) and ≥ 3 siblings. Similarly, there are two groups of household members <5 people (2-4 people) and ≥ 5 people in family. Daily allowances (kip) are classified ≤ 20,000 kip and > 20,000 kip.

In the enabling factors, the living arrangement were classified as parents and guardians (non-parents). Parents/guardians' education was defined as college and college/university levels, and parents/guardians' occupation was divided in three groups: government, non-government and unemployed.

Among the reinforcing factors, sources of nutrition information were included books, magazines and newspapers, social media, TV, radio, teachers, friends, school program and community program.

The results of the estimated relation between the nutritional status (underweight normal weight) and the predisposing factors are reported in Table 4.17.

It was found that study participants within the age group 15-17 years were 1.9 times more likely to be underweight than those in the 18-19 years group (OR=1.9, 95% CI= 0.85,4.15). Girls were 1.3 times more likely to be underweight than boys (OR= 1.3, 95% CI=0.61, 2.79). Respondents who were in grade 5 were twice as likely to be underweight compared to those in grade 7 (OR= 2.0, 95% CI=0.81, 4.97). A child that was the first or second child in the family was 1.3 times more likely to be underweight than those who were the third child or higher (OR= 1.3, 95% CI=0.54, 3.11). Respondents with 1-2 siblings were 1.1 times more likely to be underweight than those who had more than 2 siblings (OR= 1.1, 95% CI=0.52, 2.37).

Adolescents with 2-4 household members were 1.6 times more likely to be underweight than those who had at least 5 members (OR= 1.6, 95% CI=0.76, 3.49). Adolescents who had never experienced a chronic disease were 1.8 times more likely to be underweight than who those had (OR= 1.8, 95% CI=0.56, 5.88). Those consuming food supplements regularly were 1.4 times more likely to be underweight compared to those who did not (OR= 1.4, 95% CI=0.56, 3.37). Adolescents with a good level of nutrition knowledge were 1.3 times more likely to be underweight than those with a poor and fair level of knowledge (OR= 1.4, 95% CI=0.63, 3.46). Also, the students who had fair and good level of attitude on nutrition were 1.9 times to be underweight than those with a poor level of attitude (OR= 1.9, 95% CI=0.85, 4.48). Moreover, participants having poor level of eating habits were almost 1.5 times more likely to be underweight than those with fair and good level of eating habits (OR= 1.5, 95% CI=0.71, 3.26). Those who had a low level of physical activity were 1.6 times more likely to be underweight than pupils who had moderate or high level of physical activity (OR= 1.6, 95% CI=0.76, 3.53).

In the area of enabling factors, the association was found between sources of nutrition information and nutritional status. It should be noted, that adolescents who received nutrition information from radio were almost four times more

likely to be underweight than those who did not received (OR= 3.9, 95% CI=0.51, 30.12) and the similarity with adolescents who received nutrition information from health program activities in community was 4.5 time more likely to be underweight than those who did not received (OR= 4.5, 95% CI=0.59, 34.48)

No statistically significant relationship was found between the nutrition status and its hypothesized reinforcing factors. It may still be of interest to note that students who did not live with parents were 1.4 times likely to be underweight than those who lived with their parents (OR= 1.4, 95% CI=0.47, 4.38). Students whose caregivers had higher education (college or university) were 1.5 times more likely to be underweight than those who were cared for by people of lower education levels (i.e., below the college level) (OR= 1.5, 95% CI=0.41, 5.72). Adolescents whose caregivers were unemployed were 1.7 times more likely to be underweight than those whose caregivers worked for the government (OR= 1.7, 95% CI=0.20, 14.50).

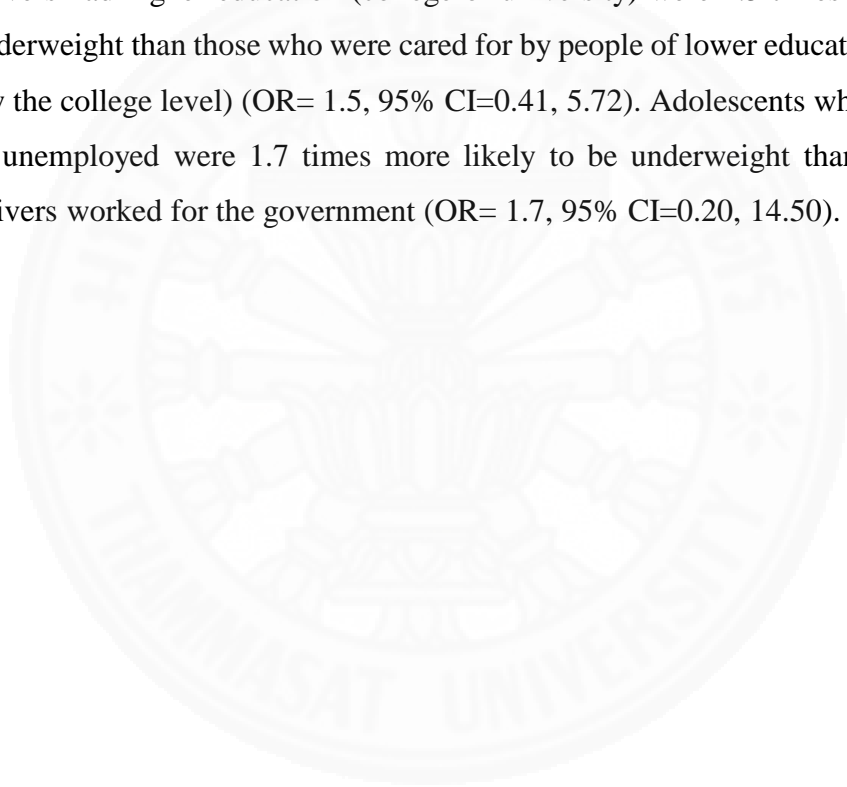


Table 4.17 The relationship of nutritional status with predisposing, enabling and reinforcing factors (normal weight[§] versus underweight) among 300 adolescents

Factors	OR	95% Confidence interval		<i>p</i> - value
		Lower	Upper	
<u>Predisposing factors</u>				
General characteristics				
Grade (Grade 7[§])				0.210
Grade 5	2.0	0.81	4.97	
Grade 6	2.0	0.78	5.09	
Gender (Boy[§])				0.495
Girl	1.3	0.61	2.79	
Age (Year) (18-19[§])				0.117
15-17	1.9	0.85	4.15	
Birth order ($\geq 3^{\text{rd}}$ Birth[§])				0.556
1 st and 2 nd Birth	1.3	0.54	3.11	
Number of siblings ($\geq 3^{\text{rd}}$)				0.782
1-2	1.1	0.52	2.37	
Household member (2-4[§])				0.209
≥ 5	1.6	0.76	3.49	
Daily kip allowance (5.000-20.000[§])(1$\\$=8,000kip)				0.997
>20000	1.0	0.41	2.48	
History of chronic diseases (Yes[§])				0.319
No	1.8	0.56	5.88	
Food supplements (No[§])				0.485
Yes	1.4	0.56	3.37	
Level of nutrition knowledge (Poor & fair[§])				0.360
Good	1.4	0.63	3.46	

([§]) Reference group.

Table 4.17 The relationship of nutritional status with predisposing, enabling and reinforcing factors (Normal weight[§] versus underweight) (Cont.)

Factors	OR	95% CI		p-value
		Lower	Upper	
Level of nutrition attitude (Poor[§])				0.114
Fair & good	1.9	0.85	4.48	
Level of eating habit (Fair & good[§])				0.285
Poor	1.5	0.69	3.19	
Level of physical activity (Moderate & High[§])				0.285
Low	1.5	0.71	3.26	
<u>Enabling factors</u>				
Source of information				
Textbook (No[§])				0.485
Yes	1.4	0.56	3.37	
Newspaper or Magazine (No[§])				0.964
Yes	0.9	0.42	2.26	
Television (No[§])				0.813
Yes	0.9	0.41	0.20	
Radio (No[§])				0.189
Yes	3.9	0.51	30.12	
Family members (No[§])				0.665
Yes	0.8	0.39	1.80	
Teacher (No[§])				
Yes	2.4	1.09	5.45	
Friends (No[§])				0.225
Yes	1.6	0.74	3.57	
Social Media (No[§])				0.763
Yes	1.2	0.38	3.72	

([§]) Reference

Table 4.17 The relationship of nutritional status with predisposing, enabling and reinforcing factors (Normal weight[§] versus underweight) (Cont.)

Factors	OR	95% CI		p-value
		Lower	Upper	
Health program activities in community (No[§])				0.147
Yes	4.5	0.59	34.48	
Health program activities in School (No[§])				0.899
Yes	1.1	0.43	2.61	
<u>Reinforcing factors</u>				
Take care (parents[§])				0.520
Guardian	1.4	0.47	4.38	
Parents/guardians education (below college[§])				0.525
college/university	1.5	0.41	5.72	
Parents/guardians occupation (government[§])				0.865
Non-government	0.9	0.44	2.11	
Unemployed	1.7	0.20	14.51	

([§]) Reference

The results reported in Table 4.18 show that respondents from grade 7 were 2.3 times more likely to be overweight/obese compared to those in grade 5 (OR= 2.3, 95% CI=1.12, 4.58). Boys showed a 1.2 times higher risk of overweight/obesity than girls (OR= 1.2, 95% CI=0.70, 2.08). The study participants in the age group of 18-19 years were 1.4 times more likely to be overweight/obese than those in the 15-17 age group (OR=1.4, 95% CI= 0.75, 2.48). Adolescents who were the first or second child in their family was 1.3 times more likely to be overweight/obese than those who were the third child and higher (OR= 1.3, 95% CI=0.64, 2.63). Respondents who had 1-2 siblings were 1.3 times more likely to be overweight/obese than those who had more than 2 siblings (OR= 1.3, 95% CI=0.73, 2.2).

Students from households of 2-4 members were 1.2 times more likely to be overweight/obese than those who had at least 5 members (OR= 1.2,

95%CI=0.69, 2.07). Adolescents who had never experienced chronic disease were 1.8 times more likely to be overweight/obese than those who had (OR= 1.8, 95% CI=0.51, 6.49). Children who did not consume food supplements regularly had 1.5 times to be overweight/obese compared to children who did (OR= 1.5, 95% CI=0.77, 2.82). Adolescents with poor eating habits were 1.9 times more likely to be overweight/obese than those with fair and good level of eating habits (OR= 1.9, 95% CI=1.05, 3.77). Pupils who had low physical activities were 18.8 times more likely to be overweight/obese than those who had moderate and high level of physical activities (OR= 18.8, 95% CI=5.73, 61.84).

In enabling factors, the statistically significant relationship was found between the sources of nutrition information and the adolescents' nutritional status. Adolescents who received the information from television were almost 1.6 times more likely to be overweight/obese than those who did not (OR= 1.6, 95% CI=0.89, 2.96). Adolescents who received the nutrition information from social media could better protect themselves from being overweight/obese than those who did not (OR= 0.8 95%CI=0.37, 1.93).

In the area of reinforcing factors, the influence of caregivers was found to be significantly associated with the participants' nutritional status. Students who lived with their parents were more than 3.5 times likely to be overweight/obese than those who did not live with their parents (OR= 3.5, 95% CI=1.20, 10.30).

Table 4.18 The relationship between the nutritional status and predisposing, enabling, and reinforcing factors (Normal weight[§] versus overweight obesity)

Factors	OR	95% CI		p-value
		Lower	Upper	
<u>Predisposing factors</u>				
General characteristics				
Grade (Grade7[§])				0.068
Grade 6	1.8	0.91	3.74	
Grade 7	2.3	1.12	4.57	
Gender (Girl[§])				0.507
Boy	1.2	0.70	2.08	
Age (Year) (15-17[§])				0.307
18-19	1.4	0.75	2.48	
Birth order (> 2nd birth[§])				0.477
1 st -2 nd birth	1.3	0.64	2.63	
Number of siblings (≥3[§])				0.407
1-2	1.3	0.73	2.20	
Household members (≥5[§])				0.521
2-4	1.2	0.69	2.07	
Daily kip allowance (20.000[§])(1\$=8,000kip)				0.838
5.000-20.000	1.1	0.55	2.07	
History of chronic diseases (Yes[§])				0.355
No	1.8	0.51	6.49	
Food supplements (Yes[§])				0.243
No	1.5	0.77	2.82	
Nutrition knowledge (Poor & fair[§])				0.777
Good	1.1	0.56	2.17	

([§]) Reference group, *p-value is significant at <0.05

Table 4.18 The relationship between the nutritional status and predisposing, enabling, and reinforcing factors (Normal weight[§] versus overweight obesity) (cont.)

Factors	OR	95% CI		p-value
		Lower	Upper	
Attitude score level (Poor [§])				0.852
Fair & good	1.1	0.53	2.14	
Eating habit (Fair & good [§])				0.035*
Poor	1.9	1.05	3.77	
Physical activity level (Moderate & High [§])				<0.001*
Low	18.8	5.73	61.84	
<u>Enabling factors</u>				
Source of information				
Textbook (No [§])				0.061
Yes	0.5	0.26	1.03	
Newspaper or Magazine (No [§])				0.377
Yes	1.3	0.73	2.32	
Television (No [§])				0.113
Yes	1.6	0.89	2.96	
Radio (No [§])				0.550
Yes	1.3	0.57	2.83	
Family members (No [§])				0.673
Yes	1.1	0.65	1.94	
Teacher (No [§])				0.010
Yes	0.5	0.27	.84	
Friends (No [§])				0.691
Yes	1.1	0.65	1.93	

([§]) Reference group, **p*-value is significant at <0.05

Table 4.18 The relationship between the nutritional status and predisposing, enabling, and reinforcing factors (Normal weight[§] versus overweight obesity) (cont.)

Factors	OR	95% CI		p-value
		Lower	Upper	
Social Media (No [§])				0.685
Yes	0.8	0.37	1.93	
Health program activities in community (No [§])				0.503
Yes	0.7	0.31	1.79	
Health program activities in School (No [§])				0.708
Yes	0.8	0.46	1.70	
<u>Reinforcing factors</u>				
Take care (Guardians [§])				0.022*
Parents	3.5	1.20	10.30	
Parents/guardians occupation (Government officer [§])				0.884
Non-government	0.9	0.55	1.73	
Unemployed	1.3	0.41	4.07	

([§]) Reference group, **p*-value is significant at <0.05

(3) Multivariate logistic regression analysis

An attempt to identify the best model for nutritional status analysis was presented in Table 4.18. That involved a selection of the independent variable to be included into the multiple logistic regression model from the literature review, or from the results of the univariate analysis. The independent variable had to be significantly correlated with the dependent variable, with p -value <0.10 . The backward stepwise was performed to determine association between factors and nutrition status. Some independent variables that made model unreliable were excluded and the results were presented by adjusted odds ratio (aOR) with corresponding to 95% confidence level (Table 4.19)

After adjusting for the eating habit (predisposing factor), the multivariate logistic regression model showed that the low level of physical activity (a predisposing factor), receiving information from teachers (enabling factor) and the living arrangement (parents) (reinforcing factor) had a statistically significant association with the adolescents' nutritional status. The result for low physical activity gave an aOR (95% confidence interval) 18.5 (5.58-61.64), receiving information from teacher 0.5 (0.25-0.88) and living with their parents 3.8 (1.22-11.78).

Table 4.19 A multivariate logistic regression analysis of the factors associated with nutritional status (Normal weight[§] versus overweight/obesity)

Variables	aOR	95% CI of aOR		p -value
		Lower	Upper	
Low physical activities (Moderate & High [§])	18.5	5.58	61.64	<0.001*
Receive information from teacher (No [§])	0.5	0.25	0.88	0.018*
Live with their parents (Guardians [§])	3.8	1.22	11.78	0.021*
Poor eating habit (adjusted) (Fair & Good [§])	1.9	0.97	3.99	0.060

([§]) Reference group. * p -value is significant at <0.05

4.2 Discussion

4.2.1 Discussion of research methodology

Research design: the present study is a cross-sectional research designed to examine the impact of supportive factors (classified as predisposing factors, enabling factors and reinforcing factors) affecting nutritional status of adolescents aged 15-19 years attending 5 schools in Sisattanak district. The hypothesis tests in this study are the predisposing factors, enabling factors and reinforcing factors have a relationship with nutritional status of adolescents and these factors can predict nutritional status of them. The study has been conducted at one point in time, involving the analysis of data describing the current situation of the phenomena of interest.

Sample: the subject of the study were 300 adolescents aged between 15 and 19 years olds attending 5 secondary schools in Sisattanak district. A random sampling procedure was followed to recruit schools from this region in Vientiane capital, and then random selection of one class, in each grade level, in the selected schools was followed. Although random sampling at the individual level would have been methodologically, a better method to recruit the study population from classes, all students in the randomly selected classes were considered as a sample, the calculations showed that the study needed a sample size of at least 250.

The statistical method in this study ensured that the sample size was a good representation of the population (15-19-years-old adolescent studied in the schools located in Sisattank region) to be studied, and it was generalized enough to decrease selection bias. Furthermore, the sample of the study was a relatively homogenous group in terms of demographics, which allowed examination of the factors related to eating patterns and lifestyle behaviors among the different subgroups such as weight status, and concerns of source of information with a more accurate approach.

Research instruments: the present study based on the questionnaire for self-administrative answering. Researchers use self-reported general characteristic, knowledge, attitude, eating habits and lifestyles as elements of nutritional assessments. For assessing eating habits by using self-administered food frequency questionnaires to assess the weekly frequent consumption of food items (that was based on the food groups and other food items which can be reflected good and poor eating habits such

as desserts, ice creams, puddings and chocolates) can predispose to inaccuracy of the actual item consumption (67). Moreover, under reporting of some food items were also observed among underweight and overweight/obese adolescents, compared to their normal-weight counterparts. This is in agreement with previous research (68). Inaccuracies in self-reported dietary energy intake data were also recognized compared with other methodologies such as the food behaviors questionnaire: 24hours recall that the traditional dietary assessment methods typically use to measure dietary intake⁽⁶⁹⁾. In order to eliminate inaccuracies and to make sure questions were understood and answered accurately; data collectors reviewed all completed responses with participants during the survey.

In order to accomplish the present survey's goals, the questionnaire included two types of response formats, the closed-ended and open-ended formats. The response formats to open-ended questions were specified using groupings to answers according to participants' answers to questions. In this study, the use of open ended questions could be of simpler to use because the number of potential responses were large. In addition, this format could shorten questionnaire response time for the respondents. However, the survey used more close-ended formats, compared to the open-ended format. This is because the use of the open-ended questions may not be truly reflective of responses by participants with fewer writing skills, which was noticed during the pilot study and the pretesting of the questionnaire. On the other hand, the use of the close-ended questions in this survey allowed for responses in standard categories. Responses were also easier to code and analyses.

In order to assessing the nutritional status, the researcher used the bathroom weight scale and height scale. All of processes the accuracy of the scale was checked by recalibrating it with a standard weight and height according to a standard procedure. Then, calculated the Body Mass Index (BMI) based on weight-for-height (kg/m^2), then compare with BMI children Graph for age from WHO-NCHS and get Z-score. For this process, we have limited the BMI per age for Asian (Expanded tables for constructing national health cards for Asian). So, researchers had to follow the BMI for age in WHO standard and classified the BMI for age status of the samples.

4.2.2 Discussion of research findings

There are many factors might relate with nutritional status. There was a study of Badrilaily 2008 which identified factors contributing to the nutrition status of adolescents in Indonesia. The study showed that some factors related with nutritional including age, grade of class, nutritional knowledge, attitude about nutrition, family size, accommodation type, caretakers, family income, occupation parents, information, aid from school ⁽³²⁾.

The discussion on these related factors to nutritional status of adolescents' secondary school age will be presented as followed.

(1) Nutritional status of adolescents

In developing countries undergoing rapid economic growth such as Lao PDR, a nutrition transition is observed, with a progressive change of patterns of nutrition related diseases, which allow both under-nutrition and over-nutrition to co-exist. As the current study showed the nutrition of adolescents in Loa PDR, there are both underweight and overweight problem situation. In the pass, Laos PDR was fell into the situation in which controlled by other countries and Lao people was struggled with the poor, hunger, poverty and lacked of developing. Lao people had concerned about high prevalence of malnourish especially for children had underweight, stunting and wasting. With the result of that, there are not only the prevalence of underweight still high but also there are increasing of overweight/obese dramatically. This could be referred to the fact that Sisattank's populations are coming from different regions, which could affect the urban city and modernization at the city level.

Using the 2007 WHO BMI for age (Z-score) reference data, the prevalence of overweight and underweight in Sisattanak adolescent secondary schools was recognized. The present findings of BMI for age (Z-score) status demonstrated that about 10.3% of adolescents are underweight, 14% are overweight and 9.3% are obese. Comparison of prevalence data in this study with those from a study in Saysettha located nearly district of Sisattanak (n= 203) that was carried on in 2015 by ⁽¹²⁾ showed a higher prevalence of underweight status among adolescents (34% vs. 10.3%) and a lower prevalence of overweight/obese status (12.8% vs 23.3%). The Saysettha data of Phouapanya and her colleagues used the difference aged group that was used in the present study. Phouapanya data included adolescents from schools that located in

Saysettha district. However, the data did not include a population from Sisattanak district at all, so the present finding could be a baseline of prevalence rates for underweight, overweight and obesity in Saysettha adolescents ⁽¹²⁾.

Moreover, the study in Kuala Lumpur of Malaysia by Maryam Zarei et al. in 2014 ⁽⁵⁾ found that more than one-third of the respondents (43.6 %) having normal weight while 14.9% being underweight and at the same time 41.5% of the respondents perceived themselves as overweight and obese. The study of Bupe Bwalya in 2015 ⁽⁷⁰⁾ focus on the female Adolescent age 15-19 years in Zambia revealed that proportion of prevalence of underweight was high 13.7 % and 9.4 overweight/obese.

Based on the finding we can assume that adolescents still concern with the underweight situation, nevertheless the dramatically rising the prevalence of overweight/obese. This could be referred to the fact that Sisattanak's populations are coming from different regions, which could affect the urban city and modernization at the city level, and consequently, affect knowledge and concerns about body image. As mentioned above, body size competition is also well-known among young children. In addition, media concerns of body image were demonstrated in the present study.

(2) Predisposing Factors

□ General characteristics

Grade of class and age: this research found that there was no significant relationship between grade and nutritional status (p -value > 0.05). This study revealed that being higher level of study was found to be an important predictor of underweight, this might be due to as age increases adolescents might access food easily by themselves, and on the other hand as age increased adolescents become more matured. However, the prevalence of underweight were found to be higher in older aged, this might be due to the difference they might be having the influent by teenage fashion for take care their appearances. That may be explained by the fact that they try to intense fear of gaining weight or becoming fat, even though underweight. Generally restrict the number of calories and the types of food they eat. Some people with the disorder also exercise compulsively, purge via vomiting and laxatives, and/or binge eat. However, these finding differ from previous studies where grade (level in school) was significant association with body weight status (nutritional status) (p -value < 0.05) ⁽⁵⁾.

The difference results of the research by Esimai OA (43) which studied that there was significant difference in the mean BMI by age group of adolescents. Moreover, the association between early adolescence and the prevalence of underweight was higher while the early adolescence had the prevalence of stunting was higher (p -value =0.02); low BMI and period of adolescence (p -value =0.014). Similarity with the result of adolescent nutrition survey Nepal (44) was found that the figure is slightly higher among early adolescents 33% and 27% among late adolescent.

Gender: the proportion of boy and girl respondents were the same 150 people for each sex. In the study, the proportion of boy underweight (11.3%) higher than girl underweight (9.3%). This might be due to variation of maturation time in boys and girls, for which girls reached maturation earlier than boys. The difference of prevalence in underweight by sex was also demonstrated by study done in Indonesia i.e lower underweight 20.59% and 24.53% among boys and girls respectively (32). However, this study also found, the rate of healthy weight boy (64%) lower than girl healthy weight (68.7%). Although the proportion overweight (24.7%) boy higher than girl (22%). This study did not find any significant relationship between gender and nutritional status of adolescents (p -value >0.05).

Results of this study not agree with those reported by Maryam Zarei et al. (5) who investigated the nutritional status of adolescents attending the Iranian secondary school. The study found that there was a significant association between gender and BMI (p -value < 0.01), 20% of males were severely thin compared to 17.1% of the females. In contrast, 16.4% of females were overweight compared to 12.7% in males. In addition, significantly more females were overweight/obese than males (p -value < 0.05).

Birth order: the results of the present study showed that no differences were found in birth order, between the underweight, normal-weight and overweight groups. When considering the nutritional status in detail, there were higher prevalence of underweight and overweight among adolescent who are an only child in their families. It can be due to their parents let their children have their way all the time and spoil them to do anything that they want although those things may not be good for their health. It is a result that is consistent with previous research by Lokeesan V. et al. (46) found that no association was seen for underweight though the proportion increased

with an increase in birth order. Birth order was statistically not significantly affect the nutritional status among the adolescents.

Number of siblings and number of household members: the present study showed that there was no statistically significant relation between number of sibling, number of household member and nutritional status (p -value >0.05). Based on the result of this study, it can be showed that the less of number of siblings (<3 people including themselves) and household member (2-4 people) had more prevalent of underweight (22.1% vs 12.6% respectively) and overweight (51.7% vs 24.4% respectively). It can due to when the number of children and household members are less the parents tried to allow the children to choose foods they like to eat because nowadays everything was changing most of people to challenge with rush hours for travelling to work or school. Most of people did not have time to prepare food for their family, they liked to buy the prepare food or junk food for their children because it was easier way to do for their family. This finding is differ from previous study of Himashree B. ⁽⁴⁷⁾ was observed a statistically significant difference were 36.5% and thinness 31.72% of children with stunting belonged to families with more than 5 members (p -value <0.05).

Daily allowance: the results of the present study showed there was no statistically significant association between the daily allowance and nutritional status of adolescent. The proportion of overweight in the adolescent (48.6%) who got daily allowance $>10,000$ kip was higher than adolescents who less than 10.000 kips (19.4%). It could be due to the fact that most adolescents who have money allowance higher are mainly whose from better socioeconomic status and the greater money enables students to purchase any food they like without thinking about quality nutrients of food. Therefore, the affluent money for snacking can facilitated the students to choose the quality of food's snack.

It was not relevant with the recent study of Mirzawati Latifah ⁽⁴⁸⁾ that there was relationship between the pocket money and nutritional status (p -value $=0.04$) and in another research by Dokkhem in Bangkok in 2011 ⁽⁴⁹⁾. showed that there was a significant association between the pocket money per day towards the body shape of student (p -value $= 0.024$) at 0.05 level of significance and significantly higher

percentage of overweight and obese children (80%) received Bath 150 or more when compared to underweight children (20%).

□ Knowledge of nutrition

The results found that there were no significant association between knowledge on nutrition and nutritional status of respondents (p -value >0.05). Although, majority of respondents had good nutrition knowledge, but did not use their knowledge to make healthy food choice. However, the informants showed a lack of knowledge about important nutrition problem. For example, as much as almost of 50% of respondents did not know that they should had breakfast every day for prevent gaining weight. Avoiding breakfast can lead to overweight/Obese and less appetite for needed food children need for their normal working of metabolic and growth of the body.

Similarity with the according to Phouapanya V. ⁽¹²⁾, the research found that there was no association between nutrition and knowledge toward nutrition (p -value >0.05). Conversely, the another research of Kinyua L.W. ⁽⁵⁰⁾ about the association of nutrition knowledge and nutrition status was not significant at (p -value = 0.549).

□ Attitude toward nutrition

The present study showed that Adolescents who had moderate and good attitude toward nutrition had higher prevalence of overweight/obesity when compared to those who had poor attitude. Attitude level toward health and nutrition had no association with nutritional status (p -value >0.05). This could be attributed to the fact that attitude does not directly influence nutrition status but help to promote healthy eating habits by influencing food choices. The fact that nutrition status is a sum total of interlinked factors attitude indirectly contributes to nutrition status but attributes such as quality and quantity of food directly influences nutrition status over a period of time. Food choices therefore are presumed to promote healthy lifestyle and consequently healthy status when positive nutrition attitude is based on long term healthy benefits of good dietary practices.

Result of this study agree with those reported by Kinyua L.W. ⁽⁵⁰⁾ who investigate about the Association between Attitude with dietary practices and nutritional status, results showed a positive relationship but not significant (p -value=

0.566) and it means that students with positive attitude did not necessary have good nutrition status.

❑ Eating habits

Good eating habits are one of the key factors of a healthy lifestyle. Nutrition behavior depends on cultures and traditions because they determine preparation methods and specific dietary restrictions. That can have an impact of nutrition patterns and societies' health at large. The finding of this study showed that more than half of the subjects did not have an appropriate eating behavior and got poor eating habits (67%). More understandably, respondents with poor eating habits had a higher percentage of overweight/obesity. The relationship between the eating habit and nutritional status was significant (p -value < 0.05). They did not know amount of which kind of food they should always have, and which kind of food they should not have. Therefore, the eating habit of adolescent consumed high diet diversity.

This results of this study was similar with the research of Saimuang S. ⁽⁵¹⁾ focused research in Kamphaengphet district and found that there was a significant association between food behaviors towards obesity among children in early elementary school (p -value = 0.026) at 0.05 level of significance.

❑ Physical activities

The present of study found that there was strongly significant associated between physical activities and nutritional status of adolescents (p -value < 0.001). The adolescents with low level of physical activities were more likely to be overweight/obese than adolescents with moderate and high level of physical activities. Although lack of physical activity increases the risk of obesity, being overweight also is associated with poor physical fitness. We found that overweight adolescents generally had poorer physical fitness than their normal weight counterparts. This result is in agreement with Yvonne ⁽⁵²⁾ Wake studied cultural and lifestyle-related factors that affect obesity in school-aged children living in England and France. The study found that there were significant differences (p -value < 0.01) in the levels of out-of-school physical activity undertaken by the French children and that of the English children.

When we looked at the percentage of sedentary behavior, classified by hour, it was found that about 17.3% of adolescents did not move more

than 6 hours. The sedentary lifestyles and poor diets and nutrition are increasingly becoming leading causes of mortality. They double the risk of cardiovascular diseases, diabetes, and obesity, and increase the risks of colon cancer, high blood pressure, osteoporosis, lipid disorders, depression and anxiety. These are the health risks that have to be addressed by promoting healthy and active lifestyles in school-aged adolescents.

After adjusted odd ratio by eating habit, there was strongly relationship between physical activities and nutritional status. Adolescents who had low level of physical activities were 18 times more likely to be overweight/obese than those had moderate and high level of physical activities (AOR: 18.5, 95% CI: 5.58-61.64). Similarity with Desalew A. et al. in eastern Ethiopia 2017 (53) revealed that children had not engaged in regular physical exercise (AOR = 3.8, 95% CI: 1.5, 9.8) were significant associated with overweight/obesity risk.

(3) Enabling Factors

Source of information toward nutrition and health: This study revealed that sources of nutrition information were a significant enabling factor determining the nutritional status of adolescents, especially when the information came from teachers in school (p -value<0.007). Underweight (7.0%), normal-weight (75.4%) and overweight/obese (17.6 %) adolescents received nutritional information from teachers. Teachers are among the most important influences in the lives of school-aged children, yet relatively little emphasis has been placed on examining the potential role teachers may play in facilitating adolescent health promotion efforts. According to a study conducted by researchers at Columbia University's Mailman School of Public Health, and published in the Journal of School Health, teachers provide valuable information to school personnel about the health issues that are important to adolescents.

Other sources of nutrition information were not significantly associated with the nutritional status of adolescents, even though most of them received health and nutrition information from social media 88.3%, followed by television 65.0%. This may be due to the easily accessible to social media through cell phones, computers or tablets. These ways could be explain that social media and television are sources 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 influence by commercial advertisement for low nutritive foods. Most of the food advertisements are high in fat, sugar, or sodium; while almost no advertisements are for healthy food such as fruit and vegetable. In addition, it was indicated that nowadays there was a lot of confusing surrounding what constitutes a healthy diet, a particularly food good or bad for health, the merits of diet or food which sometimes is not scientifically confirmed. Such conflicting nutrition messages can lead to confusing and misinterpretation, causing individual unhealthy eating patterns.

Differently with the study of Mundie D. ⁽⁵⁶⁾ do the research about the correlation between demographic, socio-economic factors and the knowledge, attitude and practice of primary care given. The research found that the sources of nutrition information relied on by the respondents were community health workers (41%), media (29%), school feeding program (24%), health facilities and seminars (6%). Those results were showed that no association between the source of nutrition information and the knowledge level at the 0.05 level of significance (p -value =0.14).

After adjusting odd ratio for eating habits, a significant relationship was found between the source of nutrition information and the nutritional status. Adolescents who received nutrition information from teachers were better able to prevent overweight/obesity than those did not (AOR: 0.5, CI: 0.25-0.88).

(4) Reinforcing Factors

Caretakers. Most adolescents lived with parents (76.3%), separated family (only father or mother) (9.3%), and guardians (relatives) (14.3%). The results of this study found significantly association with nutritional status and had more the prevalence of malnutrition especially overweight/obese (p -value <0.05). The adolescents living with their parents had more chance to be malnutrition than those not living with parents. This may due to their parents allowed their children to choose foods they liked to eat including fast food, food with high sugar and salt containing. This is a mistake, parents should respect their children's food preferences. Making their own food selection with their parents' advice, it is a way for children to learn about nutrition and to develop good and healthy eating habits. It was relevant with the recent study of Badrilalaily, 2008 ⁽³²⁾ shown that people taking care students were significant associated to nutritional status (p -value <0.05).

After adjusting odd ratio for eating habit, there was a statistically significant relationship between adolescents' living arrangement and their nutritional status. Adolescents living with their parents were 3.8 times more likely to be overweight/obese than those not living with parents (AOR: 3.8, CI: 1.22-11.78).

Parents/guardians' education: the result of research found there was no significant association with educational parents/guardian and nutritional status of adolescents (p -value >0.05). Education levels of parents/guardian in this study were found to be quite high. More than 90% of parents/guardian with completed college or university and less than 10% completed high school or lower. In addition, the results also revealed that the prevalence of overweight happened in the group of parents with upper high school and were found to be important predictor for overweight of study participants. It may be due to their parents who had high education level affect income and would have a good job. So, they did not have time to take care their children and would effect to nutritional status of their children.

In Contrary, this finding was comparable to the study done by Roba KT, et al, ⁽⁵⁷⁾ concluded that adolescent girls who were from an illiterate father were more likely to develop under nutrition (thinness) compared to those born from fathers of college level training (p -value <0.001) and those daily laborer fathers were twice more likely to be undernourished compared to those adolescent girls from merchant fathers (aOR=2.7, CI: 1.48-4.8, $p<0.001$). As similar of the research of Silabutra & Ramosoota (32) found that the guardians was significantly association with nutritional status (p -value <0.05). This research has shown that education level of parents are influenced directly to the nutritional status of children and high income of parents.

Parents/guardians' occupation: the current study expressed that the occupation of parents/guardians were not associated with nutritional status (p -value >0.05). However, according to the results, adolescents whose parents/guardian with no job have more prevalence to be overweight/obese rather than whose parents/guardian have a job. In contrast, the research of Lola Adekunle ⁽⁵⁰⁾ found that the prevalence of malnutrition was strongly related to the father's occupation (p -value < 0.05). In addition, the research of Roba KT et al ⁽⁵⁷⁾ shown that occupation of caregivers was associated with nutritional status of adolescent (p -value <0.01).

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Adolescents are future leaders of a nation and healthy adolescents are fundamental to nation's development. Adolescence is also a period when they form lasting eating habits and physical activities that can affect their physical and intellectual development in the future. Being in school provides the school with an opportunity to contribute to the adoption of healthy lifestyles. It is therefore important for school-based intervention programs that can be conducted to improve the nutritional status of their children. For a start it should be made compulsory for all students to participate in physical education classes. Furthermore programs on improved dietary habits could be incorporated into sciences with emphasis on the selection of easily available local foods. Intervention programs to promote healthy body image can be developed among school aged students to reduce their vulnerability towards distorted body image in later years.

5.1 Conclusions

The present study is a cross-sectional survey examining the factors affecting nutritional status of adolescents attended secondary schools in Sisattanak. The sample consists of 300 adolescents of secondary school in Sisattanak district area. The sample of this study was constructed by means of a simple random sampling method. The data were collected by using self-administrative questionnaires for adolescents. Data collection was conducted from April 01, 2018 to April 30, 2018. Frequency distributing, chi-square, fisher-test, univariate and multivariate regression were used for data analysis. In this chapter, the findings of the study are summarized based on the research objectives and research hypotheses.

The majority of adolescents were 17 years old. Nearly half of these adolescents were the first child living with 2-4 family members. The study also found that nearly half of adolescents got daily allowance 10,001-20,000kip. One-fourth of them took the food supplements during last three months. Three-fourths of adolescents

lived with their parents. Fathers and male guardians had higher education and better jobs than mothers. More four-fifth of adolescents got the information about nutrition and health through social media, followed by television and teacher.

The majority of adolescents had good knowledge of nutrition and a good attitude toward nutrition. But most of them had poor eating habits and physical activities, and these two variables were main influences on the nutritional status of adolescents. In addition, most adolescents living with their parents were more likely to be overweight/obese than adolescents who did not live with their parents.

The main outcome variable of this study shows that the extent of malnutrition was high among study participants. The study found that 23.3% of adolescents were overweight 23.3%, with boys being more overweight than girls. Underweight was shown in 10.3% of adolescents, with boys being more affected than girls. This problem should not be overlooked and would require the appropriate public health intervention.

The results also showed the association between predisposing factors -- general characteristics consisting of grade, gender, age, birth order, number of siblings, number of household member, daily allowance, history of chronic disease, and food supplement – and adolescents' nutritional status. However, the knowledge of nutrition and attitude towards nutrition were not significantly related to nutritional status of adolescents.

Also, there was no statistically significant association between reinforcing factors -- educational and occupational status of parents/guardians -- and the nutritional status of adolescents.

Only three independent variables -- physical activities classified as predisposing factors, teachers classified as enabling factors, living arrangement (parents/guardians) classified as reinforcing factors – were significantly related to the nutritional status and were adjusted for eating habits (aOR=18.5, 0.5, and 3.8, respectively at p -value<0.05).

Limitation of the study

The limitation of our study was that the cross-sectional analysis could not be used to determine causality between physical activities and overweight/obesity. The parts of questionnaire referring to the knowledge of nutrition and attitude toward nutrition may sometimes be consistent with the food frequency questionnaire (FFQ). That may be due to the fact that the knowledge and attitude about nutrition may not be reflecting their real eating habits. Also, the anthropometric height measurement may not sometime follow the standard guideline written in the methodology part.

5.2 Recommendations

1. To address the alarming levels of malnutrition in adolescents, next steps are urgently needed to identify ways to improve the nutritional status of adolescent in Lao PDR, and contribute to sustainable development.

2. There is need to enhance nutrition education among the students. School curriculum may provide common nutrition subjects for all students particularly disciplines where nutrition and health is not directly or indirectly taught.

3. There is need for enhancing enabling environment where students can access and exploit sources beyond the conventional classroom set up such as internet to enable them benefit from wide range of authenticated nutritional information.

4. Eating premises within schools should be guided by nutrition principles to ensure provision of convenient, nutritious, varied, acceptable and affordable meals for students to discourage reliance on unhealthy convenient fast foods that expose students to future health risks that are preventable.

5. Serving healthy food choices for school lunches, limiting availability and accessibility of unhealthful foods and sugary drinks, and making water available to students throughout the day are some of the ways that schools can help prevent obesity.

6. Do not allow the adolescents bring the snacks, mobile phone in the classroom.

7. Physical activities ought to be promoted among adolescents to physically active daily, or nearly every day, as part of play, games, sport, work,

transportation, recreation, physical education or planned exercise, in the context of family, school and community activities.

8. Families as well as the whole community need to get awareness on nutrition of adolescent through health extension worker and including in routine facilities service. In addition, family and cultural factors contribute many barriers to healthier eating and lifestyle. For example, some families do not like to change their eating habits such as eating together. Families should prepare breakfast for adolescents before going to school.

9. Collaborate with communities to maximize use of school, to develop active transit plans (bike, walk to school) and community spaces for physical activity during and outside school hours.

10. Peer support provides potential for strong linkages and motivation within students' networks. Peer who exhibited higher knowledge than younger students may help disseminate and influence positive nutrition habits within peer networks.

11. Health care providers can be strong advocates for policies that promote healthy nutrition and physical activity on a local and national level. Training food service staff in healthy food preparation and food safety can help to eliminate sugar-sweetened beverages in the school environment or to limit access to them.

12. Future research should include families and schools as they influence adolescent eating behaviors and lifestyles. For example, research on knowledge among overweight and underweight parents could help to examine the home environment that adolescents live in.

13. This should include long-term follow-up and evaluation to assess the degree of commitment and implications of standardized guidelines assigned to tackle nutrition-related problems and prevent later chronic health problems.

14. There is a need for a longitudinal study that can further increase our understanding of the relation between physical activity and obesity, possibly by using more objective methods of measuring both parameters.

REFERENCE

1. WHO. World Health Organization, Regional Pffice for south_East Asia New Delhi. 2005.
2. Global Nutrition Report. Research Institute, International Food Policy; 2016.
3. Malik VS, Willett WC, Hu FB. Global obesity: trends, risk factors and policy implications. *Nature Reviews Endocrinology*. 2012;9:13.
4. Onyiriuka AN, Umoru DD, Ibeawuchi AN. Weight status and eating habits of adolescent Nigerian urban secondary school girls. *South African Journal of Child Health*. 2013;7(3):108-12.
5. Zarei Me, al. Nutritional status of adolescents attending the Iranian secondary school in Kuala Lumpur, Malaysia. *Global journal of health science*. 2014;6(6):185.
6. Silangwe BN. Nutritional status and dietary intake of adolescent girls in Mandlenkosi High School, Lindelani 2013.
7. Vignarajah S. A frequency survey of sugary foods and drinks consumption in school children and adolescents in a West Indian island–Antigua. *International dental journal*. 1997;47(5):293-7.
8. Nikoi E, Anthamatten P. An examination of environmental correlates with childhood height-for-age in Ghana. *Public health nutrition*. 2013;16(1):46-53.
9. Senbanjo I, Oshikoya K, Njokanma O. Changes in the nutritional status of school children and adolescents in Abeokuta, Nigeria between 1983 and 2006. *West African journal of medicine*. 2011;30(6).
10. WHO. Obesity and overweight. 2016.
11. Lao PDR Lao Social Indicator Survey (LSIS) 2012.
12. Phouapanya V. Food consumption behavior and nutritional status of student at Secondary school in Saysettha district, Vientiane Capital, Lao PDR. 2015.
13. NationalNutritionStrategy. National Nutrition Strategy to 2025 and Plan of Action 2016-2020 2015. Available from: http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/lao_peoples_democratic_republic/final_lao_version_nnspa_2016_matrix_updated_21_dec2015-part1rta-.pdf.
14. WHO. Growth Reference 5-19 year old2008.

15. Mackie D. food nutrition guidelines for healthy-children and young people (Aged 2-18 years). 2012;2.
16. Ortiz A. Adolescence, Brain Development and Legal Culpability Defending Liberty Pursuing Justice: Adam Ortiz; 2004 [Available from: https://www.americanbar.org/content/dam/aba/publishing/criminal_justice_section_newsletter/crimjust_juvjus_Adolescence.authcheckdam.pdf].
17. UNICEF. The State of the World's Children 2011: Adolescence-an Age of Opportunity: UNICEF; 2011.
18. Daniels SR. The consequences of childhood overweight and obesity. The Future of children. 2006;16(1):47-67.
19. WHO. Preventing chronic diseases. 2005.
20. Dambhare D, Bharambe M, Mehendale A, Garg B. Nutritional status and morbidity among school going adolescents in Wardha, a Peri-Urban area. Online Journal of Health and Allied Sciences. 2010;9(2).
21. A report card on adolescents. Unit for children; 2012.
22. A. Roth R. Nutrition & Diet Therapy 2010.
23. Lieberman S, Bruning N. The real vitamin and mineral book: a definitive guide to designing your personal supplement program: Penguin; 2007.
24. Pietsch J, Ford C. Children with Cancer: Measurements of Nutritional Status at Diagnosis 2000. 185-8 p.
25. Body Mass Index Medical New Today 2016 [updated 5/01/2016. Available from: <https://www.medicalnewstoday.com/info/obesity/what-is-bmi.php>].
26. Hsu WC, Araneta MRG, Kanaya AM, Chiang JL, Fujimoto W. BMI Cut Points to Identify At-Risk Asian Americans for Type 2 Diabetes Screening. Diabetes Care. 2015;38(1):150-8.
27. Stegenga H, Haines A, Jones K, Wilding J. Identification, assessment, and management of overweight and obesity: summary of updated NICE guidance. BMJ : British Medical Journal. 2014;349.
28. De Onis M, Blossner M, Organization WH. WHO global database on child growth and malnutrition. 1997.
29. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. Jama. 2014;311(8):806-14.

30. Gómez F. Mortality in second and third degree malnutrition. *Bulletin of the World Health Organization*. 2000;78(10):1275-80.
31. Shepherd J, Garcia J, Oliver S, Harden A, Rees R, Brunton G, et al. 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. Vol. 1, Overview. Vol. 2, Complete report. 2002.
32. Badrialaily. Nutritional status and related factors among elementary school students in Banda Aceh Municipality, Nanggroe Aceh Darussalam province, Indonesia. 2008.
33. Gibson RS. *Principles of nutritional assessment*: Oxford university press, USA; 2005.
34. Sparling PB. Obesity on campus. *Preventing chronic disease*. 2007;4(3).
35. Smith LC, Haddad LJ. *Overcoming child malnutrition in developing countries: past achievements and future choices*: Intl Food Policy Res Inst; 2000.
36. Aisbitt B, Caswell H, Lunn J. Cereals—current and emerging nutritional issues. *Nutrition bulletin*. 2008;33(3):169-85.
37. Hallal PC, Victora CG, Azevedo MR, Wells JC. Adolescent physical activity and health: a systematic review. *Sports medicine (Auckland, NZ)*. 2006;36(12):1019-30.
38. *Global recommendations on physical activity for health 2010* [Internet]. 2010. Available from: http://www.who.int/dietphysicalactivity/factsheet_young_people/en/.
39. Martin KS, Ferris AM. Food Insecurity and Gender are Risk Factors for Obesity. *Journal of Nutrition Education and Behavior*. 2007;39(1):31-6.
40. Jitnarin N, Kosulwat V, Rojroongwasinkul N, Boonpradern A, Haddock C, Poston W. Prevalence of overweight and obesity in Thai population: Results of the National Thai Food Consumption Survey 2011. e242-9 p.
41. McGraw-Hill. *The Precede-Proceed Model of Health Program Planning & Evaluation 2005* [Available from: <http://lgreen.net/precede.htm>].
42. Visschere L. *The development and application of an oral health care model for institutionalised older people* 2010.
43. Olapeju E. Nutrition and Health Status of Adolescents in a Private Secondary School in Port Harcourt. *Health Science Journal*. 2015.

44. Thapa M, Neopane A, Singh U, Aryal N, Agrawal K, Shrestha B. Nutritional status of children in two districts of the mountain region of Nepal. *Journal of Nepal Health Research Council*. 2014.
45. Brown PH. Parental education and investment in children's human capital in rural China. *Economic Development and Cultural Change*. 2006;54(4):759-89.
46. Lokeesan V, Gnanaselvam K. nutritional-status-of-grade-five-students-in-selected-school-of-batticaloadistrict-sri-lanka-2161-0509-10001622017.
47. Bhattacharyya H, Barua A. Nutritional status and factors affecting nutrition among adolescent girls in urban slums of Dibrugarh, Assam. *Natl J Community Med*. 2013;4(1):35-9.
48. Latifah M, Murti B, Dewi YLR. Effect of Soft Drink, Electronic Media Exposure, Family Income, Pocket Money, and Nutritional Status, on Age at Menarche Among Adolescents in Surakarta. *Journal of Maternal and Child Health*. 2017;2(1):54-63.
49. Dokkhem POS. The Food Consumption of junior high school Students in Bangkok 2011.
50. Kinyua LW. Association of Nutrition Knowledge and Attitude with Dietary Practices and Nutritional Status of Female Undergraduate Students Attending University Colleges within Nairobi Metropolis (Unpublished Doctoral Dissertation). The University of Nairobi, Kenya. 2013.
51. Soutisad S. Factors Correlated With The Incidence Of Obesity Among Children In Primary Schools Amphoe Mueang Kamphaengphet 2558.
52. Wake Y, Reeves S. Factors that influence obesity in children at primary schools in England and France. *International Journal of Health Promotion and Education*. 2012;50(1):2-9.
53. Desalew A, Mandesh A, Semahegn A. Childhood overweight, obesity and associated factors among primary school children in dire dawa, eastern Ethiopia; a cross-sectional study. *BMC obesity*. 2017;4(1):20.
54. McCullough FSW, Yoo S, Ainsworth P. Food choice, nutrition education and parental influence on British and Korean primary school children. *International Journal of Consumer Studies*. 2004;28(3):235-44.

55. Green L, Kreuter M. The precede–proceed model. *Health promotion planning: an educational approach* 3rd ed Mountain View (CA): Mayfield Publishing Company. 1999:32-43.
56. Mundia DN. Nutritional knowledge, attitudes and practices of primary caregivers of home grown school feeding programme pupils at Sauri millennium village, Siaya-Kenya 2013.
57. Roba K, Abdo M, Wakayo T. Nutritional Status and Its Associated Factors among School Adolescent Girls in Adama City, Central Ethiopia. *J Nutr Food Sci.* 2016;6(493):2.
58. Enderlein G. Daniel, Wayne W.: *Biostatistics — A Foundations for Analysis in the Health Sciences.* Wiley & Sons, New York—Chichester—Brisbane—Toronto—Singapore, 6th ed. 1995, 780 S., £58.—, ISBN 0–471–58852-0 (cloth). *Biometrical Journal.* 1995;37(6):744-.
59. Mariás Y, Glasauer P. Guidelines for assessing nutrition-related knowledge, attitudes and practices: Food and Agriculture Organization of the United Nations (FAO); 2014.
60. Shultz K, Whitney D. *Measurement Theory in Action: Case Studies and Exercises.* Thousand Oaks, California 2005. Available from: <http://sk.sagepub.com/books/measurement-theory-in-action>.
61. Mariás YF, Glasauer P. Guidelines for assessing nutrition-related knowledge, attitudes and practices. Rome: Food and Agriculture Organization of the United Nations (FAO); 2014. vi + 180 pp. p.
62. Liu L, Wang PP, Roebathan B, Ryan A, Tucker CS, Colbourne J, et al. Assessing the validity of a self-administered food-frequency questionnaire (FFQ) in the adult population of Newfoundland and Labrador, Canada. *Nutrition journal.* 2013;12(1):49.
63. WHO. *Global Physical Activity Questionnaire.* 20 Avenue Appia, 1211 Geneva 27, Switzerland 2009.
64. Watt A. Development and validation of the sport imagery ability measure. 2003.
65. O.S. OBMOTLOMLARAaO. The Relationships between Percent Body Fat and Other Anthropometric Nutritional Predictors among Male and Female Children in Nigeria. *African Journal of Biomedical Research.* 2006;Vol. 9, (Num. 1, 2006.);pp. 45-52.

66. Algar FJ, Alvarez A, Aranda JL, Salvatierra A, Baamonde C, López-Pujol FJ. Prediction of early bronchopleural fistula after pneumonectomy: a multivariate analysis. *The Annals of thoracic surgery*. 2001;72(5):1662-7.
67. Krall EA, Dwyer JT, Coleman KA. Factors influencing accuracy of dietary recall. *Nutrition Research*. 1988;8(7):829-41.
68. Vance VA, Woodruff SJ, McCargar LJ, Husted J, Hanning RM. Self-reported dietary energy intake of normal weight, overweight and obese adolescents. *Public Health Nutrition*. 2009;12(2):222-7.
69. Turconi G, Celsa M, Rezzani C, Biino G, Sartirana MA, Roggi C. Reliability of a dietary questionnaire on food habits, eating behaviour and nutritional knowledge of adolescents. *European Journal Of Clinical Nutrition*. 2003;57:753.
70. Bwalya B. Nutritional Status Among Female Adolescents Aged (15 – 19 years) in Zambia: Why it Matters 2015. 1-7 p.
71. WHO. Growth reference data for 5-19 years. World Health Organization; 2007.



APPENDICES

Part 2: Knowledge toward nutrition

No.	Statement	Yes ²	No ¹
1	Having breakfast every day can prevent you from gaining weight.		
2	Eating a lot of sugar and sweet food can keep you healthy.		
3	Eating raw meat can help to strengthen the immune system.		
4	It is not necessary for overweight people to do more physical activity when compare to normal weight people.		
5	Eating a variety of vegetables regularly is a way to reduce the risk of obesity.		
6	Fruits and vegetables are rich in vitamins and mineral which are benefit for health.		
7	Processed foods are a major source of salt, it is a risk of hypertension.		
8	Eating burnt animal meat can caused cancer.		
9	We should consume a lot of ice-cream and Coca-Cola contain high sugar because they are healthy source of energy.		
10	You can eat fried foods and fats as much as you want, it is good way to keep you fit.		
11	The main nutrient in milk is calcium, it benefits for bone development.		
12	Potato chips is the best resource of energy and can keep you healthy.		
13	Fried foods contain high fat that protects the body from illnesses.		
14	Drinking water at least 8 glasses per day, it can help your metabolism working well.		
15	Protein-rich foods are very important for body muscle building and tissues repairing.		

Part 3: Attitude toward nutrition

Please read the statements below, and indicate how the statement applies to your attitude.

1= Strong Disagree 2= Disagree 3= Uncertain 4= Agree 5= Strong Agree

NO .	Statement	① Strong disagree -to- ⑤ Strong agree				
		①	②	③	④	⑤
1	Eating the adequate amount of food and exercise can help us to be healthy.	①	②	③	④	⑤
2	Fast food like fried chicken is not good to eat every day.	①	②	③	④	⑤
3	Replacing normal diet with junk food does not affect to your health.	①	②	③	④	⑤
4	Deep fried is healthier cooking method when compare to boiling or steaming.	①	②	③	④	⑤
5	I have to make an effort to drink milk every day because drinking milk can help bone growing.	①	②	③	④	⑤
6	It is important to skip meal if you want to maintain your weight.	①	②	③	④	⑤
7	Unhealthy diet is a risk factor for various diseases.	①	②	③	④	⑤
8	Eating more fruits is good way to gain weight.	①	②	③	④	⑤
9	Diets and exercise is the best way to lose weight.	①	②	③	④	⑤
10	Eating vegetarian diet can help you losing weight.	①	②	③	④	⑤
11	Slim person looks more beautiful when compare to fat person.	①	②	③	④	⑤
12	Balanced diet is not essential for adolescents.	①	②	③	④	⑤
13	It is not easy to achieve a balanced diet if you still eating unhealthy foods.	①	②	③	④	⑤
14	Eating a variety of foods in moderation is key to balanced nutrition.	①	②	③	④	⑤
15	The necessity of eating main meals if you want to lose weight.	①	②	③	④	⑤

Part 4: Eating habits toward nutrition

Last 4 weeks, frequency of times you ate following food on average is

No	Statement	Average portion size	Never	Time/month	Times/week			Times/day				Number of portion
				1-3	1	2-4	5-6	1	2-3	4-5	≥6	
1	Ice-cream, Choc ice	1 cup/ 125 ml										
2	Fried chicken, potato chips	1piece/ 200mg										
3	Yogurt's drink/ milk	1glass/ 125ml										
4	Pickled fruit/ Vegetable	1sachet/ 125mg										
5	Bakery, Cake (chocolate, milk)	1slice/ 60g										
6	Fizzy drink a bottle (free sugar free)	1bottle/ 300ml										
7	Eggs as boiled, fried	1 medium										
8	Cracker, Crisps snack (potato, popcorn)	Sachet/ 50mg										
9	Fresh vegetables	Medium serving (100mg)										
10	Pizza, hamburger	1piece/ 240g										
11	Fresh fruits	Medium serving (100mg)										
12	High lipid: Beef, pork belly	Medium serving /120g										
13	Low fat: chicken, fish	Medium serving / 120g										
14	Papaya salad, noodle salad with fermented fish	Medium serving /120g										
15	White rice	1 cup/ 158g										

No	Statement	Average portion size	Never	Time/month	Times/week			Times/day				Number of portion
				1-3	1	2-4	5-6	1	2-3	4-5	≥6	
16	Instant noodle	1cup/ 220g										
17	Tea/ coffee	1cup/ 150g										
18	Chocolate or candy bar	1bar/30g										
19	Fried of Hot dogs, meat ball	1plate/ 150g										
20	Uncooked food (Larb, som mou)	Medium serving/ 100mg										



Part 5: Physical activities

Questions		Response
Section 1: Activities at school		
P1	Do you play vigorous-intensity sport like <u>running, football</u> at school for at least 10 minutes continuously?	Yes <input type="checkbox"/> ¹ No <input type="checkbox"/> ² ⇨⇨ (Skip <i>go to P4</i>) P2 .....days/ week P3 (a-b) .....hrs :mn /time
P4	Do you play moderate-intensity sport like <u>brisk walking, cycling, swimming, volleyball</u> at school for at least 10 minutes continuously?	Yes <input type="checkbox"/> ¹ No <input type="checkbox"/> ² ⇨⇨ (Skip <i>go to P7</i>) P5 .....days/week P6 (a-b) .....hrs :mn per time
Section 2: Travel to and from places (to school, for shopping, to market)		
P7	Do you walk or ride a bicycle for at least 10 minutes continuously to get to and from places?	Yes <input type="checkbox"/> ¹ No <input type="checkbox"/> ² ⇨⇨ (Skip <i>go to P10</i>) P8 .....days/week P9 (a-b).....hrs :mn per time
Section 3: Recreational activities (about sports, fitness and leisure)		
P10	Do you play vigorous-intensity sports, fitness and leisure activities like <u>running, football, weight lifting</u>.....outside school for at least 10 minutes continuously?	Yes <input type="checkbox"/> ¹ No <input type="checkbox"/> ² ⇨⇨ (Skip <i>go to P13</i>) P11 .....days/week P12 (a-b).....hrs :mn per time
P13	Do you do any moderate-intensity such as <u>brisk walking, cycling, swimming, volleyball, rattan ball</u> outside school for at least 10 minutes continuously?	Yes <input type="checkbox"/> ¹ No <input type="checkbox"/> ² ⇨⇨ (Skip <i>go to P16</i>) P14 .....days/week P15 (a-b) .....hrs: .....mn per time
Section 4: Sedentary behavior: Sitting or reclining at home, getting to and from places, travelling (in car, bus, train), reading, playing cards or watching television, but do not include time spent sleeping.		
P16(a-b)	How much time do you usually spend sitting or reclining on a typical day?	..... hrs :mins

vigorous-intensity : Breathe deep and rapid, sweat break after 5 minutes and can't speak

moderate-intensity: Breathe deeper, sweat break after 10 minutes and can speak

Part 6: Enabling Factors

1. How did you receive information about nutrition and health on following topics for the last 3 month (multiple answer)

- ¹ Non ² Text book ³ Newspaper /Magazines
⁴ Television ⁵ Radio ⁶ Family members
⁷ Teacher ⁸ Friends
⁹ Social media (Facebook, line, Instagram)
¹⁰ Healthy Learning program activities in community
¹¹ Healthy Learning program activities in school
¹² Other (Specify).....

2. Which of the sources mentioned above provide you with the most information? Rank in order 1, 2 and 3 of their importance source)

1= The main source 2= the second source 3= The rare source

- ¹Non ²Text book ³Newspaper /Magazines
⁴ Television ⁵Radio ⁶Family members
⁷Teacher ⁸Friends
⁹Social media (Facebook, line, Instagram)
¹⁰Healthy Learning program activities in community
¹¹Healthy Learning program activities in school
¹²Other (Specify).....

Part 7: Reinforcing Factors**1. Who do you live with? (in last 3 month)**

- Mother Father
 Guardians (Grandfather, grandmother, uncle and aunt)

2. Educational Mother

- ¹ No school ² Primary school ³ Secondary school
⁴ College/University ⁵ other (specify).....

3. Educational Father

- ¹ No school ² Primary school ³ Secondary school
⁴ College/University ⁵ other (specify).....

4. Educational Guardians (if not father or mother response to the question)

- ¹ No school ² Primary school ³ Secondary school
⁴ College/University ⁵ other (specify).....

After entry this part please skipping to Q 7 (Guardians Occupation)**5. Mother Occupation**

- ¹ Farmer ² Own business ³ Government officer
⁴ worker ⁵ Housewife ⁶ other (specify).....

6. Father Occupation

- ¹ Farmer ² Own business ³ Government officer
⁴ worker ⁵ Unemployment ⁶ other (specify).....

7. Guardians Occupation (if not father or mother response to the question)

- ¹ Farmer ² Own business ³ Government officer
⁴ worker ⁵ Unemployment ⁶ other (specify).....

Observation form
Environmental surrounding school

1. Number of food shop in school:

2. Type of food: _____

3. How about Prize _____

4. Number of food shop outside school: _____

5. Policy involve with Foods and Nutrition at school:

6. Having campaign with promoting nutrition for students

7. What are the malnutrition issues in your school

8. What is your plan to deal with student malnutrition

APPENDIX B
QUESTIONNAIRE LAO VERSION

ລວງສູງ _____ cm ນ້ຳໜັກ _____ Kg

ລະຫັດ _____
ວັນທີ...../...../ 2018

ແບບຟອມສອບຖາມ

**ການປະເມີນພາວະໄພຊຸມນາການຂອງນັກຮຽນ (ອາຍຸ 15-19 ປີ) ໃນໂຮງຮຽນມັດທະຍົມ
ຕອນປາຍໃນເມືອງສີສັດຕະນາກ ສປປລາວ**

ກະລຸນາໝາຍ (✓) ໃສ່ໃນບ່ອນຫວ່າງທີ່ເໝາະສົມ ແລະ ຂຽນຕື່ມໃສ່ບ່ອນຫວ່າງ

- ພາກທີ 1: ຂໍ້ມູນທົ່ວໄປ

1. ລະດັບຊັ້ນຮຽນ: ¹ ມ 5 ² ມ 6 ³ ມ 7
2. ເພດ: ¹ ຊາຍ ² ຍິງ
3. ອາຍຸ ປີ
4. ລູກຜູ້ທີ່.....
5. ຈຳນວນອ້າຍເອື້ອຍນ້ອງ (ນັບຕົນເອງຜ່ອມ).....
6. ຈຳນວນສະມາຊິກໃນຄອບຄົວ (ນັບຕົນເອງຜ່ອມ).....
7. ເງິນໄປໂຮງຮຽນແຕ່ລະມື້.....ກີບ
8. ໃນໄລຍະ 3 ເດືອນຜ່ານມາທ່ານໄດ້ມີປະຫວັດການເປັນພະຍາດບໍ່?
 - ¹ ບໍ່ (ຂ້າມໄປ ຂໍ້ 9) ² ມີ ☹ (ຖ້າເປັນແມ່ນພະຍາດໃດ) (ສາມາດເລືອກໄດ້ຫຼາຍຄຳຕອບ)
 - ¹ ຄວາມດັນເລືອດສູງ ² ເລືອດຈາງ ³ ບ້າໝູ (ລົມຊັກ)
 - ⁴ ຄໍໝຽງ (ຂາດໄອໂອດິນ) ⁵ ພະຍາດຫິດ ⁶ ເປົາຫວານ ⁷ ອື່ນໆ.....
9. ເຈົ້າໄດ້ກິນວິຕາມິນ ຫຼື ອາຫານເສີມບໍ່?
 - ¹ ບໍ່ ² ໄດ້ກິນ ☹ ຖ້າກິນແມ່ນປະເພດໃດ (ເລືອກໄດ້ຫຼາຍຄຳຕອບ)
 - ¹ ແຄນຊຽມ ² ກູຕ້າໄທໂອນ (ຜິວຂາວ) ³ ເອຄານິທິນ (ລິດນ້ຳໜັກ)
 - ⁴ ໄປຕິນ (ສ້າງກ້າມເນື້ອ) ⁵ ວິຕາມິນຊີ (ຜິວໃສ) ⁶ ວິຕາມິນລວມ
 - ⁷ ຄໍລາເຈນ ⁸ ອື່ນໆ.....
10. ປົກກະຕິແລ້ວຕົ້ນນອນຈັກໂມງ.....ໂມງ, ຕອນຄ່ຳເຂົ້ານອນຈັກໂມງ.....ໂມງ

- **ພາກທີ 2: ຄວາມຮູ້ທົ່ວໄປກ່ຽວກັບໄພຊະນາການ**

ກະລຸນາໝາຍ (✓) ໃສ່ໃນບ່ອນຫວ່າງທີ່ຄິດວ່າຖືກຕ້ອງ ແລະ ເຫມາະສົມ

	ຄວາມຮູ້ທົ່ວໄປ	ແມ່ນ	ບໍ່ແມ່ນ
1	ການກິນອາຫານເຊົ້າທຸກໆມື້ສາມາດຊ່ວຍບໍ່ໃຫ້ຕຸ້ຍ.		
2	ການກິນອາຫານທີ່ມີນໍ້າຕານຫຼາຍ ແລະ ລົດຊາດຫວານໆ ສາມາດເຮັດໃຫ້ເຈົ້າມີສຸຂະພາບດີໄດ້.		
3	ການກິນອາຫານສຸກໆດີບາງສາມາດສ້າງພູມຄຸ້ມກັນໃຫ້ຮ່າງກາຍໄດ້.		
4	ຄົນທີ່ອ່ວນບໍ່ມີຄວາມຈຳເປັນຫຍັງທີ່ຕ້ອງເຄື່ອນໄຫວຫຼາຍກວ່າຄົນທີ່ນໍ້າໜັກປົກກະຕິ.		
5	ການກິນຜັກຫຼາຍຊະນິດເປັນປະຈຳແມ່ນວິທີໜຶ່ງທີ່ສາມາດຫຼຸດຜ່ອນຄວາມສ່ຽງທີ່ຈະເກີດພະຍາດຕຸ້ຍໄດ້.		
6	ໝາກໄມ້ ແລະ ຜັກແມ່ນແຫຼ່ງສານອາຫານທີ່ອຸດົມໄປດ້ວຍວິຕາມິນ ແລະ ແຮ່ທາດທີ່ມີປະໂຫຍດຕໍ່ຮ່າງກາຍ.		
7	ອາຫານສຳເລັດຮູບແມ່ນມີສ່ວນປະກອບຂອງເກືອຈຳນວນຫຼາຍ ຊຶ່ງເປັນຄວາມສ່ຽງຂອງການເປັນພະຍາດຄວາມດັນເລືອດສູງ.		
8	ການກິນຊີ້ນທີ່ໄຫມ້ດຳນັ້ນເປັນສາເຫດຂອງການເປັນມະເຮັງ.		
9	ເຮົາສາມາດກິນກະແລັມ ແລະ ແປບຊີທີ່ມີສ່ວນປະສົມຂອງນໍ້າຕານຫຼາຍໆ ເພາະວ່າມັນເປັນແຫຼ່ງພະລັງງານທີ່ມີປະໂຫຍດ.		
10	ອາຫານທອດ ແລະ ອາຫານມັນໆ ກິນຫຼາຍເທົ່າໃດກໍ່ໄດ້ຕາມທີ່ຕ້ອງການ ຊຶ່ງມັນເປັນວິທີທີ່ຊ່ວຍໃຫ້ເຈົ້າມີຫຸ້ນທິດີ.		
11	ສານອາຫານຫຼັກທີ່ມີຢູ່ໃນນົມແມ່ນແຄຊຽມ, ມັນມີປະໂຫຍດຫຼາຍຕໍ່ການພັດທະນາຂອງກະດູກໃນຮ່າງກາຍ.		
12	ມັນຝຣັ່ງທອດ ແມ່ນແຫຼ່ງຂອງພະລັງງານທີ່ມີປະໂຫຍດທີ່ຈະຊ່ວຍເຮັດໃຫ້ຮ່າງກາຍແຂງແຮງ.		
13	ອາຫານທອດແມ່ນອາຫານທີ່ມີໄຂມັນສູງ, ທີ່ຊ່ວຍໃນການປ້ອງກັນການເກີດພະຍາດ.		
14	ການດື່ມນໍ້າຢ່າງໜ້ອຍ 8 ຈອກຕໍ່ມື້ ຈະຊ່ວຍໃນການເຮັດວຽກຂອງລະບົບການເຜົາຜານຂອງຮ່າງກາຍໄດ້ດີ.		
15	ອາຫານທີ່ອຸດົມໄປດ້ວຍໂປຣຕີນມີສ່ວນສຳຄັນໃນການສ້ອມແຊມແຜຈຸລັງໃນຮ່າງກາຍ ແລະ ເສີມສ້າງກ້າມເນື້ອ.		

- **ພາກທີ 3: ທັດສະນະຕໍ່ກ່ຽວກັບໂຜຂະນາການ**

ກະລຸນາອ່ານປະໂຫຍກລຸ່ມນີ້ແລ້ວໝາຍ (✓)ໃສ່ຕົວເລກຂອງຄວາມຖີ່ທີ່ເໝາະກັບຄວາມຄິດເຫັນຂອງເຈົ້າ (ເລືອກໄດ້ 1ຄໍາຕອບໃນ1ຄໍາຖາມ) ໃຫ້ໝາຍ 1= ບໍ່ເຫັນດີແທ້ໆ, 2= ບໍ່ເຫັນດີ, 3= ເຫັນດີແຕ່ບໍ່ເຫັນດີແດ່, 4= ເຫັນດີ, 5= ເຫັນດີຫຼາຍ

ລດ	ທັດສະນະຕໍ່	① ບໍ່ເຫັນດີແທ້ໆ ຈົນເຖິງ ⑤ ເຫັນດີແທ້ໆ				
		①	②	③	④	⑤
1	ການກິນອາຫານໃນປະລິມານທີ່ເໝາະສົມ ແລະ ອອກກຳລັງກາຍສາມາດເຮັດໃຫ້ເຮົາມີສຸຂະພາບທີ່ດີ.	①	②	③	④	⑤
2	ການກິນອາຫານສຳເລັດຮູບ (Fast food) ເຊັ່ນໄກ່ທອດ KFC ເປັນປະຈຳແມ່ນບໍ່ດີຕໍ່ສຸຂະພາບ.	①	②	③	④	⑤
3	ການກິນອາຫານສຳເລັດຮູບແທນຄາບເຂົ້າປົກກະຕິ ເຊັ່ນ ຝິສຊາ, ແຮມເບີເກີ ແມ່ນບໍ່ສິ່ງຜົນກະທົບຫຍັງຕໍ່ສຸຂະພາບ.	①	②	③	④	⑤
4	ເພື່ອຮັກສາສຸຂະພາບ ວິທີການຈົນແມ່ນວິທີການປຸງແຕ່ງທີ່ດີກວ່າ ການປຸງແຕ່ງແບບໜຶ່ງ ແລະ ຕົ້ມ	①	②	③	④	⑤
5	ຂ້ອຍພະຍາຍາມດື່ມນົມຢ່າງເປັນປະຈຳ ເພາະວ່າການດື່ມນົມແມ່ນຈະຊ່ວຍໃນການເຕີບໂຕຂອງກະດູກ ແລະ ຮ່າງກາຍ	①	②	③	④	⑤
6	ການອົດອາຫານແມ່ນວິທີທີ່ດີໃນການຈະຮັກສາຮູບຮ່າງ	①	②	③	④	⑤
7	ການກິນອາຫານທີ່ບໍ່ມີປະໂຫຍດຕໍ່ສຸຂະພາບ ແມ່ນປັດໄຈຫຼັກຂອງການເກີດພະຍາດຫຼາຍຊະນິດ	①	②	③	④	⑤
8	ການກິນໝາກໄມ້ໃນປະລິມານຫຼາຍ ເປັນວິທີທີ່ດີທີ່ສຸດໃນການເພີ່ມນ້ຳໜັກ	①	②	③	④	⑤
9	ການຄວບຄຸມອາຫານແລະ ການອອກກຳລັງກາຍແມ່ນວິທີທີ່ດີທີ່ສຸດໃນການລົດນ້ຳໜັກ	①	②	③	④	⑤
10	ການກິນ ອາຫານເຈຈະສາມາດຊ່ວຍໃນການລົດນ້ຳໜັກ	①	②	③	④	⑤
11	ຄົນທີ່ມີຮູບຮ່າງຈ່ອຍ ແມ່ນຄົນທີ່ມີບຸກຄະລິກທີ່ດີກວ່າທີ່ມີຮູບຮ່າງຕຸ້ຍ	①	②	③	④	⑤
12	ການກິນອາຫານທີ່ມີຄວາມເໝາະສົມ ແລະ ສົມດູນ ແມ່ນບໍ່ມີຄວາມຈຳເປັນສຳລັບໄວລຸ້ນເລີຍ	①	②	③	④	⑤
13	ບໍ່ງ່າຍເລີຍທີ່ເຮົາຈະໄດ້ສານອາຫານທີ່ຄົບຖ້ວນ ແລະ ສົມດູນຕໍ່ຮ່າງກາຍ ຖ້າເຮົາຍັງກິນອາຫານທີ່ບໍ່ມີປະໂຫຍດ.	①	②	③	④	⑤
14	ການກິນອາຫານທີ່ຫຼາກຫຼາຍໃນປະລິມານທີ່ເໝາະສົມ ແມ່ນສ່ວນສຳຄັນໃນຫຼັກການຂອງການກິນອາຫານທີ່ຖືກຕ້ອງ.	①	②	③	④	⑤
15	ມັນມີຄວາມຈຳເປັນຫຼາຍທີ່ຕ້ອງກິນອາຫານໃຫ້ຄົບທັງ 3 ຄາບຕໍ່ມື້, ຖ້າຕ້ອງການທີ່ຈະລົດນ້ຳໜັກ.	①	②	③	④	⑤

- ພາກທີ 4: ການກິນອາຫານທີ່ສົ່ງຜົນຕໍ່ໂພຊະນາການ

ໃນໄລຍະ 1 ເດືອນທີ່ຜ່ານມານີ້ ເຈົ້າ/ກິນອາຫານແຕ່ລະຊະນິດຕໍ່ໄປນີ້ເລື້ອຍປານໃດ ກະລຸນາໝາຍ (✓) ໃສ່ໃນບ່ອນ ຫວ່າງທີ່ເໝາະສົມ ແລະ ຂຽນຕື່ມໃສ່ບ່ອນຫວ່າງ (.....) [ໃນໜຶ່ງຄໍາຖາມສາມາດເລືອກໄດ້ໜຶ່ງຄໍາຕອບເທົ່ານັ້ນ]

ລດ	ປະເພດອາຫານ	ປະລິມານ ສັດສ່ວນຂອງ ອາຫານ	ສາມາດເລືອກ (✓) ເອົາຄໍາຕອບດຽວເທົ່ານັ້ນ								ຈໍານວນ ກິນ/1ຄັ້ງ	
			ບໍ່ໄດ້ກິນ	1-3ຄັ້ງ /ເດືອນ	1ຄັ້ງ/ ອາທິດ	2-4ຄັ້ງ /ອາທິດ	5-6ຄັ້ງ /ອາທິດ	1ຄັ້ງ /ມື້	2-3ຄັ້ງ /ມື້	4-5ຄັ້ງ /ມື້		≥6ຄັ້ງ /ມື້
EX	ຕົວຢ່າງ:ກິນໝາກແອບເປັນ1ໜ່ວຍ 2 ຄັ້ງຕໍ່ອາທິດ,ກິນ1ໜ່ວຍຕໍ່ຄັ້ງ	1ໜ່ວຍ/100g				✓						1
1	ກະແລັມ,ນໍ້າປັ້ນ (ໂກ້ໂກ,ຊາ)	ຈອກ/125ml										.....
2	ໄກ່ຈິນ(ທອດ)	ຕອນ/100g										.....
3	ໂຍເກີສ / ນົມ	ຈອກ/125ml										.....
4	ໝາກໄມ້ດອງ/ຜັກດອງ(ສົ້ມຜັກ)	ຖົງ/100g										.....
5	ເຄັກ(ຊ່ອກໂກແລັດ,ນົມ,ຄຣິມ)	ປ່ຽງ (80g)										.....
6	ນໍ້າອັດລົມທີ່ມີນໍ້າຕານໜ້ອຍໆ	ຂວດ/300ml										.....
7	ໄຂ່ຕົ້ມ, ຈິນໄຂ່, ໄຂ່ດາວ	1 ໜ່ວຍ										.....
8	ຂະໜົມກອບ (ມັນຝຣັ່ງທອດ ກອບ, ສາລີອົບເນີຍ)	ຖົງ/80g										.....
9	ປະເພດຜັກ	ຖ້ວຍນ້ອຍ (100g)										.....
10	ຜິດຊາ, ແຮມເບີເກີ	ປ່ຽງ/240g										.....
11	ໝາກໄມ້ສິດ	ຖ້ວຍນ້ອຍ (100g)										.....
12	ປະເພດຊີ້ນໄຂ່ມັນສູງເຊັ່ນ ໝູ ສາມຊີ້ນ	5 ຕອນນ້ອຍ (120g)										.....
13	ປະເພດໄຂ່ມັນຕໍ່າເຊັ່ນໄກ່,ປາ	5 ຕອນນ້ອຍ (120g)										.....
14	ຕໍ່າໝີ່, ຕໍ່າໝາກຫຸ່ງໃສ່ປາແດກ	ຈານ(100g)										.....
15	ເຂົ້າໜຽວ	ປື້ນ/100g										.....
16	ໝີ່ສໍາເລັດຮຸບເຊັ່ນ ໝີ່ໄວໄວ	ຖົງ (55g)										.....
17	ຊາ/ກາເຟ	ຈອກ/150ml										.....
18	ຊ່ອກໂກແລັດ ຫຼື ຂະໜົມອົມ	ແທງ/30g										.....
19	ທອດລູກຊີ້ນ, ໄສ້ກອກ	ຈານ/150g										.....
20	ອາຫານສູກງູດິບໆເຊັ່ນ ສົ້ມໝູ, ກ້ອຍປາດິບ, ລາບດິບ	ຈານ(100g)										.....

ພາກທີ 5: ການເຄື່ອນໄຫວທຸກໆກິດຈະກຳ

ໃນໄລຍະ 4 ອາທິດທີ່ຜ່ານນີ້ ເຈົ້າໄດ້ມີການເຄື່ອນໄຫວທຸກໆກາຍແຕ່ລະຊະນິດຕໍ່ໄປນີ້ເລື້ອຍປານໃດ ກະລຸນາໝາຍ (✓) ໃສ່ໃນບ່ອນຫວ່າງທີ່ເໝາະສົມ ແລະ ຂຽນຕື່ມໃສ່ບ່ອນຫວ່າງ (.....)

ໝວດທີ 1: ກິດຈະກຳໃນໂຮງຮຽນ ລວມທັງກິດຈະກຳໃນວິຊາພາລະສຶກສາ		ຄຳຕອບ
P1	ປົກກະຕິແລ້ວເຈົ້າໄດ້ ອອກກຳລັງກາຍໜັກໆ ຕໍ່ເນື່ອງກັນຢ່າງໜ້ອຍ 10 ນາທີຢູ່ໂຮງຮຽນບໍ່?(ແລ່ນ, ເຕະບານ)	ບໍ່ແມ່ນ <input type="checkbox"/> ² ໑ (ຂ້າມໄປ P 4) ແມ່ນ <input type="checkbox"/> ¹ P2 .....ມື້/ອາທິດ P3 (a-b) .....ຊມ:.....ນທ/ຄັ້ງ
P4	ປົກກະຕິແລ້ວເຈົ້າໄດ້ ອອກກຳລັງກາຍລະດັບປານກາງ ຕໍ່ເນື່ອງກັນຢ່າງໜ້ອຍ 10 ນາທີຢູ່ໂຮງຮຽນບໍ່? (ຢ່າງໄວ, ຕີບານ, ເຕະກະຕໍ້)	ບໍ່ແມ່ນ <input type="checkbox"/> ² ໑໑ (ຂ້າມໄປ P7) ແມ່ນ <input type="checkbox"/> ¹ P5 .....ມື້/ອາທິດ P6 (a-b) .....ຊມ:.....ນທ/ຄັ້ງ
ໝວດທີ 2: ການເດີນທາງໄປສະຖານທີ່ຕ່າງໆ, ເດີນທາງໄປໂຮງຮຽນ		
P7	ປົກກະຕິແລ້ວເຈົ້າໄດ້ຢ່າງ ຫຼື ຂີ່ລົດຖີບໄປໂຮງຮຽນບໍ່ (ໃນໄລຍະເວລາຢ່າງໜ້ອຍ 10 ນາທີຂຶ້ນໄປ)?	ບໍ່ແມ່ນ <input type="checkbox"/> ² ໑໑ (ຂ້າມໄປ P10) ແມ່ນ <input type="checkbox"/> ¹ P8 .....ມື້/ອາທິດ P9 (a-b) .....ຊມ:.....ນທ/ຄັ້ງ
ໝວດທີ 3: ກິດຈະກຳຕ່າງໆໃນເວລາຫວ່າງ (ຫຼັງເລີກຮຽນ)		
P10	ປົກກະຕິແລ້ວໃນເວລາເລີກຮຽນເຈົ້າໄດ້ ອອກກຳລັງກາຍໜັກໆ ຕໍ່ເນື່ອງກັນຢ່າງໜ້ອຍ 10 ນາທີ ຫຼືບໍ່?(ແລ່ນ, ເຕະບານ, ຫຼິ້ນເວດ, ເຂົ້າຝິດເນສ)	ບໍ່ແມ່ນ <input type="checkbox"/> ² ໑໑ (ຂ້າມໄປ P13) ແມ່ນ <input type="checkbox"/> ¹ P11 .....ມື້/ອາທິດ P12(a-b) .....ຊມ:.....ນທ/ຄັ້ງ
P13	ປົກກະຕິແລ້ວໃນເວລາເລີກຮຽນເຈົ້າໄດ້ ອອກກຳລັງກາຍໃນລະດັບກາງ ຕໍ່ເນື່ອງກັນຢ່າງໜ້ອຍ 10 ນາທີຫຼື ບໍ່?(ຢ່າງໄວ, ປັ່ນລົດຖີບ, ລອຍນ້ຳ, ຕີບານ, ເຕະກະຕໍ້)	ບໍ່ແມ່ນ <input type="checkbox"/> ² ໑໑ (ຂ້າມໄປ P16) ແມ່ນ <input type="checkbox"/> ¹ P14 .....ມື້/ອາທິດ P15(a-b) .....ຊມ:.....ນທ/ຄັ້ງ
ໝວດທີ 4: ກິດຈະກຳຜ່ອນຄາຍ: ນັ່ງ ຫຼື ນອນຫຼິ້ນຢູ່ບ້ານ, ນັ່ງລົດ ຫຼື ຂັບລົດອອກໄປນອກບ້ານ, ອ່ານບົດຮຽນ, ຫຼິ້ນໄຟ້ ຫຼື ເບິ່ງໜັງ ຝັງເພງ ເບິ່ງໂທລະທັດ (ຍົກເວັ້ນການນອນພັກຜ່ອນ)		
P16 (a-b)	ປົກກະຕິແລ້ວ ເຈົ້າໃຊ້ເວລາ ນັ່ງຫຼິ້ນ ຫຼື ນອນຫຼິ້ນຢູ່ບ້ານ, ນັ່ງລົດ ຫຼື ຂັບລົດອອກໄປນອກບ້ານ, ອ່ານບົດຮຽນ, ຫຼິ້ນໄຟ້ ຫຼື ເບິ່ງໜັງ ຝັງເພງ ເບິ່ງໂທລະທັດ ໂດຍສະເລ່ຍແລ້ວ ປະມານຈັກນາທີ ຫຼື ຊົ່ວໂມງຕໍ່ມື້?	.....ຊມ:.....ນທ/ຄັ້ງ

ການອອກກຳລັງກາຍໜັກ: ຫາຍໃຈໄວໆ, ເຫື່ອອອກພາຍໃນ 5 ນາທີທີ່ເຮັດ ແລະ ບໍ່ສາມາດເວົ້າໄດ້ເພາະ ຮອບຫຼາຍ

ການອອກກຳລັງກາຍລະດັບປານກາງ: ຫາຍໃຈເລິກໆ ເຫື່ອອອກພາຍໃນ 10 ນາທີທີ່ເຮັດ ແຕ່ຍັງສາມາດເວົ້າຫຼືສົນທະນາໄດ້

- **ພາກທີ 6: ບັນດາປັດໄຈເອື້ອຕ່າງໆ**

ກະລຸນາໝາຍ (✓) ໃສ່ໃນບ່ອນຫວ່າງທີ່ເໝາະສົມ ແລະ ຂຽນຕື່ມໃສ່ບ່ອນຫວ່າງ (.....)

3. ຊ່ອງທາງທີ່ເຈົ້າໄດ້ຮັບຂໍ້ມູນຂ່າວສານທາງດ້ານໂພຊະນາການທີ່ກ່ຽວຂ້ອງກັບການປ້ອງກັນ ແລະ ເບິ່ງແຍງສຸຂະພາບໃນໄລຍະສາມເດືອນທີ່ຜ່ານມານີ້ (ສາມາດໝາຍໄດ້ຫຼາຍຄໍາຕອບ)

- ¹ ບໍ່ໄດ້ຮັບ ² ປຶ້ມແບບຮຽນ ³ ໜັງສືຜິມ /ວາລະສານ ⁴ ໂທລະພາບ
- ⁵ ວິທະຍຸ ⁶ ຄອບຄົວ ⁷ ຄູອາຈານ ⁸ ໝູ່ຄູ່
- ⁹ ສັງຄົມອອນລາຍ (Facebook, line, Instagram)
- ¹⁰ ຈາກກິດຈະກຳການຮຽນຮູ້ຕ່າງໆໃນເຂດບ້ານແລະຊຸມຊົນ
- ¹¹ ຈາກກິດຈະກຳການຮຽນຮູ້ຕ່າງໆໃນໂຮງຮຽນ ¹² ອື່ນໆ ລະບຸ.....

4. ເຈົ້າຄິດວ່າຊ່ອງທາງໃດທີ່ເຮັດໃຫ້ເຈົ້າໄດ້ຮັບຂໍ້ມູນຂ່າວສານທາງດ້ານນີ້ຫຼາຍທີ່ສຸດ? ໃຫ້ເລືອກພຽງ **ສາມ** ຢ່າງໃນບັນດາຂໍ້ລຸ່ມນີ້: ກະລຸນາໝາຍເລກ 1=ແຫຼ່ງທີ່ໄດ້ຮັບຫຼາຍທີ່ສຸດ, 2=ແຫຼ່ງທີ່ໄດ້ຮັບປານກາງ, 3=ແຫຼ່ງທີ່ໄດ້ຮັບໜ້ອຍທີ່ສຸດ.

- ¹ບໍ່ໄດ້ຮັບ ²ປຶ້ມແບບຮຽນ ³ໜັງສືຜິມ /ວາລະສານ
- ⁴ໂທລະພາບ ⁵ວິທະຍຸ ⁶ຄອບຄົວ
- ⁷ຄູອາຈານ ⁸ໝູ່ຄູ່ ⁹ສັງຄົມອອນລາຍ (Facebook, line, Instagram)
- ¹⁰ຈາກກິດຈະກຳການຮຽນຮູ້ຕ່າງໆໃນເຂດບ້ານແລະຊຸມຊົນ
- ¹¹ຈາກກິດຈະກຳການຮຽນຮູ້ຕ່າງໆໃນໂຮງຮຽນ ¹²ອື່ນໆ ລະບຸ.....

- **ພາກທີ 7: ບັນດາປັດໄຈເສີມຕ່າງໆ**

1. ເຈົ້າອາໄສຢູ່ນຳໃຜ? (ໃນໄລຍະສາມເດືອນແລ້ວນີ້) (ສາມາດໝາຍໄດ້ຫຼາຍຄໍາຕອບ)

- ແມ່ ພໍ່
- ຜົນໜຶ່ງ (ຖ້າບໍ່ໄດ້ຢູ່ນຳພໍ່ແມ່) **໑໑ (ກະລຸນາຂ້າມໄປ ຕອບຄຳຖາມ ຂໍ້ທີ 4)**

2. ລະດັບການສຶກສາຂອງແມ່ ¹ ບໍ່ໄດ້ເຂົ້າໂຮງຮຽນ ² ປະຖົມ ³ ມັດທະຍົມ
⁴ ວິທະຍາໄລ/ມະຫາວິທະຍາໄລ ⁵ ອື່ນໆ ລະບຸ.....

3. ລະດັບການສຶກສາຂອງພໍ່ ¹ ບໍ່ໄດ້ເຂົ້າໂຮງຮຽນ ² ປະຖົມ ³ ມັດທະຍົມ
⁴ ວິທະຍາໄລ/ມະຫາວິທະຍາໄລ ⁵ ອື່ນໆ ລະບຸ.....

໑໑ ຫຼັງຈາກຕອບຂໍ້ນີ້ແລ້ວກະລຸນາ **ຂ້າມໄປ ຕອບ ຂໍ້ທີ 5** (ເລີຍ)

4. ລະດັບການສຶກສາຂອງຜູ້ປົກຄອງ (ຖ້າບໍ່ໄດ້ຢູ່ນຳພໍ່ແມ່)
¹ ບໍ່ໄດ້ເຂົ້າໂຮງຮຽນ ² ປະຖົມ ³ ມັດທະຍົມ
⁴ ວິທະຍາໄລ/ມະຫາວິທະຍາໄລ ⁵ ອື່ນໆ ລະບຸ.....

໑໑ ຫຼັງຈາກຕອບຂໍ້ນີ້ແລ້ວກະລຸນາ **ຂ້າມໄປ ຕອບ ຂໍ້ທີ 7** (ເລີຍ)

5. ອາຊີບຂອງແມ່ ¹ ຊາວນາ ² ທຸລະກິດສ່ວນຕົວ ³ ພະນັກງານລັດ
⁴ ກຳມະກອນ ⁵ ແມ່ເຮືອນ ⁶ ອື່ນໆ ລະບຸ.....

6. ອາຊີບຂອງພໍ່ ¹ ຊາວນາ ² ທຸລະກິດສ່ວນຕົວ ³ ພະນັກງານລັດ
⁴ ກຳມະກອນ ⁵ ຫວ່າງງານ ⁶ ອື່ນໆ ລະບຸ.....

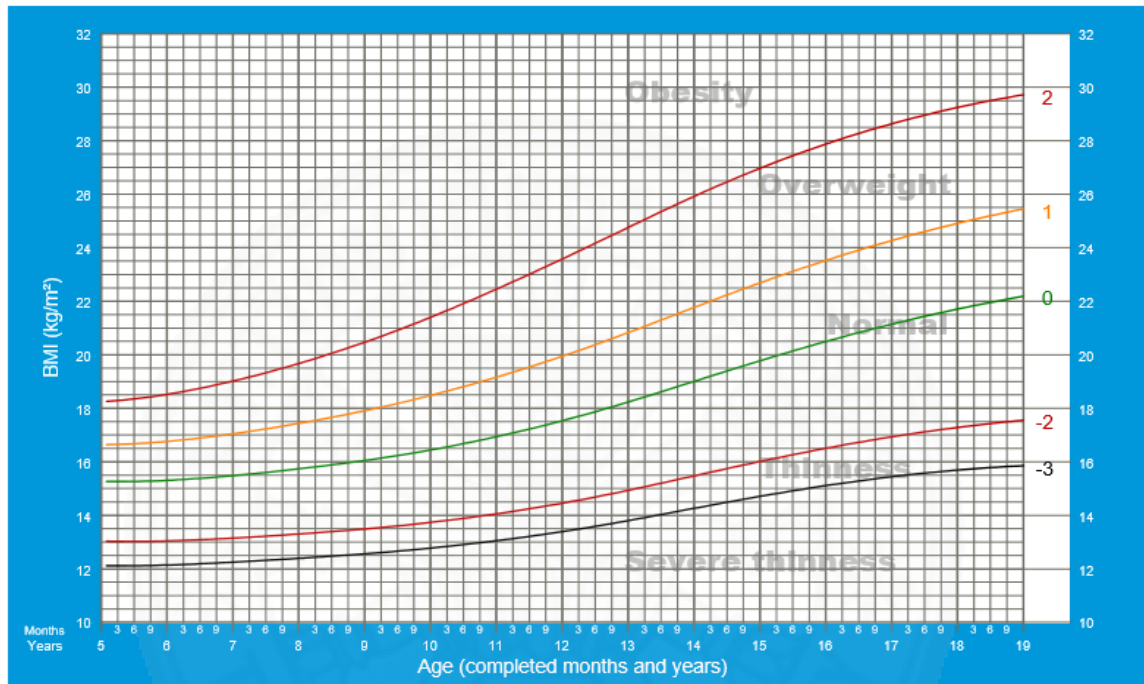
7. ອາຊີບຂອງຜູ້ປົກຄອງ (ຖ້າບໍ່ໄດ້ຢູ່ນຳພໍ່ແມ່)
¹ ຊາວນາ ² ທຸລະກິດສ່ວນຕົວ ³ ພະນັກງານລັດ

APPENDIX C

BMI FOR AGE GROWTH CHART Z-SCORE FOR BOY 5-19 YEAR OLD

BMI-for-age BOYS

5 to 19 years (z-scores)



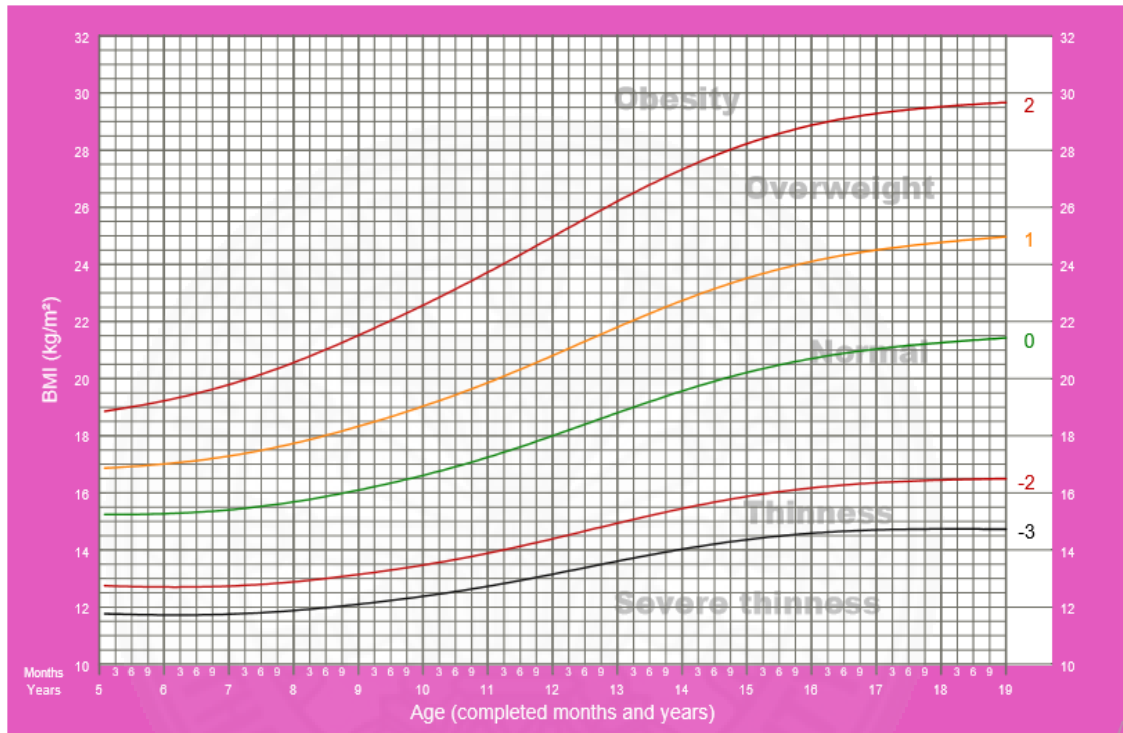
2007 WHO Reference

Source: World Health Organization 2007 (71)

APPENDIX D
BMI FOR AGE GROWTH CHART Z-SCORE FOR GIRL 5-19
YEAR OLD

BMI-for-age GIRLS

5 to 19 years (z-scores)



2007 WHO Reference

Source: World Health Organization 2007 (71)

APPENDIX E
FORM OF PARTICIPANT INFORMATION SHEET
(ENGLISH VERSION)

Title of research project “Nutritional status of adolescents attending secondary school in Sisattanak District, LAO PDR”

Principle researcher’s name Miss Sonemany Keolangsy **Position:** Students

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1. You are being invited to take part in a research project. Before you decide to participate it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and do not hesitate to ask if anything is unclear or if you would like more information.

2. Brief background, Rationale

Adolescents experience a period of transition a rapid physical growth, psychological development and social maturation from childhood to adulthood. Adolescents from resource constrained communities have limited access to and availability of healthy foods and health care services, which puts them at higher risk for poor nutritional health. Although, mortality rate of this group was low comparing with other age’s group. So, they have been a low priority in term nutritional status assessment. In context of Laos, there is very limited data access to the nutritional status of adolescents in general. Thus, this research project involves evaluate the nutritional status of adolescents attending secondary school in Sisattanak district Lao PDR.

3.Objective of the project: To assess the nutritional status and its factors related to the nutritional status of adolescents attending secondary school in Sisattanak District, Vientiane Capital of LAO PDR.

4.Details of participant.

4.1 Characteristics of participants

The adolescents who aged between 15 and 19 years and are in grade 5 to grade 7 at five secondary schools in Sisattanak district, Vientiane Capital, LAO PDR.

Inclusion criteria: Adolescents who are from 15 to 19 years and grade 5-7 at the five schools that will be considered eligible for this study.

Exclusion criteria: Adolescents who are pregnant at the time of data collection or who are absent from school at time of data collection.

4.2 Sample size

Total adolescents attending secondary school in Sisattanak district, Vientiane Capital, LAO PDR is 1,811. The prevalence of Overweight and obesity of the secondary school students' age 15-19 years was 13 % (BMI for age ≥ 23.0 kg/m²). The sample size will be estimated by using simple random sampling formula then we estimated sample size after adjusted for size of population (n_f) and increased the attrition rate by 10 % of total sample size. So we will get the final sample size is **300**.

4.3 Sampling technique.

The sample size is allocated to sex, study level and schools according to the number of students. The calculated sample size will be distributed with equally number of student in each school (i.e., Phanmanh School, Phiawat School, Chanthaviphone School, Vitaya School and Sisattanak School). Finally, the study participants will be selected by using systemic random sampling from the prepared sampling frame or student ID.

5. Procedure upon participants

I am voluntary to participate this study as mentioned in information sheet. I am pleased to answer every single question in the questionnaire for 30 minutes. Data collection forms will be destroyed after the report has been completely done.

6. Research activities which involving you volunteer to participate in this research project will be as following

- You will be explained about the risk and inconvenience that may be occurred during the research.
- You will be informed about the benefits you may receive form the research.

You will have the opportunity to ask about the research and its related processes.

You can withdraw from the research in any time without any impact.

If you voluntarily agree to be a respondent, the researcher would like you sign a written informed consent form.

Then the researcher will ask you with a set of questionnaire, you have right in deciding to participate in the research without enforcing and cheating.

7. Screening for participants to this study is voluntary and you can withdraw from the project at any time without any explanations that won't affect yourselves.

8. This won't be the risky to your physical, mental, social and economic or your belief, but you may spend about 30 minute to answer the questions.

9. This study will be not directly benefit only you, but the result of this study will be useful for your family members and community, the information will use to develop an intervention to prevent and manage in public health nutrition for adolescents in Lao PDR.

10. Participation to the study is voluntary and participant has the right to deny and/or withdraw from the study at any time, no need to give any reason, and there will be no bad impact upon that participant.

11. If you have any question or would like to obtain more information, please contact the researcher Ms. Sonemany KEOLANGSY at Sisattanak Health Office address at Thadeua Road, Ban Chomphet, Sisattanak district, Vientiane Capital, Lao PDR or mobile phone number +86520 59242777 at all time. If the researcher has new information regarding benefit on risk/harm, participants will be informed as soon as possible.

12. The researcher will use the coding system to keep the answer confidential. We will never expose the name of the respondents. The researcher will explore, interpret and note down all the information obtained by himself avoiding revealed off the respondents' confidentiality enter the data him/herself and with the help of expert. After that we will analyze data and elucidate. The hard copy of the data collection forms will be destroyed after the report has been completely done.

13. In answering the questions or any data collection, the researcher won't disturb much of your time, so there will be no Compensation in participation to this study.

14. If researcher does not perform upon participants as indicated in the information, the participants can report the incident to the National Ethic Committee for Health Research, Office address at Samsenthai Road, Ban Kaognot, Sisattanak district Vientiane Capital, Lao PDR. Tel: +85621214012, 250670, Fax: +85621 214012



APPENDIX F
FORM OF PARTICIPANT INFORMATION SHEET
(LAO VERSION)

ຂໍ້ມູນສໍາລັບຜູ້ເຂົ້າຮ່ວມການສຶກສາ

ຫົວຂໍ້ການສຶກສາ: ການປະເມີນພາວະໄພຊະນາການຂອງນັກຮຽນໃນໂຮງຮຽນມັດທະຍົມຕອນປາຍໃນ
ເມືອງສີສັດຕະນາກ ສປປລາວ

ຊື່ຜູ້ເຮັດການສຶກສາ: ນ. ສອນມະນີ ແກ້ວລັງສີ ນັກສຶກສາ

ທີ່ຢູ່ບ່ອນເຮັດວຽກ: ຫ້ອງການສາທາລະນະສຸກເມືອງ ສີສັດຕະນາກ ນະຄອນຫຼວງວຽງຈັນ ສປປລາວ

ທີ່ຢູ່: ບ້ານ ອາມອນ ເມືອງໄຊເສດຖາ ນະຄອນຫຼວງວຽງຈັນ ສປປລາວ

ໂທ: 0085620 59242777, 006992351800 **ອີເມວ:** sonmany1990@hotmail.com

1. ທ່ານໄດ້ຮັບເຊີນເຂົ້າຮ່ວມໂຄງການວິໄຈນີ້. ກ່ອນທ່ານຈະຕັດສິນໃຈເຂົ້າຮ່ວມໃນການວິໄຈນີ້ຂໍໃຫ້ທ່ານອ່ານເອກະສານນີ້ ໃຫ້ລະອຽດ ເພື່ອທ່ານຈະໄດ້ຮັບຮູ້ເຖິງເຫດຜົນ ແລະ ລາຍລະອຽດຂອງການວິໄຈໃນຄັ້ງນີ້ ແລະ ທ່ານສາມາດສອບຖາມຂໍ້ມູນເພີ່ມເຕີມ ເພື່ອຄວາມເຂົ້າໃຈທີ່ຊັດເຈນ ແລະ ສອບຖາມຂໍ້ມູນທີ່ບໍ່ຊັດເຈນໄດ້ຕະຫຼອດເວລາ.

2. ປະຫວັດ ແລະ ເຫດຜົນຄວາມສໍາຄັນ.

ໄວລຸ້ນເປັນໄວນຶ່ງທີ່ມີການປ່ຽນແປງຢ່າງໄວວາທາງດ້ານຮ່າງກາຍ ແລະ ຈິດໃຈ ທາງສັງຄົມມີການປັບສະພາບຈາກເດັກນ້ອຍໄປສູ່ຄວາມເປັນຜູ້ໃຫຍ່. ເດັກໄວລຸ້ນຈາກຊຸມຊົນທີ່ມີຄວາມຈໍາກັດການເຂົ້າເຖິງຊັບພະຍາກອນ ແລະ ການບໍລິການສຸຂະພາບ ແລະ ການບໍລິການສຸຂະພາບທີ່ຈໍາກັດເຊິ່ງເຮັດໃຫ້ພວກເຂົາມີຄວາມສ່ຽງສູງຕໍ່ບັນຫາສຸຂະພາບໄພຊະນາການ. ເຖິງຢ່າງໃດກໍຕາມ, ອັດຕາການຕາຍຂອງໄວລຸ້ນກຸ່ມນີ້ແມ່ນຫນ້ອຍທີ່ປຽບທຽບກັບກຸ່ມອາຍຸອື່ນ. ດັ່ງນັ້ນ, ພວກເຂົາຈຶ່ງໄດ້ຮັບການປະເມີນສະຖານະພາບດ້ານໄພຊະນາການທີ່ມີຄວາມສໍາຄັນໃນລະດັບຫນ້ອຍຫຼາຍ. ປະກອບກັບໃນສະພາບການຂອງລາວໃນປະຈຸບັນ, ການເຂົ້າເຖິງແຫຼ່ງຂໍ້ມູນຕ່າງໆກ່ຽວກັບພາວະໄພຊະນາການຂອງໄວລຸ້ນ ແມ່ນຍັງມີຂໍ້ຈໍາກັດຫຼາຍ.

3. ຈຸດປະສົງຂອງການສຶກສາ

ເພື່ອປະເມີນພາວະໄພຊະນາການ ແລະ ປັດໄຈທີ່ພົວພັນກັບໄພຊະນາການຂອງນັກຮຽນໃນໂຮງຮຽນມັດທະຍົມຕອນປາຍໃນເມືອງສີສັດຕະນາກ ສປປລາວເພື່ອບົ່ງບອກຄວາມພົວພັນລະຫວ່າງຂໍ້ມູນດ້ານປະຊາກອນ, ຄວາມຮູ້, ຄວາມຮັບຮູ້, ການເຂົ້າເຖິງການໃຫ້ບໍລິ ການ ດ້ານການສັກຢາກັນພະຍາດ ຂອງແມ່ຂອງເດັກ ຫຼື ຜູ້ປົກຄອງເດັກ ແລະ ອັດຕາການປົກຄຸມການສັກຢາກັນພະຍາດ.

4. ລາຍລະອຽດຂອງປະຊາກອນທີ່ສຶກສາ

4.1 ຂໍ້ມູນດ້ານປະຊາກອນທີ່ສຶກສາ

ກຸ່ມປະຊາກອນເປົ້າໝາຍ ແມ່ນກຸ່ມນັກຮຽນ ທີ່ມີອາຍຸລະຫວ່າງ 15-19ປີ ແລະ ຮຽນໃນມໍ 5-7 ໃນໂຮງຮຽນມັດທະຍົມຢູ່ໃນເມືອງສີສັດຕະນາກ ສປປລາວ.

ກໍລະນີທີ່ເອົາມາສຶກສາ: ນັກຮຽນທີ່ມີອາຍຸ15-19 ປີ ແລະ ຮຽນຫ້ອງມໍ 5-7 ໃນຫ້າໂຮງຮຽນ ມັດທະຍົມຢູ່ໃນເມືອງສີສັດຕະນາກ ໄລຍະລົງເກັບຂໍ້ມູນ.

ກໍລະນີທີ່ບໍ່ເອົາມາສຶກສາ: ນັກຮຽນຜູ້ທີ່ຂາດຮຽນໃນໄລຍະການລົງເກັບຂໍ້ມູນ ຫຼື ບໍ່ສາມາດ ຕອບ ຄໍາຖາມໃນເວລາລົງເກັບກໍາຂໍ້ມູນ.

4.2 ຂະໜາດຂອງກຸ່ມຕົວຢ່າງທີ່ນໍາມາສຶກສາ

ຈໍານວນນັກຮຽນໃນໂຮງຮຽນມັດທະຍົມໃນເມືອງສີສັດຕະນາກທັງໝົດແມ່ນ 1,811, ການ ຄິດໄລ່ຫາຂະໜາດຕົວຢ່າງແມ່ນໃຊ້ສຸດຂອງວິທີການສຸ່ມຕົວຢ່າງແບບງ່າຍດາຍ, ຫຼັງຈາກນັ້ນດັດປັບ ຈໍານວນຕົວຢ່າງໃຫ້ແທດເໝາະກັບກຸ່ມປະຊາກອນທັງໝົດ ແລະ ເພີ່ມຈໍານວນຕົວຢ່າງອີກ 10%. ສະນັ້ນ ຕົວຢ່າງທີ່ໄດ້ທັງໝົດແມ່ນ 300 ຄົນ.

4.3 ວິທີການສຸ່ມຕົວຢ່າງ

ການສຸ່ມຜູ້ເຂົ້າຮ່ວມໃນການສຶກສາຄັ້ງນີ້ແມ່ນຈະແຈກຢາຍຈໍານວນຕາມ ເພດ, ຊັ້ນຮຽນ ແລະ ໂຮງຮຽນ, ເຊິ່ງການແຈກແຈງດັ່ງກ່າວແມ່ນຈະແຈກແຈງຈໍານວນເທົ່າກັນປະມານ 60 ຄົນ ໃນແຕ່ລະ ໂຮງຮຽນ (ໂຮງຮຽນພັນໝັ້ນ, ໂຮງຮຽນເພຍວັດ, ໂຮງຮຽນຈັນທະວິພອນ, ໂຮງຮຽນວິທະຍາ ແລະ ໂຮງຮຽນສີນາກ). ຫຼັງຈາກນັ້ນໄດ້ນໍາໃຊ້ ການສຸ່ມຕົວຢ່າງແບບກຸ່ມຈາກລາຍຊື່ນັກຮຽນແຕ່ລະຊັ້ນຂອງແຕ່ ລະໂຮງຮຽນທີ່ມີຢູ່.

5. ຂະບວນການການສຶກສາທີ່ເຮັດກັບຜູ້ເຂົ້າຮ່ວມການສຶກສາ

ຂ້າພະເຈົ້າມີຄວາມສະໝັກໃຈເຂົ້າຮ່ວມໃນການສຶກສາຄັ້ງນີ້ ຕາມທີ່ລະບຸໄວ້ໃນເອກະສານຊື່ແຈງ ອາສາສະໝັກວິໄຈ. ໂດຍຂ້າພະເຈົ້າຍອມສະຫຼະເວລາ ຕອບແບບສອບຖາມທຸກຂໍ້ ເປັນເວລາ 30 ນາທີ. ຝ່ອມ ເກັບກໍາຂໍ້ມູນຈະຖືກທໍາລາຍພາຍຫຼັງທີ່ໄດ້ຂຽນບົດລາຍງານສໍາເລັດຮຽບຮ້ອຍ.

6. ຂະບວນການໃຫ້ຂໍ້ມູນແກ່ຜູ້ເຂົ້າຮ່ວມການສຶກສາ

ໃນຖານະທ່ານເປັນຜູ້ເຂົ້າຮ່ວມການສຶກສາ ທ່ານຈະໄດ້ຮັບຮູ້ຂໍ້ມູນຂ່າວສານຈາກຜູ້ເຮັດການສຶກສາ ແລະ ຜູ້ຊ່ວຍການສຶກສາ ດັ່ງຕໍ່ໄປນີ້:

- ທ່ານຈະໄດ້ຮັບການອະທິບາຍກ່ຽວກັບຄວາມສ່ຽງ ແລະ ຄວາມບໍ່ສະດວກທີ່ອາດຈະໄດ້ຮັບຈາກ ການສຶກສາ.
- ທ່ານຈະໄດ້ຮັບຮູ້ກ່ຽວກັບຜົນປະໂຫຍດທີ່ອາດຈະໄດ້ຮັບຈາກການສຶກສາຄັ້ງນີ້.
- ທ່ານຈະໄດ້ຮັບໂອກາດໃນການຖາມກ່ຽວກັບການວິໄຈຄັ້ງນີ້ ແລະ ຂະບວນການທີ່ກ່ຽວຂ້ອງກັບ ການວິໄຈ.
- ທ່ານສາມາດຖອນຕົວອອກຈາກການສຶກສານີ້ໄດ້ທຸກເວລາໂດຍທີ່ທ່ານຈະບໍ່ໄດ້ຮັບຜົນກະທົບ ໃດໆ.
- ເຈົ້າຈະໄດ້ຮັບສໍານຳເນົາຂໍ້ມູນອະທິບາຍສໍາລັບຜູ້ເຂົ້າຮ່ວມການສຶກສາ ແລະ ເອກະສານໃບຢືນຍອມ ເຂົ້າຮ່ວມການສຶກສາ.
- ທ່ານມີສິດໃນການຕັດສິນໃຈວ່າຈະເຂົ້າຮ່ວມການສຶກສານີ້ ຫຼື ບໍ່ເຂົ້າຮ່ວມກໍໄດ້ ໂດຍປາສະຈາ ການບັງຄັບ ແລະ ຫຼອກລວງ

7. ການຄັດເລືອກຜູ້ເຂົ້າຮ່ວມການສຶກສາ

ການເຂົ້າຮ່ວມການສຶກສາຄັ້ງນີ້ເປັນໄປດ້ວຍຄວາມສະໝັກໃຈ ແລະ ທ່ານສາມາດຖອນຕົວອອກ ຈາກການເຂົ້າຮ່ວມໂຄງການຕະຫຼອດເວລາໂດຍບໍ່ຕ້ອງຊື່ແຈງເຫດຜົນ, ເຊິ່ງຈະບໍ່ມີຜົນກະທົບໃດໆກັບ.

8. ອັນຕະລາຍ ຫຼື ຄວາມສ່ຽງທີ່ອາດຈະເກີດຂຶ້ນກັບຜູ້ເຂົ້າຮ່ວມການສຶກສາ.

ທ່ານຈະບໍ່ມີຄວາມສ່ຽງທາງຮ່າງກາຍ, ຈິດໃຈ, ສັງຄົມ ແລະ ເສດຖະກິດ ຫຼື ຄວາມເຊື່ອຂອງທ່ານ ແຕ່ທ່ານອາດຈະຕ້ອງໃຊ້ເວລາປະມານ 30 ນາທີ ໃນການຕອບແບບສອບຖາມ.

9. ປະໂຫຍດທີ່ອາດຈະໄດ້ຮັບໃນການເຂົ້າຮ່ວມການສຶກສາ.

ການສຶກສາຄັ້ງນີ້ຈະເຮັດໃຫ້ເຂົ້າໃຈກ່ຽວກັບບັນຫາໄພຊະນາການທີ່ເກີດຂຶ້ນໃນນັກຮຽນໄດ້ດີຂຶ້ນ ມັນຈະເປັນປະໂຫຍດຕໍ່ຂະແໜງວຽກງານສາທາລະນະສຸກໄດ້ແກ່ ເປັນຊຸມນິຕິບັນດາໃນການເຮັດໃຫ້ ເກີດຄວາມເຂົ້າໃຈດີຂຶ້ນກ່ຽວກັບວິທີການປະສານສານອົງປະກອບຕ່າງໆໃນດ້ານໄພຊະນາການໃຫ້ເປັນ ບັນດາໂຄງການຕ່າງໆໃນວຽກງານໄພຊະນາການທີ່ສາມາດນຳໄປສູ່ການແກ້ໄຂບັນຫາເພື່ອບັນລຸເປົ້າຫມາຍ ໃນປີ 2025. ເຊິ່ງມັນອາດຈະເປັນຜົນດີໃຫ້ແກ່ເດັກນ້ອຍໝົດທຸກຄົນ ລວມທັງຄົນພາຍໃນຊຸມຊົນ.

10. ການເຂົ້າຮ່ວມການວິໄຈຄັ້ງນີ້ເປັນໄປດ້ວຍຄວາມສະໝັກໃຈ ແລະ ຜູ້ເຂົ້າຮ່ວມການສຶກສາມີສິດທີ່ ຈະປະຕິເສດ ແລະ/ຫຼື ຖອນຕົວອອກຈາກການສຶກສາໄດ້ທຸກເວລາ ໂດຍບໍ່ຈຳເປັນຕ້ອງໃຫ້ເຫດຜົນໃດໆ ແລະ ຈະບໍ່ມີຜົນກະທົບໃດໆຕໍ່ຜູ້ເຂົ້າຮ່ວມການສຶກສາ.

11. ຖ້າທ່ານມີຂໍສົງໄສໃສ່ສອບຖາມເພີ່ມເຕີມໄດ້ໂດຍສາມາດຕິດຕໍ່ຜູ້ເຮັດການສຶກສາ ນາງ ສອນມະນີ ແກ້ວລັງສີ ໄດ້ທີ່ ຫ້ອງການສາທາລະນະສຸກເມືອງສີສັດຕະນາກ ນະຄອນຫຼວງວຽງ ຫຼື ໂທລະສັບ 020 59242777 ໄດ້ຕະຫຼອດ 24 ຊົ່ວໂມງ ແລະ ຖ້າຜູ້ເຮັດການສຶກສາມີຂໍ້ມູນເພີ່ມເຕີມ ທີ່ເປັນປະໂຫຍດ ຫຼື ໂທດທີ່ກ່ຽວຂ້ອງກັບການສຶກສາ ຜູ້ເຮັດການສຶກສາຈະແຈ້ງໃຫ້ທ່ານຮູ້ຢ່າງທັນການ.

12. ຜູ້ວິໄຈຈະໃຊ້ລະບົບເຂົ້າລະຫັດໃນການເກັບຮັກສາຄວາມລັບຂອງຜູ້ເຂົ້າຮ່ວມການວິໄຈ. ພວກເຮົາ ຈະບໍ່ໃສ່ຊື່ຜູ້ເຂົ້າຮ່ວມການວິໄຈໃສ່ໃນຄຳຖາມ. ຜູ້ວິໄຈຈະຊອກຫາຂໍ້ມູນ, ແປຜົນ ແລະ ບັນທຶກຂໍ້ມູນທັງ ໝົດທີ່ໄດ້ມາດ້ວຍຕົວເອງ ໂດຍການຊ່ວມເຫຼືອຂອງຜູ້ຊ່ຽວຊານ ເພື່ອເປັນການຫຼີກລ່ຽງບໍ່ໃຫ້ຄວາມລັບ ຂອງຜູ້ເຂົ້າຮ່ວມການວິໄຈຮົ່ວໄຫຼ. ຫຼັງຈາກນັ້ນພວກເຮົາຈະວິເຄາະຂໍ້ມູນ ແລະ ອະທິບາຍຜົນການສຶກສາ. ຂໍ້ມູນທີ່ເກັບມາທັງໝົດທີ່ເກັບມາຈະຖືກທຳລາຍ ພາຍຫຼັງທີ່ໄດ້ຂຽນບົດລາຍງານ ສຳເລັດແລ້ວ.

13. ໃນການຕອບຄຳຖາມ ຫຼື ການເກັບກຳຂໍ້ມູນ, ຜູ້ເຮັດການສຶກສາຈະບໍ່ລົບກວນເວລາຂອງທ່ານຫຼາຍ ເກີນໄປ, ສະນັ້ນ ຈິ່ງບໍ່ມີຄ່າຕອບແທນໃດໆ ໃນການເຂົ້າຮ່ວມການສຶກສາຄັ້ງນີ້.

14. ຖ້າຫາກທ່ານບໍ່ໄດ້ຮັບການປະຕິບັດຕາມຂໍ້ມູນດັ່ງກ່າວສາມາດຮ້ອງຮຽນໄດ້ຢູ່ ຄະນະກຳມະການ ຈັນຍາທຳແຫ່ງຊາດ ການສຶກສາໃນຄົນ ມະຫາວິທະຍາໄລ ວິທະຍາສາດ ສຸຂະພາບ (ຄະນະຫຼັງມະຫາ) ຖະ ໜົນ ສາມແສນໄທ, ບ້ານເກົ້າຍອດ ເມືອງສີສັດຕະນາກ, ນະຄອນຫຼວງວຽງຈັນ ໂທລະສັບ: +85621214012, 250670, Fax: +85621 214012.

APPENDIX G

INFORMED CONSENT FORM (ENGLISH VERSION)

I who have signed here below agree to participate in this research project

Title: “Nutritional status of adolescents attending secondary school in Sisattanak district, LAO PDR”

Principle researcher’s name Miss Sonemany KEOLANGSY

Contact address: Amone village, Saysettha district, Vientiane Capital of LAO PDR

Telephone: 0992351800, 0085620 59242777

I have **(read or been informed)** about rationale and objective of the project, what I will be engaged with in details, risk/harm and benefit of this project. The researcher has explained to me and I **clearly understand with satisfaction.**

I willingly **agree** to participate in this project and consent the researcher to response to the questionnaire until the interview finish.

I have **the right** to withdraw from this research project at any time as I wish with no need to **give any reason.** This withdrawal **will not have any negative impact upon me.**

Researcher has guaranteed that procedure(s) acted upon me would be exactly the same as indicated in the information. Any of my personal information will be **kept confidential.** Results of the study will be reported as total picture. Any of personal information which could be able to identify me will not appear in the report.

If I am not treated as indicated in the information sheet, I can report to the National Ethic Committee for Health Research, Office address at Samsenthai Road, Ban Kaognot, Sisattanak district Vientiane Capital, Lao PDR.

Tel: +856 21 214012, 250670, Fax: +856 21 214012

I also have received a copy of information sheet and informed consent form

Sign

(.....)

Researcher

Sign

(.....)

Participant

Sign

(.....)

Witness

Sign

(.....)

Witness

APPENDIX H
INFORMED CONSENT FORM (LAO VERSION)

ແບບຟອມຍິນຍອມເຂົ້າຮ່ວມການສຶກສາ

ຂ້າພະເຈົ້າໄດ້ເຊັນຍິນຍອມເຂົ້າຮ່ວມການສຶກສານີ້ **ຫົວຂໍ້** “ການປະເມີນພາວະໂຜຊະນາການຂອງນັກຮຽນໃນໂຮງຮຽນມັດທະຍົມຕອນປາຍໃນເມືອງສີສັດຕະນາກ ສປປລາວ.

ຜູ້ເຮັດການສຶກສາ: ນ. ສອນມະນີ ແກ້ວລັງສີ

ໂທ: 0085620 59242777 / 0992351800.

ຂ້າພະເຈົ້າໄດ້ຮັບຮູ້ເຖິງເຫດຜົນ ແລະ ຈຸດປະສົງຂອງການສຶກສາຄັ້ງນີ້, ລາຍລະອຽດຂັ້ນຕອນຕ່າງໆ ທີ່ຈະຕ້ອງປະຕິບັດ ຫຼື ໄດ້ຮັບການປະຕິບັດ, ຄວາມສ່ຽງ ແລະ ຜົນປະໂຫຍດ ທີ່ຈະເກີດຂຶ້ນຈາກການສຶກສາຄັ້ງນີ້ ໂດຍໄດ້ຮູ້ລະອຽດໃນເອກະສານທີ່ຊື່ແຈງໃນການວິໄຈ ແລະ ໄດ້ຮັບຄຳອະທິບາຍຈາກຜູ້ເຮັດການສຶກສາຢ່າງລະອຽດ ແລະ ຈະແຈ້ງແລ້ວ.

ຂ້າພະເຈົ້າມີຄວາມຍິນດີ ແລະ ສະໝັກໃຈເຂົ້າຮ່ວມການວິໄຈຄັ້ງນີ້ ຕາມທີ່ລະບຸໄວ້ໃນເອກະສານຊື່ແຈງອາສາສະໝັກວິໄຈ ຂ້າພະເຈົ້າຍິນຍອມເສຍສະຫຼະເວລາ ຕອບແບບສອບຖາມທັງໝົດ ແລະ ຍິນຍອມທີ່ຈະຕອບຄຳຖາມຈົນກະທັ້ງສິ້ນສຸດ.

ຂ້າພະເຈົ້າມີສິດທີ່ຈະຖອນຕົວອອກຈາກການສຶກສາຍາມໃດກໍ່ໄດ້ທີ່ຂ້ອຍຢາກອອກໂດຍບໍ່ເປັນຕ້ອງໃຫ້ເຫດຜົນໃດໆ.ການຖອນໂຕອອກຈາກການສຶກສາຈະບໍ່ມີຜົນກະທົບໃດໆກັບຂ້າພະເຈົ້າ.

ຜູ້ເຮັດການສຶກສາໄດ້ຮັບປະກັນວ່າ ຂັ້ນຕອນຕ່າງໆໃນການວິໄຈຄັ້ງນີ້ ແມ່ນເປັນໄປຕາມທີ່ລະບຸໄວ້ໃນຂໍ້ມູນໃນການເຂົ້າຮ່ວມການວິໄຈ ທຸກປະການ. ສ່ວນມູນສ່ວນຕົວຂອງຂ້າພະເຈົ້າທຸກຢ່າງ ຈະຖືກເກັບເປັນຄວາມລັບ. ຜົນຂອງການສຶກສາຄັ້ງນີ້ ຈະຖືກລາຍງານໂດຍພາບລວມ. ບັນດາຂໍ້ມູນສ່ວນຕົວຕ່າງໆຈະບໍ່ຖືກເປີດເຜີຍໃນບົດລາຍງານ.

ຖ້າຂ້າພະເຈົ້າບໍ່ໄດ້ຖືກປະຕິບັດຕາມທີ່ໄດ້ລະບຸໄວ້ໃນ ໃບຂໍ້ມູນໃນການເຂົ້າຮ່ວມການວິໄຈ, ຂ້ອຍສາມາດລາຍງານຕໍ່ຄະນະກຳມະການ ຈັນຍາທຳແຫ່ງຊາດ ໃນການເຮັດການສຶກສາໃນມະນຸດ, ທີ່ຕັ້ງຢູ່ຖະໜົນ ສາມແສນໄທ, ບ້ານເກົ້າຍອດ, ນະຄອນຫຼວງວຽງຈັນ, ສປປ ລາວ ໂທ: +856 21 214012, 250670, Fax: +856 21 214012

ຂ້າພະເຈົ້າໄດ້ຮັບສຳເນົາໃບຂໍ້ມູນການເຂົ້າຮ່ວມແລະໃບຍິນຍອມເຂົ້າຮ່ວມການສຶກສາ.

ລາຍເຊັນ

(.....)

ຜູ້ເຮັດການສຶກສາ

ລາຍເຊັນ

(.....)

ຜະຍານ

ລາຍເຊັນ

(.....)

ຜູ້ເຂົ້າຮ່ວມການສຶກສາ

ລາຍເຊັນ

(.....)

ຜະຍານ

APPENDIX I

CERTIFICATE OF APPROVAL



Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity

Ministry of Health
National Ethics Committee
for Health Research (NECHR)

No 040 /NECHR
Vientiane Capital 26/3/2018

Approval Notice

Ms Sonemany Keolangsy
Email: sonemany.k@fph.tu.ac.th
Tel: +85620 59242777

RE: Ethical Approval for Health Research

Title: "Nutritional Status of adolescents attending Secondary school in Sisattanak district, Vientiane Capital" (Submission ID: 2018.45.Vie)

Dear Ms Sonemany Keolangsy,

The National Ethics Committee for Health Research of the Lao People's Democratic Republic have reviewed and approved your research.

Please note the following information about your approved research protocol:

Approval period: March 2018 – March 2019

Approved Subject Enrollment: All school-going adolescents aged between 15 and 19 years who are in grade 5 to grade 7 at five secondary schools in Sisattanak district, Vientiane capital, Lao PDR

Sponsor: ADB

Implementing Panel/Project Investigator: Ms Sonemany Keolangsy

Please note that the Ethics Committee reserves the right to ask for further questions, seek additional or monitor the conduct of your research and consent process.

Principle Investigator is required to notify the Secretary of the National Ethic Committee for Health Research:

- Any significant change to the project and the reason for that change, including an indication of ethical implications (if any);
- Serious adverse effects on participants and the action taken to address those effects;
- Any other unforeseen events or unexpected developments that merit notification;
- The inability of the Principal Investigator to continue in that role, or any other change in research personnel involved in the project;
- Any expiry of the insurance coverage provided with respect to sponsored clinical trials and proof of re-insurance;
- A delay of more than 12 months in the commencement of the project; and,
- Termination or closure of the project.

Additionally, the Principal Investigator is required to submit a progress report on the anniversary of approval and on completion of the project.

President of National Ethics Committee for Health Research

Prof. Dr. Douangdao SOUKALOUN

BIOGRAPHY

Name Ms. Sonemany KEOLANGSY
Date of birth August 07, 1990
Educational Attainment Academic year 2012: Bachelor of pharmaceutical sciences, University of health, LAO PDR
Work Position Technical staff
WORK EXPERIENCE Sisattak Health office, Sisattanak district 2012 until now
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