

**NUTRITIONAL STATUS AND RELATED FACTORS AMONG  
ELEMENTARY SCHOOL STUDENTS IN BANDA ACEH  
MUNICIPALITY, NANGGROE ACEH DARUSSALAM  
PROVINCE, INDONESIA**



**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF PRIMARY HEALTH CARE MANAGEMENT  
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MAHIDOL UNIVERSITY**

**2008**

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Thesis  
entitled

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NANGGROE ACEH DARUSSALAM PROVINCE, INDONESIA**



*Badrialaily*  
.....  
Mrs. Badrialaily  
Candidate

*J. Sillabutra*  
.....  
Lect. Jutatip Sillabutra,  
Ph.D.  
Major-Advisor

*Pantyp Ramasoota*  
.....  
Prof. Pantyp Ramasoota,  
Dr. P.H.  
Co-Advisor

*B. Mahaisavariya*  
.....  
Prof. Banchong Mahaisavariya,  
M.D.  
Dean  
Faculty of Graduate Studies

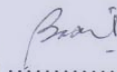
*Sirikul Isaranurug*  
.....  
Assoc. Prof. Sirikul Isaranurug,  
M.D., Dip. Thai Board of Pediatrics  
Chair  
Master of Primary Health Care Management  
ASEAN Institute for Health Development

Thesis  
entitled

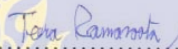
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was submitted to the Faculty of Graduate Studies, Mahidol University  
for the degree of Master of Primary Health Care Management

on  
March 13, 2008



Mrs. Badrialaily  
Candidate



Prof. Teera Ramasoota,  
M.D., M.P.H., Dip. in Dermal Pathology  
Chair



Prof. Pantyp Ramasoota,  
Dr. P.H.  
Member



Lect. Jutatip Sillabutra,  
Ph.D.  
Member



Prof. Banchong Mahaisavariya,  
M.D.  
Dean  
Faculty of Graduate Studies  
Mahidol University



Assoc. Prof. Sirikul Isaranurug,  
M.D., Dip. Thai Board of Pediatrics  
Director  
ASEAN Institute for Health Development  
Mahidol University

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BADRIALAILY 5037987 ADPM/M

M.P.H.M. (PRIMARY HEALTH CARE MANAGEMENT)

THESIS ADVISORS : JUTATIP SILLABUTRA, Ph.D. PANTYP RAMASOOTA, Dr. P.H

ABSTRACT

This study is a descriptive cross sectional study, which assessed nutritional status and related factors among elementary school children in SD Negeri 32 Beurawe, Banda Aceh Municipality, NAD Province, Indonesia. The data was collected from 15<sup>th</sup> January to 30<sup>th</sup> January 2008. Students totally 121, aged 10-14 years old who attended to the class 4, 5 and 6 were interviewed by questionnaire and were measured for weight and height. Minitab for windows was used to analyze the data.

Only 4.96 percent of respondents had a poor level of attitude, and most of them had good (34.71%) and (42.98%) fair knowledge.

Two thirds of respondents had a healthy weight, while 22.31 percent were underweight and 2.48 percent were overweight. Nearly 25 percent of respondent was abnormal weight.

The association between nutritional status and some independent variables was found at the significant level of 0.05. These independent variables were accommodation type ( $p=0.007$ ), caregiver ( $p=0.007$ ), father's occupation ( $p=0.02$ ), mother's education ( $p=0.05$ ) household members ( $p=0.05$ ), and supplementary food support from the school ( $p=0.04$ )

Based on results, it's suggested that to determine other causes a cohort study among overweight and underweight cases should be conducted using skin fold anthropometry. To avoid students snacking in the school time, it's better to let them bring a meal from home. Periodical monitoring and evaluation of nutritional status of the students should focus on underweight students. Supplementary support from schools is still needed, to assist daily intake of students still underweight especially. Health and nutrition education should be taught.

KEY WORDS: NUTRITIONAL STATUS/ ELEMENTARY SCHOOL STUDENTS.

97 pp.

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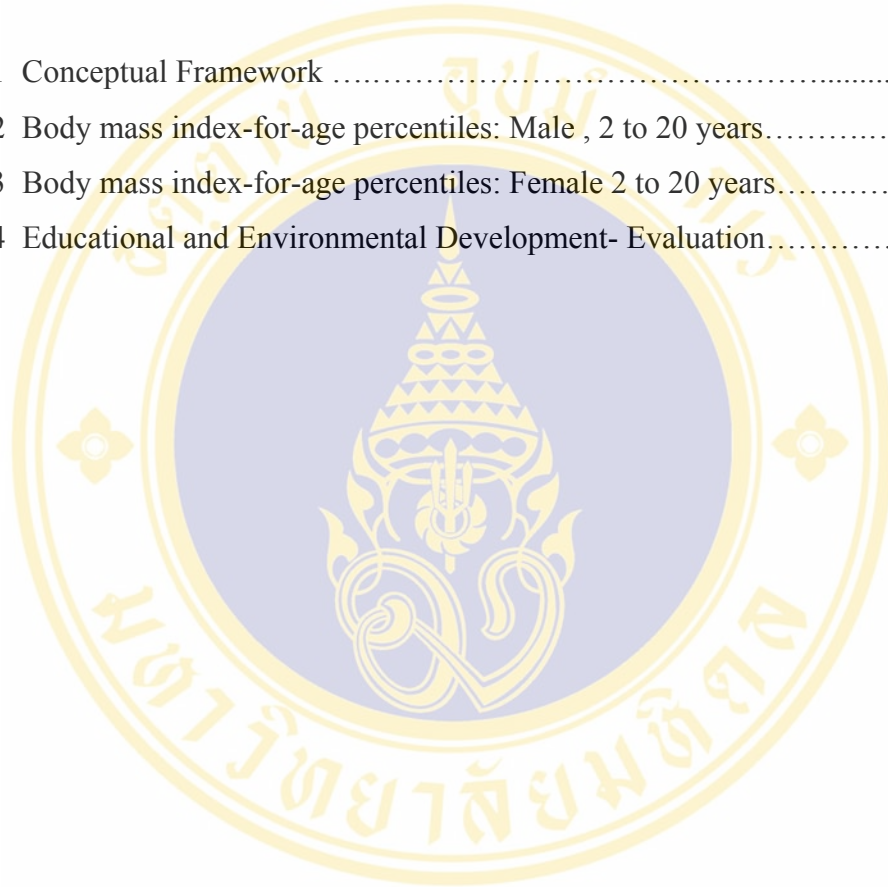
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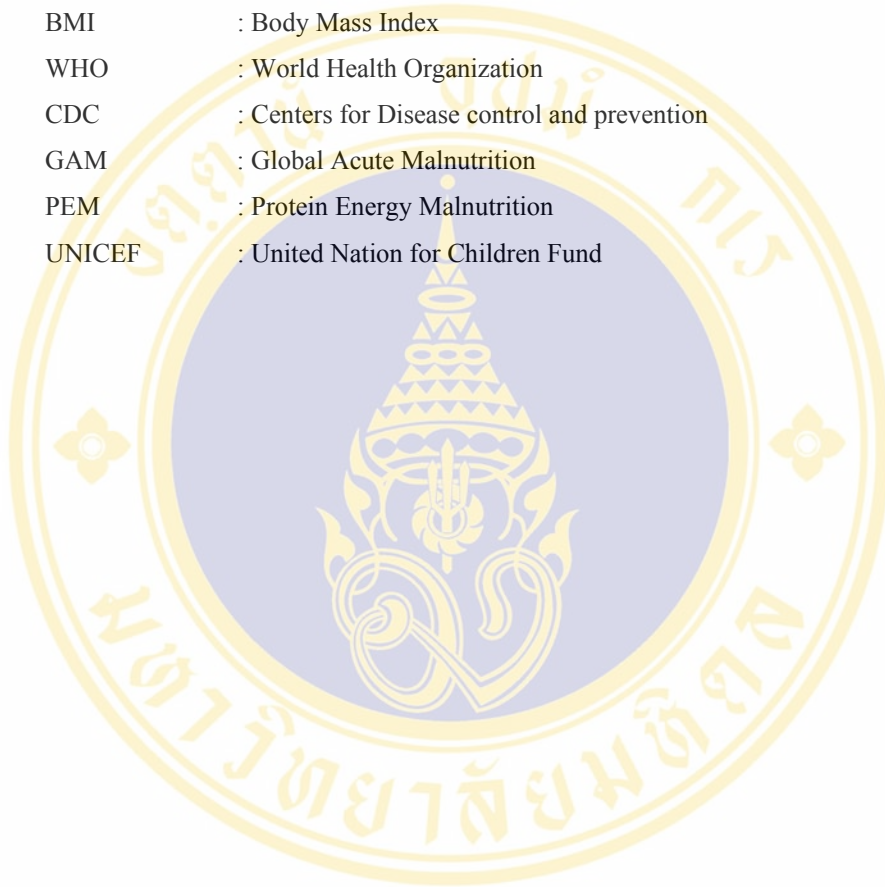
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## LIST OF ABBREVIATIONS

WFP	: World Food Programme
BMI	: Body Mass Index
WHO	: World Health Organization
CDC	: Centers for Disease control and prevention
GAM	: Global Acute Malnutrition
PEM	: Protein Energy Malnutrition
UNICEF	: United Nation for Children Fund



# CHAPTER 1

## INTRODUCTION

### 1.1 Rationale and Justification

The health well being of children is a fundamental issue in education. Indeed, active promotion of health is now seen as a priority for school. The level of concern is illustrated by the fact that World Health Organization has set up a global school health initiative. In countries around the world, the issue is being addressed through school health services, health education and school meals programmers (1).

Good nutrition is of prime important in the attainment of normal growth and development and in the maintenance of health throughout life. Especially in their early life, the children need adequate quantity and appropriate quality of food to meet the nutrient requirement for their physical and mental growth and development.

Malnutrition is widespread problem and affects large number of people in developing countries. Vulnerable populations like school children are susceptible to health problems associated with micronutrient deficiencies. Malnutrition has deleterious effect on the brain structure of the children. Malnourished children have smaller brain size and fewer brain cells than nourished one (2) and malnutrition lowers the children's resistance to disease: resulting in high morbidity and mortality among young children. Malnutrition lowered vitality of the people leading to lowered productivity and reduced life expectancy.

The middle childhood, 6 to 12 years old, is a period of steady physical growth. The average gain in weight during this period is about 3 to 3.5 kg per year and in height approximately 6 cm added each year (3). This age is also the period of major cognitive development. Their brain reaches nearly adult size by the end of primary-school age during this period, life pattern and habits are established and it will

become the ground where the quality of life it going to be ground. School children is one of vulnerable groups to malnutrition and health problems related with nutrient deficiencies. Improving the health of school children become a policy priority in international health School feeding program is one of the way because if they have malnutrition its can be influence in concentration of study and can decrease of ability in success of study (4).

After tsunami in Nanggroe Aceh Darussalam Province at May 2005, World Health Organization report (WHO) that prevalence of wasting for all children under five was 11.2% (7.1 to 16.9%); underweight 41.5% (33.2 to 49.7%); stunting 36.7% (24.1 to 52.8%); and anemia 48.3% (25.0 to 70.4%). The incidence of morbidity was relatively high for fever and coughing/ARI in almost all 13 districts in tsunami affected area with the average of 52.3% (fever) and 46.5% (cough/ARI). In general, children in west coast had higher morbidity rates (diarrhea, cough/ARI, fever, and vomiting) (5).

Study by Unicef – Public Health Officer of Aceh Government at 2005, describe that 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 concentration  $<11$  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  $<-2$  SD scores weight-for-height with or without edema was 12.2% among children under five years of age. There were no significant differences in the prevalence of undernutrition between genders (6).

And also study by World Food Programme - Unicef at 2006 in 8 district in Nanggroe Aceh Darussalam founded that from total of 1440 students elementary school were recruited in the survey that Prevalence of underweight were 21.2%, stunting 27.2% and wasting 7.6% consecutively in Aceh. And they also found that

Anemia cases among children elementary school was in 27% of Acehnese children (7).

Many programs have been conducted to improve nutritional status of children who are malnourished or at high risk of malnutrition. One of the programs that are widely used in developing countries is supplementary feeding program, including school feeding program for school children. World Food Program (WFP) has been distributing fortified biscuits to primary school children in Nanggroe Aceh Darussalam province and Nias Island which is being directly affected by earthquake and tsunami in year 2004 until 2006. Children in selected primary schools receive fortified biscuits every day short before break time from their teachers (8).

The another reason of selecting primary school as the place of promoting children's quality of life is that it can cover more students compared to secondary or higher institution if we consider the dropout rate in the school. In fact, program through primary school setting can cover approximately 80% of its target population (9).

With the reasons mentioned above, the researcher would like to study the current situation regarding nutritional status among elementary school students in Banda Aceh Municipality, Nanggroe Aceh Darussalam (NAD) Province, Indonesia and related factors with the hope that this study result would provide some additional information for those working for the elementary school and Public Health Officer and Educational Department, NAD Province

## **1.2 Research Question**

What is nutritional status and related factors among elementary school children in Banda Aceh Municipality, NAD Province, Indonesia ?

## 1.3 Objectives

### 1.3.1 General Objectives

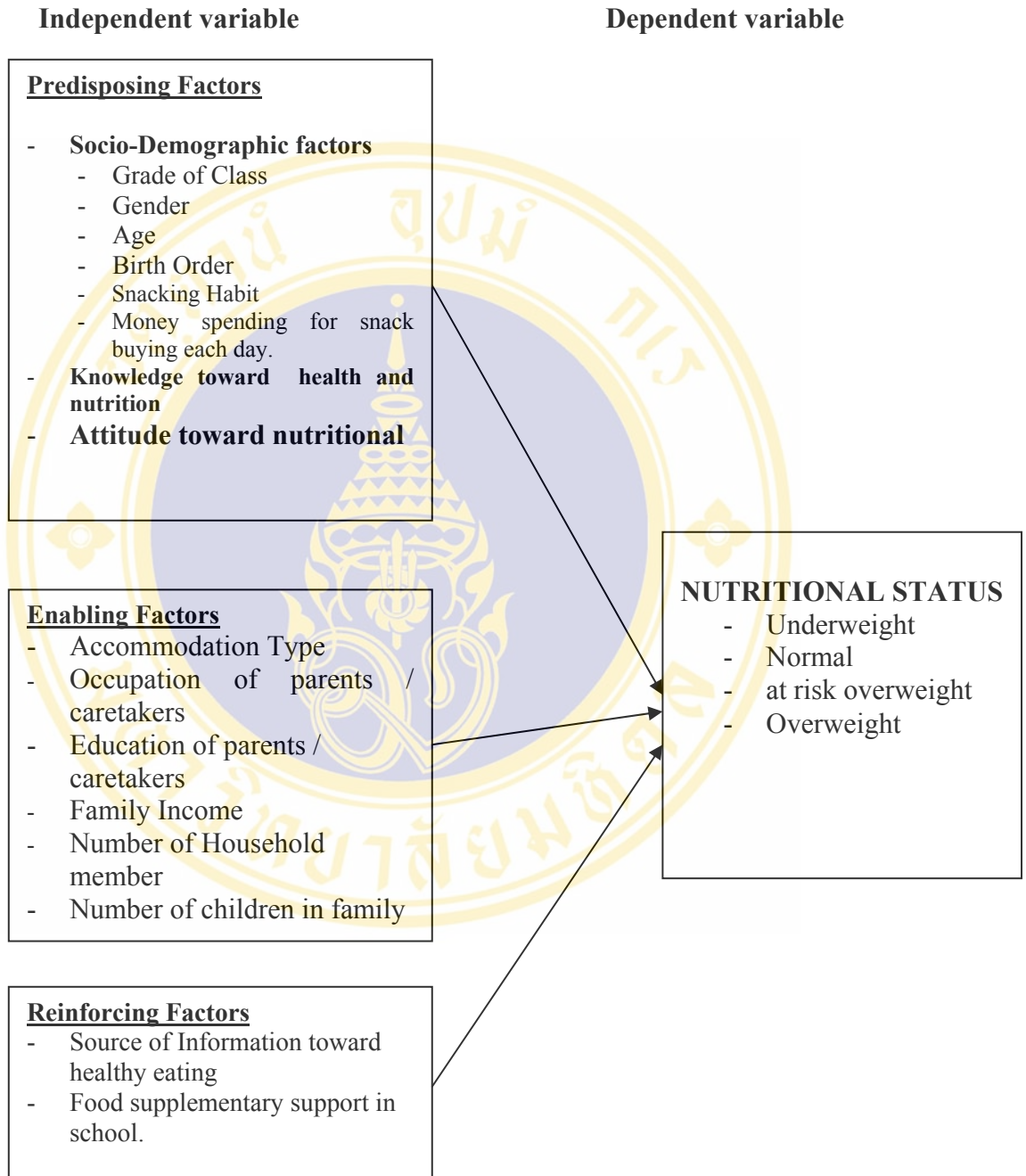
The general objectives of the study were to identify nutritional status and related factor among elementary school in Banda Aceh Municipality, NAD province, Indonesia.

### 1.3.2 Specific Objective

The specific objectives were:

1. To assess the nutritional status among elementary school children.
2. To describe the predisposing factors (Socio demographic factors included Grade of Class, Gender, Age, Birth Order, Snacking Habit , Money spending for snacking, Knowledge toward health and nutrition, attitude toward nutritional), Enabling factors (Accommodation Type, Occupation parents / caretakers, Education parents / caretakers, family income, Number of Household member, Number of children in family), and Reinforcing factors (Health Information and Sources, Food supplementary support) among elementary school children.
3. To identify the relationship between Predisposing factors, Enabling factors, Reinforcing factors and the nutritional status among elementary school children.

### 1.4 Conceptual Framework



**Figure 1** Conceptual Framework

## 1.5 Operational Definition

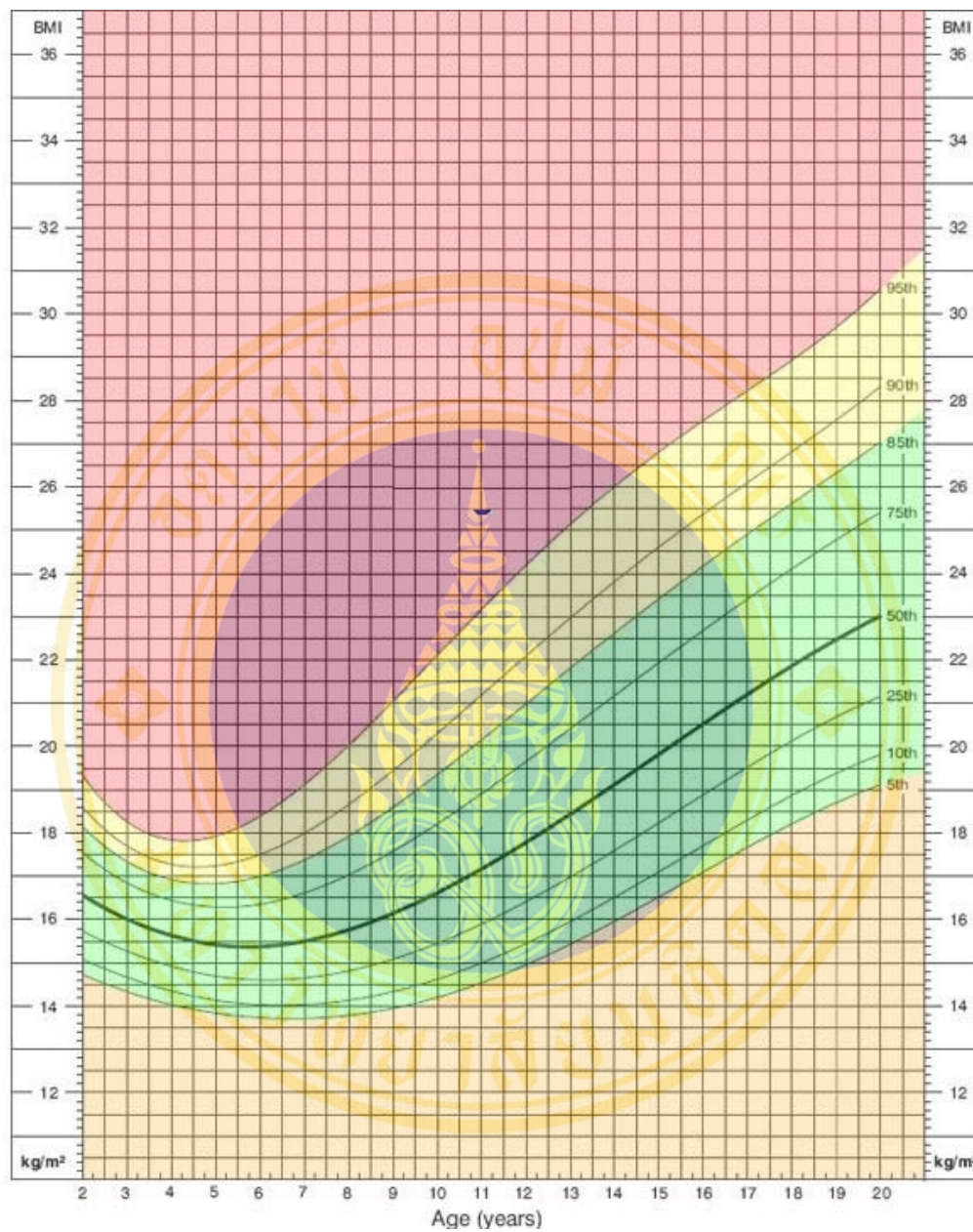
**Elementary school children** : refers to students age  $\leq 10$  to 14 years old who attend grade 4, 5, 6 in public elementary school at SD Negeri 32 Beurawe, Banda Aceh Municipality, NAD Province, Indonesia.

**Nutritional status refers** : to the physical of child in weight and height. The data were obtained by :

- Weight of the children was measured by using bath room scale to the nearest 0.1 kg. Children were weighed and measured without shoes or slippers.
- Microtoise was used to measure height of the subjects to the nearest millimeter in standing position.

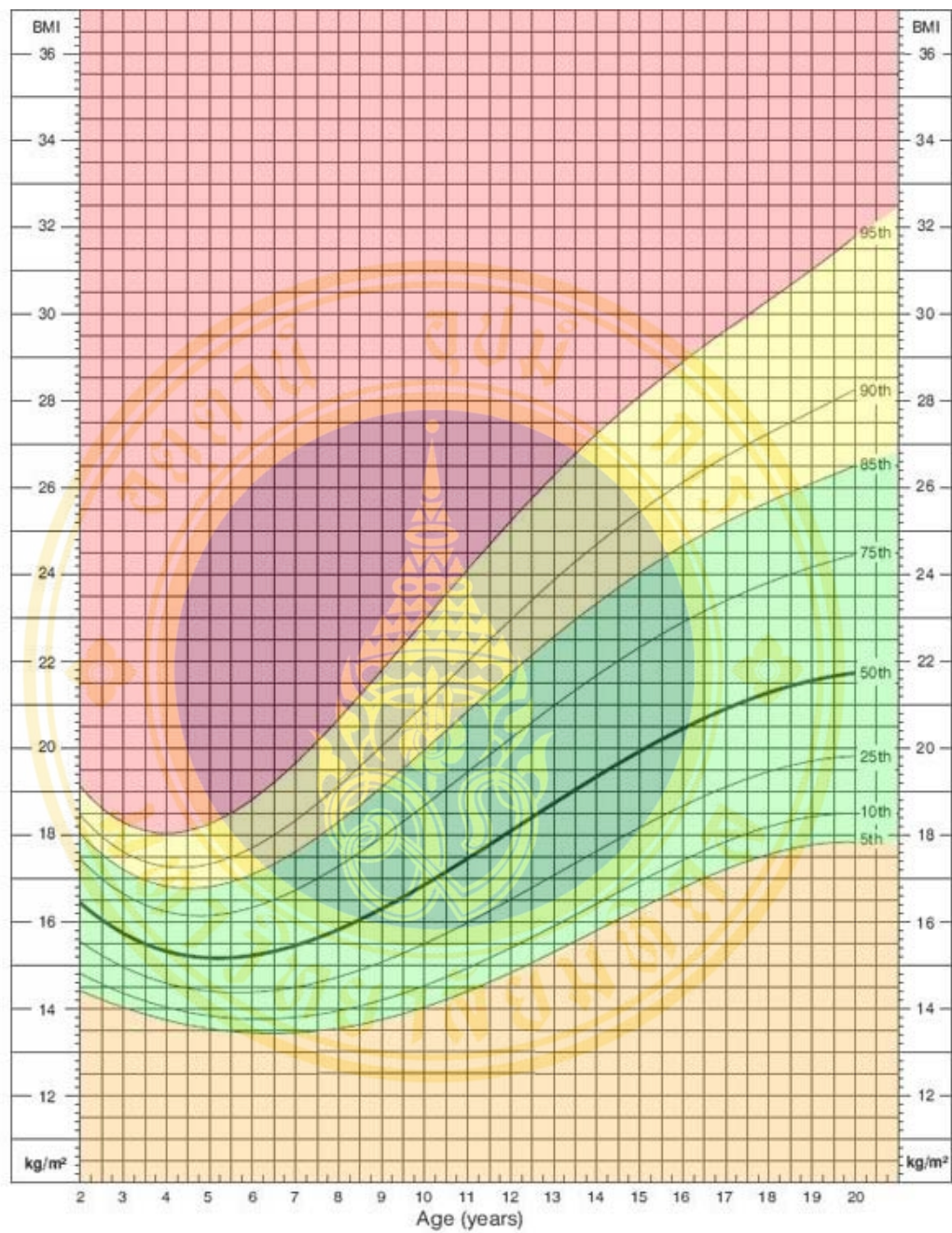
**Anthropometric** was analyzed based on weight-for-height ( $\text{kg}/\text{m}^2$ ), will compare with Body Mass Index (BMI) children Graph for age from WHO-NCHS and will get Percentile BMI (see figure 1 and 2) with following classification (10, 11, 12):

- $\leq 5$  Percentiles curve from growth chart : Underweight
- $> 5$  to 85 Percentiles curve from growth chart : Healthy weight / Normal
- $> 85$  to 95 Percentiles curve from growth chart : At risk overweight
- $> 95$  Percentiles curve from growth chart : Overweight.



Sources: World Health Organization 2007. <http://www.who.int/growthref/en/>

**Figure 2** Body mass index-for-age growth chart percentiles for Male 2 to 20 years old.



Sources: World Health Organization 2007. <http://www.who.int/growthref/en/>

**Figure 3** Body mass index-for-age growth chart percentiles for Female 2 to 20 years old.

### 1.5.1 Predisposing factor

Predisposing factors are factor related to individual (13). refer to Socio demographic factor, Knowledge about health and nutrition children, Attitude toward nutrition

**Socio demographic factor** includes Grade of Class, Age, Gender, Birth Order, Money spending for snack buying each day, Snacking Habit.

- **Grade of the class** refers to the grade of the class which child attends. There are three categorized according to the study population as 1) grade 4, 2) grade 5, and 3) grade 6.
- **Gender** refers to sex of the student and categorized into two groups as 1) male or 2) female.
- **Age** refers to the age of the students as of last birthday. The students write their age, and these response were categorized into 4 groups for the statistical analysis as 1) 10 years old, 2) 11 years old, 3) 12 years old, and 4) >12 years old
- **Birth order** refers to which order the child was born among sibling. The replies are categorized into three groups as 1) 1<sup>st</sup> born, 2) 2<sup>nd</sup> born, 3) Equal or later than 3<sup>rd</sup> born.
- **Snacking Habit** refers to consumption snack/meal in the time that is not at meal time (Breakfast, lunch, dinner). This study has been categorized into four groups : 1) 1 time/day, 2). 2 time/day, 3). ≥3 times/day, and also depend on open answer, children can answer they like to do on their snacking habit.
- **Money spending for snack buying each day** refers to daily money given by family members of children and they spend for the snack

according to this study has been categorized into three groups based on mean  $\pm$  Standard deviation: 1). Rp. 1,000-1,742 per day, 2). Rp 1,743-3,785 per day, 3). Rp. 3,786-6,000 per day.

**Knowledge toward health and nutrition** refers to understanding about nutrition, how is good food to eat, how many time main food a day, criteria of food for consumption every day, healthy life, nutritious food mean, can mention foods belongs to '4 health 5 excellent, nutrient in some specific foods, and necessity and excessive intake of nutrients'. Following total score, the knowledge was classified in to three groups following Bloom's criteria: (13)

- Good knowledge : > 80% of the total score
- Fair knowledge : 60-80% of the total score
- Poor knowledge : < 60% of the total score

**Attitude toward nutrition** refers to strongly agree, agree, uncertain, disagree, and strongly disagree based on Likert scale (13) ranging to which a student has a favorable or unfavorable evaluation of healthy eating, nutritional food. Following total score, the attitude was classified in to three groups following Bloom's criteria: (13)

- Good attitude : > 80% of the total score
- Fair attitude : 60-80% of the total score
- Poor attitude : < 60% of the total score

### 1.5.2 Enabling factors

Enabling factors are factors that make it possible for individuals to change behavior. Mostly condition of the environment, enabling factors facilitates motivation to change behavior of students. They were factors antecedence to behavior that allows a motivation or aspiration to be realized (14).

**Enabling factor in this research** refer to Accommodation Type, Occupation parents / caretakers, Education parents/ caretakers, Family income, Number of Household member, Number of children in family.

- **Accommodation type** refers to a types of living is with whom the student is living. Students were divided into three groups according to their accommodation as 1) nuclear family / parents, 2) Relative / extended family, or 3) in orphanage. Nuclear family means the family consists of the child, siblings and parents. Extended family means the family consists of other person besides the child and the parents, relatives or grandparents of the child. If the relative live in next to the child's family, it was also considered as an extended family. In orphanage means the students lived not with the parents or family, but in dormitory or shelter.

- **Father occupation** refers to the presented job of father. It is mainly categorized into five categorized as 1) government employee, 2) private/company employee, 3) labor, farmer 4) vendor or 5) unemployed. After that, for the statistical analysis, these five groups were regrouped into two as 1) government and 2) non government.

- **Mother occupation** refers to the presented job of mothers. It is mainly categorized into five categorized as 1) government employee, 2) private/company employee, 3) labor, farmer 4) vendor or 5) unemployed or house wife. After that, for the statistical analysis, these five groups were regrouped into two as 1) work and 2) non work.

- **Father Education** refers to the highest education level of respondent's father. It was defined as follow; 1) no education (illiterate), 2) elementary school, 3) Junior high school, 4) Senior high school, and 4) Bachelor degree or Diploma.

- **Mother Education** refers to the highest education level for respondent's mother. It was defined as follow; 1) no education (illiterate), 2) elementary school, 3) Junior high school, 4) Senior high school, and 4) Bachelor degree or Diploma.

- **Caretakers' occupation** refers to the presented job of caretakers. It is mainly categorized into five categorized as 1) government employee, 2) private/company employee, 3) labor, farmer 4) vendor or 5) unemployed.

- **Caretakers Education** refers to the highest education level for caretaker's respondents. It was defined as follow; 1) no education (illiterate), 2) elementary school, 3) Junior high school, 4) Senior high school, and 4) Bachelor degree or Diploma.

- **Family income** means Average Income per month. According to this study it has been categorized into three groups based on mean  $\pm$  Standard deviation.

- Rp. 300,000,-- Rp. 452,821,- (Low)
- Rp.452,822,-- Rp.2,282,178,- (Moderate)
- Rp.2,282,179,-- Rp.5,000,000,- (High)

- **Number of Household member** refer to number of people living together in same house this include grandparents, unmarried brother and unmarried sisters.

- **Number of children** in family refers to the total number of children that less than 10-14 years at the time of interview.

### 1.5.3 Reinforcing Factors

Reinforcing factors are factors that rewards or incentives; they contribute to repetition or persistence of behaviors include information and social support, might all be reinforcing factors (14, 15).

**Reinforcing factor in this research** refer Source of Information toward healthy eating, Food supplementary support in school

- **Source of Information toward healthy eating** refer to information resources about healthy eating which students received from book, newspaper,

magazine, television, radio, website on interne, leaflet, formal or informal health education class in school, family, and others.

- **Food supplementary support in school** refers to receiving biscuit or milk or others from school, NGO or Government.

### 1.6 Limitation study

This study is conducted with limited resources it make impossible to include many important question and variables. Since the study conducted in elementary school students the results may be distorted by information bias. Besides, the students were difficult to interview. Researches could not be observed the daily activity of students and food consumption, because limited time.

## CHAPTER 2

### LITERATURE REVIEW

In this chapter, we shall review the literature to provide the theoretical background to understand the concept of the study on nutritional status and factor related among elementary school children in Banda Aceh Municipality. The literature review consists following parts.

#### 2.1. Nutrition Status

##### 2.1.1. Definition of Nutrition.

##### 2.1.2. Measurement of Nutritional Status.

##### 2.1.3. Problem with Malnutrition (Obesity, Underweight)

#### 2.2. Factor Effecting Nutritional Status (Related studies)

#### 2.3. Theoretical Model Precede Proceed Model

### 2.1 Nutrition Status

#### 2.1.1 Definition of Nutrition.

Nutrition is science that examines the relationship between diet and health. In nutrition, the **diet** is the sum of food consumed by a person or other organism. **Dietary habits** are the habitual decisions an individual or culture makes when choosing what foods to eat. Although humans are omnivores, each culture holds 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 choices play a significant role in health and mortality, and can also define cultures and play a role in religion (16).

**Macronutrients** is nutrients needed in relatively large quantities. Organic nutrients include carbohydrates, fats, proteins (or their building blocks, amino acids),

and vitamins A nutrient is either a chemical element or compound used in an organism's metabolism or physiology. Non-autotrophic organisms typically acquire nutrients by the ingestion of foods. Methods for nutrient intake vary, with animals and protists having an internal digestive system, while plants digest nutrients externally and then ingest. A nutrient is essential to an organism if it cannot be synthesized by the organism in sufficient quantities and must be obtained from an external source, and are called **micronutrients**.

**Micronutrient** is those needed in relatively small quantities; Inorganic chemical compounds such as minerals; water, oxygen, and carbon dioxide may also be considered nutrients. A **dietary supplement** (also known as **food supplement**) is intended to supply nutrients, (vitamins, minerals, fatty acids or amino acids) that are missing or not consumed in sufficient quantity in a person's diet. This category may also include herbal supplements which may have added health benefits (16).

A **vitamin** is an organic compound required in tiny amounts for essential metabolic reactions in a living organism (17, 18). The term *vitamin* does not include other essential nutrients such as dietary minerals, essential fatty acids, or essential amino acids, nor does it encompass the large number of other nutrients that promote health but that are not essential for life (16). Vitamins are essential for the normal growth and development of a multicellular organism. These nutrients facilitate the chemical reactions that produce among other things, skin, bone, and muscle. If there is serious deficiency in one or more of these nutrients, a child may develop a deficiency disease. Even minor deficiencies may cause permanent damage. Once growth and development are completed, vitamins remain essential nutrients for the healthy maintenance of the cells, tissues, and organs that make up a multicellular organism; they also enable a multicellular life form to efficiently use chemical energy provided by food it eats, and to help process the proteins, carbohydrates, and fats required for respiration (32).

For the most part, vitamins are obtained with food, but a few are obtained by other means. For example, microorganisms in the intestine - commonly known as "gut

flora" - produce vitamin K and biotin, while one form of vitamin D is synthesized in the skin with the help of natural ultraviolet in sunlight. Humans can produce some vitamins from precursors they consume. Examples include vitamin A, produced from beta carotene, and niacin, from the amino acid tryptophan.

**Deficiencies of Vitamin.** Deficiencies of vitamins are classified as either primary or secondary. A primary deficiency occurs when an organism does not get enough of the vitamin in its food. A secondary deficiency may be due to an underlying disorder that prevents or limits the absorption or use of the vitamin, due to a "lifestyle factor", such as smoking, excessive alcohol consumption, or the use of medications that interfere with the absorption or use of the vitamin. People who eat a varied diet are unlikely to develop a severe primary vitamin deficiency. In contrast, restrictive diets have the potential to cause prolonged vitamin deficits, which may result in often painful and potentially deadly diseases (32).

Because human bodies do not store most vitamins, humans must consume them regularly to avoid deficiency. Human bodily stores for different vitamins vary widely; vitamins A, D, and B<sub>12</sub> are stored in significant amounts in the human body, mainly in the liver,(21) and an adult human's diet may be deficient in vitamins A and B<sub>12</sub> for many months before developing a deficiency condition. Vitamin B<sub>3</sub> is not stored in the human body in significant amounts, so stores may only last a couple of weeks (19,4).

Well-known human vitamin deficiencies involve thiamine (beriberi), niacin (pellagra), vitamin C (scurvy) and vitamin D (rickets). In much of the developed world, such deficiencies are rare; this is due to (1) an adequate supply of food; and (2) the addition of vitamins and minerals to common foods, often called fortification (20,4).

**Side Effects and Overdose.** In large doses some vitamins have documented side effects, that tend to be more severe with larger dosage. The likelihood of consuming too much of any vitamin from food is remote, but overdosing from vitamin supplementation does occur. At high enough dosages some vitamins cause side effects such as nausea, diarrhea, and vomiting(23,19). When side effects emerge, recovery is often accomplished by reducing the dosage. The concentrations of vitamins an individual can tolerate vary widely, and appear to be related to age and state of health.(24) In the United States, overdose exposure to all formulations of vitamins was reported by 62,562 individuals in 2004 (nearly 80% of these exposures were in children under the age of 6), leading to 53 “major” life-threatening outcomes and 3 deaths. (25), a small number in comparison with the 19,250 people who died of unintentional poisoning of all kinds in the U.S. in the same year (2004) (26).

## **2.1.2 Measurement of Nutritional Status.**

### **2.1.2.1 Anthropometric assessment**

It is the physical measurement of the human body and is commonly used 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 (27).

**Height-for-Age (H/A):** H/A is an indicator of past or chronic malnutrition. H/A can not be used to measure short term changes in malnutrition. Deficits in L/A or H/A are signs of **stunting**. Stunting usually results from extended periods of inadequate food intake, disease or a combination of both, especially during the periods of greatest growth for children when the slowing of skeletal growth results in reduced stature or length (27). Stunting begins in *utero*; therefore, the pro-pregnancy health and nutritional status of women and the nutrition and health of mothers during pregnancy is critical. Stunting is a result of a process over time; most of the damage occurs before 2 years of age. Emphasis should be on prevention (32).

**Stunted growth** is a reduced growth rate in human development. It is a primary manifestation of malnutrition in early childhood, including malnutrition during fetal development brought on by the malnourished mother. In developing countries, stunted growth is a common problem affecting a large percentage of children. Once established, stunting and its effects typically become permanent. Stunted children may never regain the height lost as a result of stunting, and most children will never gain the corresponding body weight. It also leads to premature death later in life because vital organs never fully developed during childhood (32, 29).

**Weight-for-Height (W/H)** helps to identify children suffering from current or acute malnutrition. It is used to examine short term effects, i.e. recent rapid weight loss associated with a period of starvation and/or severe disease (28).

**Wasting** results from weight falling significantly below the weight expected of a child of the same length or height. Wasting indicates current/acute malnutrition resulting from feeding practices, diseases and infection, or, more frequently, a combination of these factors. Wasting in individual children and population groups can change rapidly and shows marked seasonal patterns associated with changes in food availability or disease prevalence (30).

**Weight-for-Age (W/A):** Low weight-for-age identifies the condition of being underweight at a specific age. W/A may reflect both past (chronic) and present (acute) under nutrition; however, it is unable to distinguish between the two (30).

W/A is used to identify the nutritional condition **underweight**, which is a composite measure of stunting and wasting. Just over 15% of the study children were severely malnourished, having a z score less than & 3 standard deviations (SD) for any index (33, 29).

**Weight for age:** study in Nepal found that almost one third of children (30%) were underweight, as judged by a z score for weight for age less than -2SD. Twelve children (6%) were severely underweight (Z score <-3 SD) (33).

**Height for age :** Over a third of the children (35%) had a z score for height for age less than -2 SD. Twenty children (10%) were severely stunted (z score , - 3 SD) (33).

**Weight for height :** Wasting as defined by a z score less than -2 SD for weight-for-height , was present in 13% of the study children. Nine children (5%) were severely (z score <-3 SD) (33).

#### 2.1.2.2 Body Mass Index (BMI).

Body mass index is defined as the individual's body weight divided by the square of their height. The formulas universally used in medicine produce a unit of measure of kg/m<sup>2</sup>. Body mass index may be accurately calculated using the formulas below. WHO International System of Unit Formula (34):

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height}^2(\text{m}^2)}$$

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 colors for different BMI categories (34).

**Categories.** 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. The weight excess or deficiency may, in part, be accounted for by body fat (adipose tissue) although other factors such as muscularity also affect BMI significantly (see discussion below and overweight). Human bodies rank along the index from around 15 (near starvation) to over 40 (morbidly obese) (31). This statistical spread is usually described in broad categories: underweight, normal weight, overweight, obese and

morbidly obese. The particular BMI values used to demarcate these categories varies based on the authority, the CDC and the WHO (34, 36). Regard a BMI of less than 18.5 as underweight and may indicate malnutrition, an eating disorder, or other health problems, while a BMI greater than 25 is considered overweight and above 30 is considered obese. These ranges of BMI values are valid only as statistical categories when applied to adults, and do not predict health (36).

WHO Body Mass Index Classification for adult:

- Starvation : less than 15
- Underweight : from 15 to 18.5
- Normal : from 18.5 to 25
- Overweight : from 25 to 30
- Obese : from 30 to 40
- Morbidly Obese : greater than 40

The U.S. National Health and Nutrition Examination Survey of 1994 indicates that 59% of American men and 49% of women have BMIs over 25. Extreme obesity — a BMI of 40 or more — was found in 2% of the men and 4% of the women. There are differing opinions on the threshold for being underweight in females, doctors quote anything from 18.5 to 20 as being the lowest weight, the most frequently stated being 19. A BMI nearing 15 is usually used as an indicator for starvation and the health risks involved, with a BMI <17.5 being an informal criterion for the diagnosis of anorexia nervosa (34).

### **2.1.2.3 Body Mass Index-for-age at children**

BMI is a calculation that uses a child's height and weight to estimate how much body fat he or she has (35).

BMI 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, then, 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 (10, 49).

Recent studies in England have indicated those females between the ages 12 and 16 have a higher BMI than males by 1.0 kg/m<sup>2</sup> on average (34).

The following classification was used Body Mass Index (BMI) for children Graph from WHO-NCHS and will get Percentile BMI with following classification (10, 11, 12, 49):

- ≤5 Percentiles curve from growth chart : Underweight
- >5 to 85 Percentiles curve from growth chart : Healthy weight / Normal
- >85 to 95 Percentiles curve from growth chart : At risk overweight
- >95 Percentiles curve from growth chart : Overweight.

#### **2.1.2.4 Skin fold Anthropometry**

Another way to measure body fat in school children is by skin fold Anthropometry . Skinfold anthropometry is a well established clinical method for measuring body fat. About one half of the body's fat content is found in the subcutaneous layer. Measuring skinfold thickness at four sites (triceps, biceps, subscapular and iliac crest) that quantify subscapular adipose tissue thickness on the limbs and trunk can make an accurate assessment of body fat. The best estimators of body density in children and adolescents were log sigma four skin folds and combinations of BMI and tricep skin fold (37).

To obtain skinfold measures relatively easily in either a school or clinical setting. The triceps alone, triceps and subscapular, triceps and calf, and calf alone have been used with children and adolescents. When the triceps and calf are used, a sum of skinfolds of 10-25mm is considered optimal for boys, and 16-30mm is optimal for girls (18).

The tricep skinfold thickness was measured over the left tricep muscle at a level midway between the acromion and olecranon process with the arm hanging

down at the side using a vernier caliper. The subscapular skin fold thickness was measured just below the tip of the scapula. The tricep and subscapular skinfold thickness of each child was converted to percent body fat using a modeling equation (38).

$$- \% \text{ Body fat} = 1.21 (\text{tricep} + \text{subscapular skinfold}) - 0.008 (\text{tricep} - \text{subscapular})^2 - 3.2$$

The functional residual capacity of the lung of each child was estimated by a functional residual capacity modeling equation (39).

**- For males less than 1.626 metres**

$$\text{FRC} = [0.02394 \times \text{stand height (cm)}] + (-1.716)$$

where FRC is the functional residual capacity of the lung.

**- For males greater than 1.626 metres**

The tidal volume for the lung of each child was assessed using a tidal volume modelling equation reported by the same investigator (39).

$$\text{Log TV} = [1.8643 \times \log \text{stand height (cm)}] - 1.3956$$

$$\text{TV} = \log^{-1} x$$

where TV = tidal volume.

### **2.1.3 Problem with Nutrition (Obesity, Underweight)**

#### **2.1.3.1 Underweight or malnutrition.**

Defining underweight as a BMI is less than 16 and BMI or wt/ht z scores is less than -2, the overall incidence was 32% and 9%, respectively. When albumin was less than 3.2 g/dL, malnutrition was observed in 12% of the population. When comparing these results to normal values (which are dependent on age, gender, and ethnic origin), the researchers believe that the wt/ht z score for ages 0 to 10 years and the BMI z score for ages 10 to 18 years are the preferred indices (27).

United Nations World Health Organization (WHO: 1996), more than starvation the real challenge in developing nations today is malnutrition-the deficiency of micronutrients (vitamins, minerals and essential amino acids) that no longer allows the body to ensure growth and maintain its vital functions (16).

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 (28, 50).

In the presence of 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 (42). Study by Pangaribuan and Wiradnyani, 2007 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 concentration  $<11$  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  $<-2$  SD scores weight-for-height with or without edema was 12.2% among children under five years of age. There were no significant differences in the prevalence of under nutrition between genders (6,7).

### **2.1.3.2 Underweight, among pre-school children in Indonesia**

Despite the energetic effort of the program to empower communities, and ensure that the country had sufficient energy available for consumption, the weight of pre-school children remained below the international reference standard as can be seen in table 2. And while the rates of moderate malnutrition (underweight children) decreased through the 1990's, the prevalence of severely underweight

children increased. Overall, efforts over the last 14 years have reduced the proportion of underweight of pre-school children by about only 10 percentage points: 37.5% (1989) to 27.5% (2003) or with average rate of reduction less than 1% per year (57).

**Table 1** Trend in Prevalence of Underweight in Indonesia 1989–2003

(Weight for age < -2 SD, and < -3SD)

	1989	1992	1995	1998	1999	2000	2001	2002	2003
< -2 SD (Underweight)	37.5	35.5	31.6	29.5	26.4	24.6	26.1	27.3	27.5
< -3 SD (Severely underweight)	6.3	7.2	11.6	10.5	8.1	7.5	6.3	8.0	8.3

Source: Susenas Data sets, Nutritional Status Component, 1989-2003

With a diverse population of 210 million, underweight rates vary across districts. The prevalence differences between districts that estimate the proportion of preschool children were moderately or severely underweight range from under 20% to over 40%. The district differences in underweight are reflecting wide variation in the IMR between different parts of the country. Even though the national figure for IMR was 35 per 1000 live births, there were 24% of total districts of Indonesia with the rate of above 50 per 1000 live births. These regional differences reflect the broad diversity of Indonesia's society and conditions (37, 57).

The trend data on stunting among pre-school children also show no changes over time. The prevalence even has been increasing to over than 40% since the 1990's. The higher rate is observed not only on underweight and stunting but also wasting. This implies that nutrition problem in young and school children are still a serious public health problem. Table 1 presented the prevalence of wasting among pre-school children from several evidences. Considering that this problem has implication on the children educability, the seriousness of nutrition problem should also be considered as an education problem (57).

### 2.1.3.3 Obesity in Children and Adolescents

Obesity is defined as an excessive accumulation of body fat. Obesity is present when total body weight is more than 25 percent fat in boys and more than 32 percent fat in girls (17). Obesity can define by BMI >30 (>20% from BMI normal) (18). Although childhood obesity is often defined as a weight-for-height in excess of 120 percent of the ideal, skinfold measures are more accurate determinants of fatness (11, 18).

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 (17, 18).

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, is associated with Type II diabetes mellitus, increases the risk of coronary heart disease, increases 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.

Overweight children are at risk of developing medical problems that affect a child's present and future health and have direct impact on quality of life including:

- High blood pressure, high cholesterol and abnormal blood lipid levels, insulin resistance, and type 2 diabetes
- Bone and joint problems
- Shortness of breath that makes exercise, sports, or any physical activity more difficult and may aggravate the symptoms or increase the chances of developing asthma
- Restless or disordered sleep patterns
- Tendency to mature earlier (overweight kids may be taller and more sexually mature than their peers, raising expectations that they should act as old as they

look, not as old as they are; overweight girls may have irregular menstrual cycles and have fertility problems in adulthood)

- Liver and gall bladder disease
- Depression

Risk factors present in childhood (including high blood pressure, high cholesterol, and diabetes) 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 (30).

#### 2.1.3.4 Causes of Childhood Obesity

As with adult-onset obesity, childhood obesity has multiple causes centering around 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 environment, 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. Mapping of the human genome has so far identified 135 different genes that may be associated with obesity, but it is unlikely that any one of these polymorphisms can be the cause of obesity alone (31).

**Low-energy Expenditure.** The average American child spends several hours each day watching television; time which in previous years might have been devoted to physical pursuits. Obesity is greater among children and adolescents who frequently watch television (24, 25), not only because little energy is expended while viewing but also because of concurrent consumption of high-calorie snacks. Only

about one-third of elementary children have daily physical education, and fewer than one-fifth have extracurricular physical activity programs at their schools (31).

**Heredity.** Since not all children who eat non-nutritious foods, watch several hours of television daily, and are relatively inactive develop obesity, the search continues for alternative causes. Heredity has recently been shown to influence fatness, regional fat distribution, and response to overfeeding (30). In addition, infants born to overweight mothers have been found to be less active and to gain more weight by age three months when compared with infants of normal weight mothers, suggesting a possible inborn drive to conserve energy (31).

#### 2.1.3.5 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. Most studies of children have not shown exercise to be a successful strategy for weight loss unless coupled with another intervention, such as nutrition education or behavior modification (31). 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 (18).

**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 (18). Nutrition education may be necessary. Diet management coupled with exercise is an effective treatment for childhood obesity (30).

**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 (17). Graves, Meyers, and Clark (30) used problem-solving exercises in a parent-child behavioral program and found children in the problem-solving group, but not those in the behavioral treatment-only group, significantly reduced percent overweight and maintained reduced weight for six months. Problem-solving training involved identifying possible weight-control problems and, as a group, discussing solutions (51).

**Prevention of Childhood Obesity.** 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 signals 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.

## **2.2 Factors affecting nutritional status in developing countries including Indonesia.**

In 1995, 167 million children under five years old—almost one-third of developing-country children—were malnourished. Malnutrition causes a great deal of human suffering, and it is a violation of a child's human rights. It is associated with more than half of all deaths of children worldwide. People who survive a malnourished childhood are less physically and intellectually productive and suffer from more chronic illness and disability. The costs to society are enormous. Eradicating malnutrition remains a tremendous public policy challenge (36, 49).

The demographic and economic transition that many developing countries are undergoing is producing important changes in diet and lifestyle that greatly impact on disease risks. Among the risk behaviors associated with socioeconomic transition and

urbanization are excessive dietary fat intake, sedentary lifestyle, smoking, and environmental contamination (48). Combined with a reduced infant mortality and increased life expectancy, those risk factors lead to an increasing prevalence of chronic disease like non-insulin dependent diabetes and coronary heart disease. This disease profile is a relatively new phenomenon in developing countries, where health programs have traditionally focused on "acute" interventions such as immunization or oral rehydration. A new approach will be needed to address chronic diseases, which frequently demand a life-long and technically complex medical management, and may have significant impact on the quality of life and productivity of the population (33, 49).

### 2.2.1 Predisposing Factor

#### Socio-economic context:

**Age.** Interestingly, study in Pakistan in 2002 describe that the prevalence of malnutrition in any form (underweight, stunting or wasting) was higher among older children than younger ones, and will shown in table 2.

**Table 2** Age group and Malnutrition

Age group (years)	No. of children malnourished	Total
5-6	30 (44%)	69 (100%)
6-7	19 (35%)	55 (100%)
7-8	20 (47%)	43 (100%)
8-9	10 (59%)	17 (100%)
9-19	9 (56%)	16 (100%)
Total	88 (44%)	200 (100%)

Malnutrition defined as <-2SD for any indices, Percentages are row percents, chi square for linear trend: 9.7, p value < 0.01

#### Common characteristics of children **10 to 12 years old.**

##### The Growing Personality

- Starts to develop an internal measure of themselves that strengthens and stabilizes their self-esteem,

- Begins to develop a sense of who is by contrasting themselves with others
- Becomes more sensitive to social judgment
- develops an increased interest in role models
- Body awareness increases—negative feelings about his/her body is common
- concern for right and wrong, as well as the treatment of others, increases
- capacity for empathy increases
- reasoning power matures; more capable of following rules without outside guidance, but more capable of rationalizing breaking rules
- wants increased privacy as s/he seeks independence in his/her life
- Acquires pride and enjoyment from doing something well (academics, sports, music, art, etc.)(66).

**Gender.** There was no significant or consistent association between nutritional status and gender. Although proportionately more girls than boys were stunted (37% vs. 33%), more boys than girls were underweight (31% vs 28%) and wasted (14% vs. 12%). However, none of these differences were statistically significant (40).

**Birth order.** Children in families tend to take on recognizable roles. The oldest is often the leader and a "good citizen," responsible and responsive to the parents' expectations. Oldest children are typically well organized, precise, and prone to perfectionism. Youngest children tend to take on the "baby" role: easygoing and spontaneous, used to being noticed and fussed over, charming and manipulative. Middle children have less of a clear-cut role in the family; instead, they often make a place for themselves outside the family, creating a network of close friends, venturing away from the family physically, and breaking the mold intellectually as well. "Only" children often have characteristics both of first children (capable, perfectionistic) and of youngest children (attention-seeking, self-centered) (51).

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 significantly influences the level or growth rate of

wages, 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 more mature (52).

**Snacking habit.** Eighty-four primary school children (the majority aged 7–8 years), from four schools, two in England and two in Scotland, were surveyed to identify snacking behavior and the influences on perception and choice of snack foods. A questionnaire plus short interview with activity tasks was adopted, covering general snacking habits and a look at six specific groups of snacks comprising three of 'unhealthy' image and three with intermediate or fully 'healthy' image. The results showed that, for this age group, there was an overall preference for sweets, crisps and chocolate and less liking for fruit and cereal-containing snacks. Attitudes to sensory properties showed that 'taste' was the main reason for snack choices, usually in spite of a 'healthy' image belief for the snacks. Choice was also dependent on parental influence and availability. Gender and relative socio-economic level differences were minimal, but regional variations showed higher snacking frequency for the Scottish group, which also had fewer children preferring fruit. Meal patterns had little effect on snacking, but inclusion of a prepared meal at lunchtime may have reduced snacking frequency (56).

The 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 diary recorded when and which some of the most commonly eaten snacks, relative to each country, were eaten. Ninety-five English and 100 French school children aged 9-10 years, both male and female participated in the study. French children ate significantly ( $P < 0.05$ ) fewer snacks than British children. British children ate significantly ( $P < 0.001$ ) more of their snacks at meal times than their French counterparts, who ate a larger proportion of their snacks away from school ( $P < 0.001$ ). The French ate more satiating snacks, such as bread and a few cakes, than the British, who ate a significantly ( $P < 0.05$ ) larger proportion of crisps and sweets. It was concluded that the traditional French meal pattern, following a

wholesome breakfast with a highly nutritious school lunch, discourages eating at other times of the day. British children eat meals consisting of ‘snack foods’ that leave them hungry, leading to increased snacking. Snacking, often on high energy density, low bulk foods, could be an explanation as to why levels of obesity are rising so much faster in the UK than in France. Only work carried out by the government and the nation as a whole, to re-educate the population, can start to fight the increasing prevalence of this unwelcome malady (59).

**Knowledge.** Nutritional education and improvement of nutritional knowledge is an effective intervention that improves School children health. With consideration to few accurate and successful nutritional teaching programs directed at our schoolchildren in this research we evaluated the status of nutrition education system in primary school children and mothers’ point of view. The study was a qualitative study as a Focus Group Discussion (FGD). The research team consisted of a coordinator, one or two observers and two note takers. Each FGD was held with 6 to 8 person and each session lasted about 60 minutes. The field work activities of the study included 20 FGD sessions, 16 for male and female primary school children from grades 1 to 4 and 4 for mothers of two district (urban and rural) of Tehran, capital of Iran, were held. At the end of each group discussion all notes were completed, coded analyzed and classified by team members (63).

Findings show that children were eager to learn effects of bad and good foods on the body. According to their point of view TV, is the most important and effective teaching medium. In addition to TV, food advertisements, school staff especially teachers were named as the most effective factors on children’s nutritional behaviors. Most of children preferred to learn nutritional subjects from father, mother and other family members. The mothers preferred teachers, health instructors parents and classmates as source of knowledge and schools as the most effective place for teaching/or education nutritional subjects (63).

Results of the study confirm the fact that children need to learn, more about nutrition and foods. So that, designing of longitudinal nutrition education projects aiming at children through TV or other effective media is essential (63).

The study in Nigeria investigated the effect of a 3 – week school based nutrition education programme on nutrition knowledge and healthy food choices of 197 primary six pupils (197 sixth grades) randomly divided into a control (n = 102) or an experimental group (n = 95). The control group received no nutrition education while the experimental group received 40 minutes of nutrition education, 4 days a week for 3 weeks nutrition knowledge scores and 3 day food records were collected at the beginning of the study and after 3 weeks.

Food records were used to evaluate healthy food choices (i.e Dietary Guideline's recommended intake for macronutrients and the recommendations of the Food Guide Pyramid for each food group). In the experimental group there was a significantly greater increase in nutrition knowledge score ( $p = 0.001$ ) and a significant change in compliance in meeting the Dietary Guidelines ( $p = 0.0001$ ) and the Food Guide Pyramid's recommendations ( $p = 0.0001$ ). This study showed the effectiveness of a nutrition education programme on nutrition knowledge scores and healthy primary school children (children in sixth grade) (60).

**Attitude.** The healthy life for the adults, the children needs must be targeted at their earlier age for dietary interventions. According to Lytle *et al.* (62), schools provide an excellent setting for positively influencing children. If sound nutrition education programmes are included in the curriculum, children have opportunities to expand their nutrition knowledge and learn to select healthy food choices at schools, homes and in restaurants. In addition, education programmes may enable children to grasp the – significance of health related problems (61). Nutrition messages developmentally appropriate and gives specific behavioral directives, will positively affect the food choices of children (62).

### 2.2.2 Enabling Factors

**Accommodation Type.** The risk of becoming obese is greatest among children who have two obese parents (17, 18, 19). This may be due to powerful genetic factors or to parental modeling of both eating and exercise behaviors, indirectly affecting the child's energy balance. One half of parents of elementary school children never exercise vigorously (30).

**Take cares.** Care is the provision in the household and the community of time, attention, and support to meet the physical, mental, and social needs of the growing child and other household members. The significance of care has best been articulated in the framework developed by the United Nations Children's Fund (UNICEF). This paper extends the UNICEF model of care and summarizes the literature on the relationship of care practices and resources to child nutrition. The paper also summarizes attempts to measure the various dimensions of care. The concept of care is extended in two directions: first, we define resources needed by the caregiver for care and, second, we show that the child's own characteristics play a role in the kind of care that he or she receives. The literature summary and methodological recommendations are made for six types of resources for care and for two of the least studied care practices: complementary feeding and psychosocial care. The other care practices are care for women, breast-feeding, food preparation, hygiene, and home health practices. Feeding practices that affect a child's nutritional status include adaptation of feeding to the child's abilities (offering finger foods, for example); responsiveness of the caregiver to the child (perhaps offering additional or different foods); and selection of an appropriate feeding context. Psychosocial care is the provision of affection and attention to the child and responsiveness to the child's cues. It includes physical, visual, and verbal interactions (55).

South Asia trails even Sub-Saharan Africa, despite surpassing that region's record on many of the determinants of child nutritional status—national income, democracy, food supplies, health services, and education. The study indicates that three broad socioeconomic factors help explain this “Asian Enigma”: women's status, sanitation, and urbanization (49).

Women's status makes by far the greatest contribution to the regional gap in children's nutritional status. It plays this role not only because it is lower in South Asia than in Sub-Saharan Africa but mainly because its positive impact is stronger in South Asia making its costs in terms of child malnutrition far higher in that region (53, 30).

**Parental Education.** Numerous empirical studies from developing countries have noted that parental education has a robust and positive effect on child learning, a result that is often attributed to more educated parents making greater investments in their children's human capital. However, the nature of any such investment has not been well understood. This study examines how parental education affects various parental investments in goods and time used in children's human capital production via an unusually detailed survey from rural China. It is found that more educated parents make greater educational investments in both goods and time and that these relationships are generally robust to a rich set of controls. Evidence suggests that making greater investments in both goods and time stems both from higher expected returns to education for children and from different preferences for education among more educated parents. A second key finding is that the marginal effect of mother's education on educational investments is generally larger than that of father's education (53).

Study in Mozambique described that stunting prevalence rates in Mozambique are very high (41 percent), especially in rural areas (46 percent). Recent research shows that consumption growth alone will not be sufficient to solve the problem of malnutrition. To investigate the role of additional determinants they used a two-stage quantile regression approach with specific attention to the role of maternal preventive health care knowledge and schooling. Three different scores for health care knowledge are used and show similar results. For rural Mozambique, they found that maternal schooling has positive effects especially in the top quintile of the height-for-age distribution while health care knowledge has a positive effect on height-for-age of under two year old children especially at the lower end of the distribution where the severely stunted children are located. Improving health care knowledge of mothers

could substitute for the low levels of education and community health care facilities in rural areas and positively affect the height of the most severely stunted children (54).

Study in Nepal the discussions and case studies with mothers revealed several key issues that has impact on the nutritional status of children. Most of the malnourished children came from female headed families. Husbands of such families are away in India to make an earning for their families thus overburdening the mothers. Some of these mothers also had the added pain of having to endure gross abuses themselves or loose their family members at the hands of the warring parties while others had to accept their husband's second wife. Not only did mothers looked highly stressed but also clearly expressed on their difficulties in looking after family matters from children rearing to housekeeping. While mothers from Simalghari have to overcome difficulties like tending the field, look after the children and home while their husbands are away. The waiting for the mothers of Rajhena IDP camps are even more difficult as their husband's return will determine how long their hardship will continue (33).

**Number of Household member and number of children.** Study in Pakistan 2002 found that While malnutrition was more commonly observed in large families, this relationship was not statistically significant (40). But Basri HB 2001 in study in Thailand describe that Large Families have generally been associated with poor nutritional status. Their income is limited; if family have many children so year by year there are more members to share on the limited income that the poor are permitted to use.

**Family income.** Study in Pakistan describe that the majority of households (67%) surveyed reported a monthly income of less than Rs 3000 (approximately US\$70). The great majority (95%) of mothers worked as housewives, with the rest working as domestic helps, cooks, or seamstresses. As expected, there was a linear trend between nutritional status and monthly family income, with malnutrition being present in 49% of families in the lowest bracket (< Rs 3000) compared to 33% in the

Rs 3000-6000 bracket and 29% in the > Rs 6000 bracket (chi square for linear trend: 4.9, p value < 0.03) (40).

### 2.2.3 Reinforcing Factors

**Source of Information toward nutrition food.** Information source for nutrition food and healthy eating such as educational material, health professional and the media, and informal informational sources such as family and peers have all been reported to be influences associated with nutrition food and healthy.

In young people, encouragement from the family was commonly mentioned support mechanism for nutrition food and healthy, though likewise identified as barriers. Teachers and friends were not always being a source of information for nutrition food and healthy. Friends were considered to be facilitators of health, although less so in the area of nutrition food and healthy (42, 43).

Study by Akiko Mii, 2007 in Thailand found the results that information had association with healthy eating and nutritional level, which were leaflet (p=0.003) and formal or informal health education in school (p=0.034) (44).

Mass media and advertisement in the press, radio and television are powerful factors behind changes in food habits (45). Young person's food choices are influenced by television advertisement for low nutritive foods. Most of the foods advertisements are high in fat, sugar, or sodium; practically no.

**Food supplementary from school.** Many programs have been conducted to improve nutritional status of children who are malnourished or at high risk of malnutrition. One of the programs that are widely used in developing countries is supplementary feeding program (7), including school feeding program for school children. Result from one study on school feeding program in Durban South Africa showed that supplementation of biscuits fortified with 50% Recommended Dietary Allowance (RDA) of iron, iodine and  $\beta$ -carotene resulted in a significant improvement in micronutrient status and also appeared to have a favorable effect on

the antropometric status, morbidity and cognitive function of the rural school children aged 6-11 years. The children who received fortified biscuits also had less class absent because of respiratory and diarrhea-related illnesses (8).

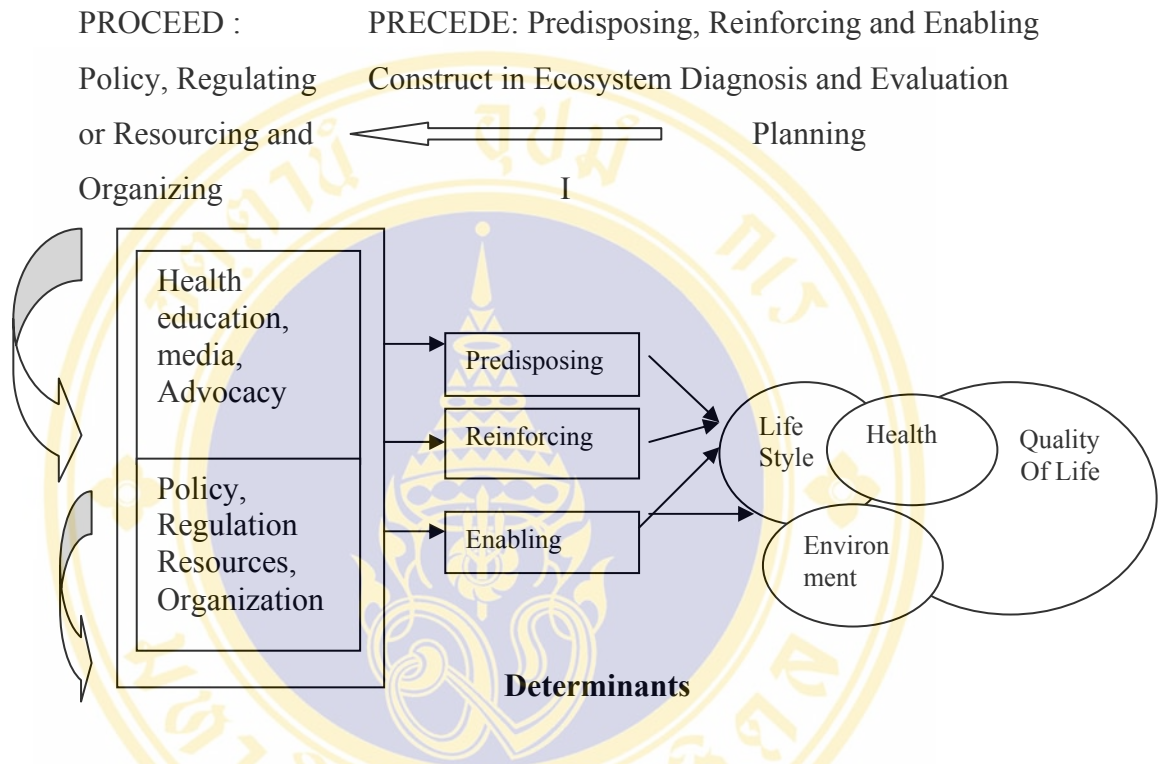
#### 2.4 Preceed-Proceed Model

The Precede-Proceed Model of health program planning and evaluation builds on more than 40 years of work by Dr. Lawrence W. Green and colleagues at Berkeley, Johns Hopkins, the U.S. Public Health Service, the University of Texas, the Kaiser Family Foundation, the University of British Columbia, Health 2000, Macro International, and Emory University. In collaboration with Marshall Kreuter on the second edition of the textbook that describes the model, the original Precede model was extended to encompass the wider environmental, policy and organizational factors that Green and Kreuter had found important in their respective roles in launching national programs of community health promotion from the Kaiser Family Foundation and the Centers for Disease Control and Prevention (24).

Precede-Proceed framework for planning is founded on the disciplines of epidemiology; the social, behavioral, and educational sciences; and health administration. Throughout the work with Precede and Proceed, two fundamental propositions are emphasized: (1) health and health risks are caused by multiple factors and (2) because health and health risks are determined by multiple factors, efforts to effect behavioral, environmental, and social change must be multidimensional or multisectoral, and participatory(46).

The name of the model, Preceed Proceed is respond to the 9 phase of the frame work, **Preceed** means “come before” and an acronym for Predisposing, Reinforcing, Enabling, Cause in, Educational Diagnosis and Evaluation, whereas **Proceed** means “continue after” and is an acronym for Policy, Regulatory, Organizational Construct in Educational and Environmental Development. The Goals of the models are to explain health related behaviors and environment, and to design and evaluate the interventions to influence both the behaviors and the living conditions. This model

has been applied, tested, studied, extended, and verified in over 900 published research in community, school, clinical, and workplace setting over the last decade (45, 50).



**Figure 4** Educational and Environmental Development- Evaluation

The Precede-Proceed model provides a comprehensive structure for assessing health and quality-of-life needs and for designing, implementing, and evaluating health promotion and other public health programs to meet those needs. Precede (Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation) outlines a diagnostic planning process to assist in the development of targeted and focused public health programs. Proceed (Policy, Regulatory, and Organizational Constructs in Educational and Environmental Development) guides the implementation and evaluation of the programs designed using Precede.

In this study only **Precede Model** were used, because this model provides a framework for such an examination by positioning that there are three types of factors that provided a collective influence nutritional status.

Precede consists of five steps or phases. Phase one involves determining the quality of life or social problems and needs of a given population. Phase two consists of identifying the health determinants of these problems and needs. Phase three involves analyzing the behavioral and environmental determinants of the health problems. In phase four, the factors that predispose to, reinforce, and enable the behaviors and lifestyles are identified. Phase five involves ascertaining which health promotion, health education and/or policy-related interventions would best be suited to encouraging the desired changes in the behaviors or environments and in the factors that support those behaviors and environments (76).

Proceed is composed of four additional phases. In phase six, the interventions identified in phase five are implemented. Phase seven entails process evaluation of those interventions. Phase eight involves evaluating the impact of the interventions on the factors supporting behavior, and on behavior itself. The ninth and last phase comprises outcome evaluation—that is, determining the ultimate effects of the interventions on the health and quality of life of the population (58).

#### **2.4.1 Predisposing Factors**

Predisposing characteristics were seen to include demographic factors (age and gender), social structure (education, occupation, ethnicity, and other factors measuring status in the community, as well as coping and the health of the physical environment), and health beliefs (attitudes, values, and knowledge that might influence perceptions of need and use of health services). In Andersen's behavioral model, therefore, the term "predisposing characteristics" refers broadly to everything that might predispose a person to need and use a particular service.

#### **2.4.2 Enabling Factors**

Lawrence W. Green originally adapted the term "enabling factor" in 1974 from the concept of "enabling resources" found in Ronald Andersen's Behavioral Model of Families' Use of Health Services (1968). Andersen's model, still used widely in the fields of health services research and health administration, suggests that among the factors that influence use of health services are two categories of enabling

resources: community enabling resources (e.g., health personnel and facilities must be available), and personal/family enabling resources (e.g., people must know how to access and use the services and have the means to get to them) (23, 48). Enabling factors are defined as factors that make it possible (or easier) for individuals or populations to change their behavior or their environment. Enabling factors include conditions of living, family supports, and skills that facilitate a behavior's occurrence (58).

### **2.4.3 Reinforcing Factor.**

The relating of causes to the effects they produce. Causes are termed necessary when they must always precede an effect and sufficient when they initiate or produce an effect (76). Reinforcing factors: factors affecting the students' ability to sustain certain behaviour, like support and cooperation from parents, other adults and peers, include information (77)

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 Study Design**

This study was descriptive cross sectional study to study nutritional status among elementary school children in SD Negeri 32 Beurawe, Banda Aceh Municipality, NAD Province, Indonesia.

#### **3.2 Study Population**

The target populations of this study was elementary schools students age between 10 to 14 years old (level 4, 5 and 6), SD Negeri 32 Beurawe, Banda Aceh Municipality, NAD Province, Indonesia.

#### **3.3 Sample Size and Sampling Techniques**

##### **3.3.1 Sample Size**

The sample was all students who attend to the class, grade 4, 5 and 6 were in grade 4 were 32 students, grade 5 were 40 students, and grade 6 were 49 students at SD Negeri 32 Beurawe, Banda Aceh Municipality, NAD Province, Indonesia.

##### **3.3.2 Sampling Technique**

Sampling procedure consisted of the following three steps.

1. Selected by purposive sampling of one elementary school in Banda Aceh Municipality.
2. Simple Random sampling to select 6 class rooms level 4, 5, 6.
3. Take all the students attending to the selected class rooms.

### 3.4 Research Instrument and Data Collection

#### 3.4.1 Questionnaire

A structured questionnaire was used for data collection. Initially, the questionnaire was prepared in English by the researcher, and then translated into Indonesian for convenience to collecting data (The questionnaire was provided in Appendix A). The questionnaire mostly multiple choice question, and some like snacking habit, money spend for snacking and family income researcher provided by open ended questionnaire. The height of each students was measured using a ruler with each child standing feet without shoes, back and heel against a vertical ruled bar (microtoise) according to a standard procedure (Whitney et al 1998). The weight of each child was measured in light clothing without shoes (Watts et al 2003) using a bathroom scale Weight was measured by bathroom scale and height was measured by microtoise. The questionnaire contains 5 parts as follows;

##### **Part 1 Socio demographic factors**

This part contains 5 questions that asked about age, birth order, money for snacking, and snacking habit.

##### **Part 2 Knowledge toward healthy and nutrition**

Knowledge part consisted of 18 questions. The score was given for each question. Score “1” was given for correct answer and “0” was given for an correct answer and don’t know. The range score is 0 to 18. Total score was summarized and categorized into based on Bloom criteria: (13)

1. Good knowledge : > 80% of the total score
2. Fair knowledge : 60-80% of the total score
3. Poor knowledge : < 60% of the total score

##### **Part 3 Attitude toward nutrition**

The attitude part consisted of 15 questions. Likert scale ranging from strongly agree to strongly disagree were applied. The score was given in positive statement, 5 score for strongly agree, 4 score for agree, 3 score for uncertain, 2 score

for disagree and 1 score for strongly disagree answer. In negative statement, 5 for strongly disagree answer, 4 score for disagree, 3 score for uncertain, 2 score for agree, and 1 score for strongly agree.

Finally, the total score were summarized, and the level of attitude of students was divided into three group based Bloom's criteria:

1. Good attitude : > 80% of the total score
2. Fair attitude : 60-80% of the total score
3. Poor attitude : < 60% of the total score

#### **Part 4 Enabling factors regarding on nutritional status**

Accommodation type, father's occupation, mother's occupation, father's education, mother's education, caretaker's occupation, caretaker's education, number of family member, and number of younger brother and sister of respondents were asked in this part.

#### **Part 5 Reinforcing factors regarding on nutritional status**

This part was consisted of 2 questions, regarding about source of information toward healthy eating and food supplementary support in school.

### **3.4.2 Data Collection**

Data is collected by the researcher and trained interviewers. Interview method is used for data collection.

### **3.5 Test of Validity And Reliability**

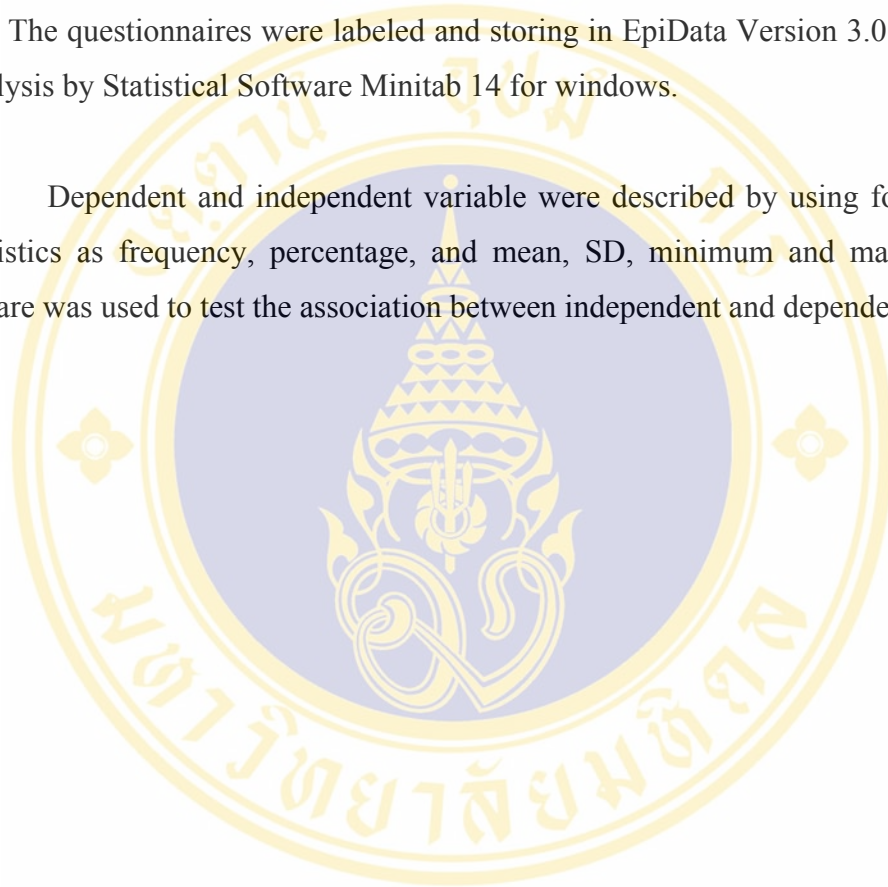
Before data collection, the questionnaire was pre-tested for validity and reliability. The questionnaire was adapted according to the comment and suggestion from by the expert, 30 elementary school students of the public elementary school in Banda Aceh Municipality was collected. The reliability of the questions of knowledge part was 0.80 (KR20). The reliability of attitude was 0.61 (Cronbach Alpha).

One trained technician may obtain height measured and weight measured to control examiner error.

### **3.6 Data Analysis and Statistical Used**

The questionnaires were labeled and storing in EpiData Version 3.0 before doing analysis by Statistical Software Minitab 14 for windows.

Dependent and independent variable were described by using for descriptive statistics as frequency, percentage, and mean, SD, minimum and maximum. Chi-square was used to test the association between independent and dependent variables.



## CHAPTER 4

### RESULTS

This study was conducted in Banda Aceh Municipality, Nanggroe Aceh Darussalam Province, Indonesia. 121 students which 10-14 years old who attended to the class 4, 5 and 6 at Elementary school, SD Negeri 32 Beurawe, Banda Aceh Municipality were collected. The students were interviewed by questionnaire and were measured for weight and height. The data collection started from 15<sup>th</sup> January to 30<sup>th</sup> January 2008.

Descriptive statistics were used to describe different variables such as gender, age, birth order, grade of the class, money for snacking, snacking Habit, family income, family size, knowledge, attitude, occupation parents or caretakers, education parents or caretakers, and etc. Chi-square test was used to find out the association between the Predisposing Factors, Enabling factors, Reinforcing factors and the nutritional status of elementary school children.

The results from the study were presented in 5 parts including:

1. Description of Predisposing Factors
2. Description of Enabling factors
3. Description of Reinforcing factors
4. Description of Nutritional Status
5. Association of dependent variable (Nutritional Status) and independent variables (Socio Demographic factors, Predisposing Factors, Enabling factors, Reinforcing factors).

### 4.1 Description of Predisposing Factors

#### 4.1.1 Socio Demographic Factors

Table 3 presented the number and percentage of socio demographic factors, grade of class, gender, age, birth order, money for snack each day, and snacking habit.

The majority of them (40.50%) were Grade 6, following by Grade 5 (33.06%), and Grade 4 (26.45%). The proportions of male and female respondents were 56.2% and 43.8%, respectively. Most of respondent was 12 years (47.11%). The mean of age was 11.471 years old with the standard deviation of 0.949.

**Table 3** Frequency distribution of students' Socio Demographic Factors

Socio Demographic Factors	Male (n=68)		Female (n=53)		Total (n=121)	
	N	%	n	%	n	%
Grade of Class						
- Grade 4	21	17.36	11	9.09	32	26.45
- Grade 5	17	14.05	23	19.01	40	33.06
- Grade 6	30	24.79	19	15.70	49	40.50
Gender	68	56.20	53	43.8	121	100
Age						
- 10 years	15	12.40	10	8.26	25	20.66
- 11 years	11	9.09	16	13.22	27	22.31
- 12 years	35	28.93	22	18.18	57	47.11
- >12 years	7	5.79	5	4.13	12	9.92
Mean=11.471	SD=0.949	Min=10	Max=14			
Birth Order						
- 1 <sup>st</sup> Birth	17	14.05	15	12.40	32	26.45
- 2 <sup>nd</sup> Birth	17	14.05	19	15.70	36	29.75
- >2 <sup>nd</sup> Birth	34	28.10	19	15.70	53	43.80
Mean=2.777	SD= 1.8	Min=1	Max=9			

**Table 3** Frequency distribution of students' Socio Demographic Factors (cont.)

Socio Demographic Factors	Male (n=68)		Female (n=53)		Total (n=121)	
	N	%	n	%	n	%
Snacking Habit (per day)						
- 1 time	27	22.31	20	16.53	47	38.84
- 2 time	24	19.83	18	14.88	42	34.71
- $\geq 3$ time	17	14.05	15	12.40	32	26.45
Mean= 1.9669 SD=1.0078 Min=1 Max=5						
Money for snacking (rupiah)(per day)						
- Low (1,000 – 1,742)	4	3.31	4	3.31	8	6.61
- Moderate (1,743 - 3,785)	55	45.45	40	33.06	95	78.51
- High (3,786 – 6,000)	9	7.44	9	7.44	18	14.88
Mean=2764.5 SD=1020.8 Min=1000 Max=6000						

Majority of students (43.80%) was more than second child of their family, only 26.45 percent was the first child, and 29.75 percent was the second born child.

Some of respondent (38.84%) took snacking 1 time per day. 34.71 percent take snacking 2 times per day and 26.45 percent spent money for snacks more than two times per day. They mostly spent between 1,743- 3,785 rupiah daily for buying snack. The mean of money for buying snacking per day was 2,764.5, and standard deviation was 1,020.8, minimum and maximum were 1,000,- and 6.000,- rupiah respectively.

18 items pertaining to health and nutrition knowledge. The knowledge on health and nutrition was categorized into three groups, good (>80%), fair (60%-80%) and poor (>60%). The percentage of score was range from minimum 0 to maximum 18. Table 4 shows the level of knowledge. Good level of knowledge was found among 34.71% of respondent, fair level 42.98% and poor level 22.31%. The mean score was 71.95 with standard deviation of 17.64 with minimum score 22.22 and maximum score 100 among total of respondent.

**Table 4** Frequency distribution of students' Knowledge Level

Knowledge Level	Male (n=68)		Female (n=53)		Total (n=)	
	n	%	n	%	n	%
Knowledge about healthy and nutrition at children						
- Good (>80% of the total score)	20	16.53	22	18.18	42	34.71
- Fair (60%-80% of the total score)	28	23.14	24	19.80	52	42.98
- Poor (<60% of the total score)	20	16.53	7	5.79	27	22.31
Mean= 71.95 SD=17.64 Min=22.22 Max=100						

Frequency distributions of knowledge by question items showed that nearly 90% of respondent knew the meaning of nutritious food. Most of respondent (86.78%) knew that main nutrient in biscuit is carbohydrate. The low rate (14.88%) of correct answer was found in the statement that food contain vitamin resource. The details were provided in Table 5.

**Table 5** Frequency distribution of students' correct answer of knowledge about health and nutrition by item analysis.

Knowledge items	Correct	
	n=121	%
1. Reflect of healthy? (multiple answer)		
1. Has appropriate weight for age.	75	61.98
2. Gain weight every month.	66	54.55
3. Active and do sports.	96	79.34
4. Had good appetite.	98	80.99
5. Rarely ill.	98	80.99
2. Meaning of nutritious food? (multiple answer)		
1. Contain vitamins.	107	88.43
2. 4 healthy food 5 excellent.	107	88.43
3. Healthy and clean foods	99	81.82
4. Fruit and vegetable.	108	89.27
3. The main nutrient in rice. is carbohydrate	87	71.90
4. Food contain protein resource	87	71.90
5. Food contain vitamin resource	18	14.88
6. The main nutrient in oil is fat	95	78.51
7. Eating a wide variety of vegetables regularly	81	66.94
8. Fast food like fried chicken have high cholesterol	71	58.68
9. Main nutrient in biscuit is carbohydrate	105	86.78
10. Main nutrient in milk	89	73.55
11. Main nutrient in green vegetable	80	66.12

Frequency distribution of attitude by item showed in Table 6, 40.50% of respondent agree with the sentences that it is important for my good health to eat 3 meals a day without skipping. Particularly, trying to make conscious effort to try drinking milk gained the highest the strongly agree at 52.07%, while 23.97% strongly disagreed with the fast food like fried chicken is good to eat every day and 36.36% disagreed with this statement. And also 23.97% strongly disagreed with the eating healthy is just another fashion.

**Table 6** Frequency distribution of attitude towards nutrition by item analysis.  
n=121 (Total)

Attitude Statement	SA		A		U		D		SD	
	n	%	n	%	n	%	n	%	n	%
1. Fast food like fried chicken is good to eat every day	9	7.44	12	9.92	27	22.31	44	36.36	29	23.97
2. I usually consider nutrition when I choose foods	45	37.19	40	33.06	24	19.83	8	6.61	4	3.31
3. Important for my good health to enjoy eating variety of food.	47	38.84	29	23.97	28	23.14	15	12.40	2	1.65
4. I am willing to cut down on foods that are not good for me	53	43.80	30	24.79	11	9.09	15	12.40	12	9.92
5. I make conscious effort to try drinking milk.	63	52.07	36	29.75	11	9.09	9	7.44	2	1.65
6. It is important for my good health to eat 3 meals	44	36.36	49	40.50	20	16.53	5	4.13	3	2.48
7. I like homemade foods better than food in restaurants.	49	40.50	39	32.23	23	19.01	9	7.44	1	0.83
8. Eating healthy is just another fashion.	8	6.61	13	10.74	29	23.97	42	34.71	29	23.97
9. I do not need to make changes to my diet.	42	34.71	39	32.23	30	24.79	6	4.96	4	3.31
10. It is important to eat adequate amount of rice or alternative carbohydrate food as a staple food.	40	33.06	46	38.02	24	19.83	4	3.31	7	5.79

**Table 6** Frequency distribution of attitude towards nutrition by item analysis.  
n=121 (Total) (cont.)

Attitude Statement	SA		A		U		D		SD	
	n	%	n	%	n	%	n	%	n	%
1. I eat more when I am bored or unhappy	4	3.31	12	9.92	34	28.10	37	30.58	34	28.10
2. I think thin is beautiful	6	4.96	8	6.61	23	19.01	35	28.93	49	40.50
3. I like to reward myself with foods	11	9.09	15	12.40	22	18.18	29	23.97	44	36.36
4. I like trying new and unusual foods.	14	11.57	14	11.57	26	21.49	18	14.88	49	40.50
5. We can eat Instant noodle every day and can make healthy	18	14.88	21	17.36	14	11.57	22	18.18	46	38.02

Table 7 showed the level of attitude. Good level of attitude was found among 41.32% of respondent, Fair level and Poor level were 53.72% and 4.96% respectively. The mean score was 76.364 standard deviation of 9.096 the minimum score was 46.667 and maximum score was 90.667 among total of respondent.

**Table 7** Frequency distribution of students' Attitude Level

Attitude Level	Male (n=68)		Female (n=53)		Total (n=)	
	n	%	n	%	n	%
Attitude about health, nutrition, sanitation and hygiene						
- Good (>80% of the total score)	25	20.66	25	20.66	50	41.32
- Fair (60%-80% of the total score)	41	33.88	24	19.83	65	53.72
- Poor (<60% of the total score)	2	1.65	4	3.31	6	4.96
Mean= 76.364 SD=9.094 Min=46.667 Max=90.667						

#### 4.2 Description of Enabling factors

The descriptive statistics of enabling factors included Accommodation Type, Occupation parents / caretakers, Education parents/ caretakers, Number of Household member, Number of children in family were presented in Table 8.

**Table 8** Frequency distribution of enabling factors.

Enabling Factor	Male		Female		Total	
	(n=68)		(n=53)		(n=121)	
	n	%	n	%	n	%
Accommodation Type						
- Parents	50	41.32	48	39.67	98	80.99
- Relative/Family	0	0	2	1.65	2	1.65
- In orphanage	18	14.88	3	2.48	21	17.36
Take Care						
- Parents	50	41.32	48	39.67	98	80.99
- Relative/Family	0	0	2	1.65	2	1.65
- Staff of orphanage	18	14.88	3	2.48	21	17.36
Occupation Father (n=98)						
- Government Employee	10	10.20	10	10.20	20	20.41
- Private employee	20	20.41	15	15.31	35	35.71
- Labor. farmer	8	8.16	18	18.37	26	26.53
- Vendor	9	9.18	4	4.08	13	13.27
- Unemployed	3	3.06	1	1.02	4	4.08
Occupation Mother (n=98)						
- Government Employee	9	9.18	7	7.143	15	15.63
- Private employee	2	2.04	1	1.02	3	3.15
- Labor. farmer	1	1.02	5	5.10	6	6.25
- Vendor	2	2.04	1	1.02	3	3.12
- Unemployed or housewife	36	36.73	34	34.69	69	71.87
Education Father (n=98)						
- No Education/illiterate	1	1.02	2	2.04	3	3.06
- Elementary school	3	3.06	5	5.10	8	8.16
- Junior High School	10	10.20	6	6.12	16	16.33
- Senior High School	28	28.57	30	30.61	58	59.18
- Bachelor degree or Diploma	8	8.16	5	5.10	13	13.27
Education Mother (n=98)						
- No Education/illiterate	3	3.06	2	2.04	5	5.10
- Elementary school	3	3.06	1	1.02	4	4.08
- Junior High School	9	9.18	13	12.27	22	22.45
- Senior High School	32	32.65	24	24.49	56	57.14
- Bachelor degree or Diploma	3	3.06	8	8.16	11	11.22
Caretakers Occupation (n=23)						
- Private employee	12	52.17	5	21.74	17	73.91
- Labor. farmer	3	13.04	0	0	3	13.04
- Unemployed	3	13.04	0	0	3	13.04
Education Caretakers (n=23)						
- Elementary school	12	52.17	5	21.74	17	73.91
- Junior High School	3	13.04	0	0	3	13.04
- Bachelor degree or Diploma	3	13.04	0	0	3	13.04

**Table 8** Frequency distribution of enabling factors (cont.).

Enabling Factor	Male		Female		Total	
	(n=68)		(n=53)		(n=121)	
	n	%	n	%	n	%
Family Income (rupiah) (n=121)						
- Low (300,000 – 452,821)	6	4.96	0	0.00	6	4.95
- Moderate (452,822 – 2,282,178)	35	28.92	44	36.36	79	65.29
- High (2,282,179 – 5,000,000)	9	7.44	6	4.94	15	12.40
- Don't have	18	14.88	3	2.48	21	17.36
Mean=1,367,500 SD=914678 Min=300,000 Max=5,000,000						
Household member (n=121)						
- 2-3	4	3.31	2	1.65	6	4.96
- 4-7	39	32.23	45	37.19	84	69.42
- 8-11	7	5.78	3	2.48	10	8.26
- Don't have	18	5.78	3	2.48	21	17.35
Mean= 5.670 SD=1.758 Min=2 Max=11						
Have younger brother and sister						
- Yes	35	28.93	28	23.14	63	52.07
- No	33	27.27	25	20.66	58	47.93
Number of children in family below 10-14 years old (n=63)						
- 1 children	19	30.16	12	19.05	31	49.21
- 2 children	10	15.87	10	15.87	20	31.75
- 3 children	4	6.35	4	6.35	8	12.70
- >3 children	2	3.17	2	3.17	4	6.35

Regarding type of accommodation, most of respondent 80.99% lived with parents. Fewer respondents lived in orphanage (17.36%) and with extended family/ relative (1.65%).

The caretakers were mostly parents (80.99%), especially mothers. A few students had extended family or relative to be caretakers (1.65%), and staff of orphanage (17.36%). Educational level of the caretakers was relatively low, as more than half of them had only elementary school education (73.91%) and only 13.04% had education on level junior high school and also 13.04% had high level of education as bachelor degree or diploma. Majority the caretakers worked as a government employee (73.91%). Others worked as labor and farmer (13.04%) and unemployed (13.04%).(Table 8)

Concerning the parents occupations, from 98 students still had parents and live with their parents, majority of the father's and mother's occupation were private employee (35.71%) and unemployed or housewife (71.87%) respectively. Only 26.53% of their father were laborer or farmer, and 20.41% and 13.271% of their father worked as government employee and vendor respectively. Only 15.63% of mother were engaged in government employee, 6.25% work as laborer and farmer, and 3.15% were doing private employee.

Table 8 describes that majority of the respondents' parent's education were in the senior high school (father 59.18% and mother 57.14%), the lowest education was no education (father 3.06% and mother 5.10%) and higher education was bachelor degree or diploma (father 13.27% and mother 11.22%).

The mean of respondent's monthly family income was Rp.1,367,500 . most of them has middle income (65.29%). The rest has higher monthly income (12.40%) and low (4.95%). However there were about 17.36 percent don't know their family income.

Among the respondent having brother or sister (52.07% of all respondent), 6.35% of them have younger brother or sister more than 3 person. Only 49.21% and 31.75% had 1 younger and 2 younger respectively.

From the result in table 8, it showed that most of family (84%) has member 4 to 7 person, and a few of them 8 to 11 member (8.26%) and 2 to 3 member (4.96%) living together in household.

### 4.3 Description of Reinforcing factors

The details of frequency distribution of source of information toward healthy eating were provided in Table 9. 121 of respondent got health and nutrition information from school 100% followed by the television 58.68% and family member 47.93%. The lowest percentage sources of information came from mass media (4.13%), and leaflet/brochure (6.61%).

Regarding food supplementary supported in school in last 3 month only 52.07% student got biscuit from school.

**Table 9** Frequency distribution of Reinforcing factors

Reinforcing Factor	Male (n=68)		Female (n=53)		Total (n=121)	
	n	%	n	%	n	%
Source of Information toward healthy eating						
- In the school/Class.	68	56.20	53	43.80	121	100
- Mass media (news paper, magazine)	4	3.31	1	0.83	5	4.13
- Leaflet/brochure	5	4.13	3	2.48	8	6.61
- Television	35	28.93	36	29.75	71	58.68
- Family member	29	23.97	29	23.97	58	47.93
Food supplementary support in school						
- Yes	34	28.10	29	23.97	63	52.07
- No	34	28.10	24	19.83	58	47.95

### 4.4 Description of Nutritional Status

Nutritional status of students was determined by measuring weight for height ( $\text{kg}/\text{m}^2$ ). According to weight for height it will classification with Body Mass Index for children Percentile and it was categorize by Underweight ( $\leq 5$  Percentiles curve from growth chart), Healthy weight / Normal ( $>5$  to  $85$  Percentiles curve from growth chart), at risk overweight ( $>85$  to  $95$  Percentiles curve from growth chart), and Overweight ( $>95$  Percentiles curve from growth chart).

Regarding the classification of nutritional status, most of respondent (68.60%) had healthy weight. This applied to both male and female 38.44% and 29.75%, respectively. Some of them underweight (22.31%) and overweight (2.48%). (Table 10)

**Table 10** Frequency distribution of Nutritional Status between male and female

Nutritional Status	Male (n=68)		Female (n=53)		Total (n=121)	
	n	%	n	%	n	%
Underweight	14	11.57	13	10.47	27	22.31
Healthy weight	47	38.44	36	29.75	83	68.60
At risk overweight	5	4.13	3	2.48	8	6.61
Overweight	2	1.65	1	0.83	3	2.48
Mean=16.948	SD=2.891	Min=12.539	Max=28.363			

#### 4.5 Association of Nutritional Status and Independent Variable

To find out the relationship between dependent and independent variables, some variable such as Grade class, gender, age, birth order, snacking habit, money for snacking, knowledge, attitude, total younger brother and sister, educational parent, occupational parent, total household member, and family income were regrop in order to get enough frequency for statistical analysis. Chi-square was used to determine the association of Nutritional Status between predisposing factors, enabling factor and reinforcing factors of elementary school students. Fishers' exact test was applied if the result of Chi-square test showed more than 20% of cell with expected frequency less than 5.0. The test showed that there was significant relationship between independent variables and nutritional status if p-value is <0.05.

#### 4.5.1 Association of Nutritional Status and Predisposing Factors

The grade of class classified into two groups based on grade 4 and grade 5, and grade 6. Age was regrouping into two groups <12 years old (10 to 11 years old), and  $\geq 12$  years old (12 to 14 years old). Birth order regrouping into two groups based on family planning in Indonesia, that in family is better if have only 2 child; <3th birth order (1 to 2 birth order) and  $\geq 3$ th birth order. Money for snacking regrouping into two groups; <3,785 rupiah and  $\geq 3,785$  rupiah per day. Snacking habit regrouping into two groups; <3 time and  $\geq 3$  time per day. Knowledge and attitude level was regrouping into two group Fair and Poor knowledge (<80% total score) and Good knowledge ( $\geq 80\%$  total score).

In Table 11, the association between grade class, gender, age, birth order, snacking habit, knowledge, attitude and nutritional status level of students; the results indicated that there were not statistically significant relation between each of those factors and nutritional status level respectively ( $p > 0.005$ ).

However, the results also showed that male students has more overweight more than female students. The students having good knowledge and good attitude have a nutritional status problem less than the one having fair and poor knowledge and attitude.

**Table 11** Association of Nutritional Status and Predisposing Factors

Predisposing Factors	Nutritional Status			Total n (%)	$\chi^2$	P
	Under weight n (%)	Healthy weight n (%)	Over weight n (%)			
Grade of Class (n=121)						
- Grade 4 and 5	13(18.05)	51(70.83)	8(11.11)	72(100)	2.37	.305
- Grade 6	14(28.57)	52(65.31)	3(6.12)	49(100)		
Gender (n=121)						
- Male	14(20.59)	47(69.12)	7(10.29)	53(100)	0.46	.793
- Female	13(24.53)	36(67.92)	4(7.55)	68(100)		
Age						
• <12 years old	9(17.07)	38(73.07)	5(9.6)	52(100)	1.319	.517
- ≥12 years old	18(26.08)	45(65.22)	6(8.69)	69(100)		
Birth Order (n=121)						
- < 3th Birth	17(25.00)	45(66.76)	6(8.82)	68(100)	0.65	.724
- ≥ 3th Birth	10(18.87)	38(71.70)	5(9.43)	53(100)		
Snacking Habit (per day) (n=121)						
- <3 time	8 (25.00)	21(65.62)	3(2.91)	32(100)	0.20	.905
- ≥3 time	19 (21.35)	62(61.05)	8(0.90)	89(100)		
Knowledge Level (n=121)						
- Fair and Poor (<80% total score)	19 (24.05)	51(64.56)	9(11.39)	79(100)	2.17	.337
- Good (≥80% total score)	8 (19.04)	32(76.19)	2 (4.76)	42(100)		
Attitude Level (n=121)						
- Fair and Poor (<80% total score)	16 (22.53)	46(64.79)	9(12.68)	71 (100)	2.79	.247
- Good (≥80% total score)	11 (22.00)	37(74.00)	2(4.00)	50 (100)		

**Table 12** Association of Nutritional Status and Money for snack

Predisposing Factors	Nutritional Status			$\chi^2$	p
	Healthy weight n (%)	unhealthy weight n (%)	Total n (%)		
Money for snacking (per day)					
- < Rp. 3785,-	73(70.87)	30(29.13)	103(100)	1.669	.196
- $\geq$ Rp. 3785,-	10(55.56)	8(44.44)	18(100)		

#### 4.5.2 Association of Nutritional Status and Enabling Factors

Accommodation type regrouping into two groups live with parents and live with non parents. Take care was regrouping into two groups; take care by parents and non parents. Educational level of father and mother was regrouping into low education (illiterate , primary school and junior high school), middle and high education (senior high school, diploma or bachelor degree) Occupation of parents was classified; father occupation into government and non government. Mother occupation into worker and un worker or housewife. For family income regrouping into; high , moderate and low income. Total house hold member regrouping into; <8 member and  $\geq$ 8 member.

The results of study revealed in table 13. The Accommodation type was significantly association with nutritional status ( $p < 0.05$ ). And who taking care student was also significantly associated to nutritional status ( $p < 0.05$ ). Father occupation also significantly association with nutritional status ( $p < 0.05$ ). But Education mother and total household member nearly have association with nutritional status ( $p = 0.050$ ). Family income, having younger children, education father and caretakers, occupation mother were no found significant association ( $p > 0.05$ ).

**Table 13** Association of Nutritional Status and Enabling Factors

Enabling Factors	Nutritional Status				$\chi^2$	p
	Under weight	Healthy weight	Over weight	Total		
	n (%)	n (%)	n (%)	n (%)		
Accommodation Type						
- Live with Parents	27(27.55)	61(23.88)	10(10.20)	98(100)	10.07	<b>.007</b>
- Live with Non Parents	0(0.00)	22(95.65)	1(4.35)	23(100)		
Take Care						
- Parents	27(27.55)	61(23.88)	10(10.20)	98(100)	10.07	<b>.007</b>
- Non Parents	0(0.00)	22(95.65)	1(4.35)	23(100)		
Have younger						
- No have Younger	15(25.86)	38(65.52)	5(8.62)	58(100)	0.809	.667
- Have younger	12(19.05)	45(71.43)	6(9.52)	63(100)		
Father Occupation (n=98)						
- Government Employee	4(20.00)	10(50.00)	6(30.00)	20(100)	3.023	<b>.022</b>
- Non Government	6(7.96)	51(65.38)	21(26.92)	78(100)		
Mother Occupation (n=98)						
- Worker	8(28.57)	15(53.57)	5(17.86)	28(100)	2.739	.254
- Unworker (Housewife)	19(27.14)	46(65.71)	5(7.14)	70(100)		
Education Father (n=98)						
- Low Education	8 (29.63)	19 (70.37)	0(0)	27(100)	4.257	.119
- Middle and High Education	19 (26.76)	42 (59.15)	10(14.08)	71(100)		
Mother Education (n=98)						
- Low Education	11(35.48)	20(64.52)	0(0)	31(100)	5.700	<b>.050</b>
- Middle and High Education	16(23.48)	41(61.19)	10(23.88)	67(100)		

**Table 13** Association of Nutritional Status and Enabling Factors (cont.)

Enabling Factors	Nutritional Status			$\chi^2$	p
	Healthy weight	Unhealthy weight	Total		
	n (%)	n (%)	n (%)		
Family Income (n=100)					
- High	8(61.54)	5(38.46)	13(100)	*	1.00
- Moderate & Low	53(62.35)	32(37.65)	85(100)		
Household member (n=98)					
- <8 member	52(59.09)	36(40.90)	88(100)	3.650	<b>.050</b>
- ≥8 member	9(90.00)	1(10.00)	10(100)		
Money for snacking (per day)					
- < Rp. 3785,-	73(70.87)	30(29.12)	103(100)	1.669	.196
- ≥Rp. 3785,-	10(55.55)	8(44.44)	18(100)		

#### 4.5.3 Association of Nutritional Status and Reinforcing Factors

The results in table 14 revealed that there is no significant association between information source ( $p>0.05$ ). But food supplementary support from school was significantly association with nutritional status ( $p<0.05$ ).

**Table 14** Association of Nutritional Status and Reinforcing Factors

Reinforcing Factors	Nutritional Status			Total	$\chi^2$	p
	Under weight	Healthy weight	Over weight			
	n (%)	n (%)	n (%)			
Source of Information toward healthy eating						
Television (n=121)						
- Yes	19(26.76)	46(64.79)	6(8.45)	71(100)	1.963	.375
- No	8(16.00)	37(74.00)	5(10.00)	50(100)		
Family (n=121)						
- Yes	13(33.41)	40(69.97)	5(8.62)	63(100)	0.03	.985
- No	14(22.22)	43(68.25)	6(9.52)	58(100)		
Aid from school (n=121)						
- Yes	11(17.46)	42(66.67)	10(15.87)	63(100)	10.843	<b>.004</b>
- No	4(6.89)	30(51.73)	24(41.38)	58(100)		

**Table 14** Association of Nutritional Status and Reinforcing Factors (cont.)

Reinforcing Factors	Nutritional Status			$\chi^2$	p
	Healthy weight n (%)	unhealthy weight n (%)	Total n (%)		
Leaflet/brochure (n=121)					
- Yes	76(67.26)	37(32.74)	113(100)	*	.228
- No	7(87.5)	1(12.5)	8(100)		
Mass media (n=121)					
- Yes	80(68.96)	36(31.04)	116(100)	*	.672*
- No	3(60.00)	2(40.00)	5(100)		

(\*) Fisher exact

## CHAPTER 5

### DISCUSSION

#### 5.1 Nutritional Status of Children

The nutritional status in this study was measured by weight for height based on Body Mass Index WHO Standard Classification.

Regarding the classification of nutritional status two third respondents (68.60%) have healthy weight. 22.31% was underweight and 2.48% was overweight, and the results showed that male has more healthy weight than female.

In this study the prevalence of underweight was 22.31%. However, it found to be higher than WFP and Unicef survey at 2006, which reported that 21.2% student of primary school in 8 district in Nanggroe Aceh Darussalam was underweight, 27.2% stunting and 7.6% wasting consecutively (7).

#### 5.2 Characteristic and Associations of Predisposing Factors.

Many factors might relate with nutritional status. This study of factor contributing to the nutritional status of mother and young children in Guatemala that studied by Stachel 2005 describe that some factor related with nutritional including regional availability, economic constraints, nutritional knowledge, family food allocation, beliefs and attitudes about pregnancy and lactation, family size, child spacing, early childhood illness (64). Other factor then influence nutritional status are anemia and worm infection among children (65).

The discussion on these related factors to nutritional status of children elementary school age will be presented as follow.

**Gender.** The proportions of male and female respondents were 56.2% and 43.8% respectively. In this study, the proportion of male underweight (20.59%) lower than female underweight (24.53%). And the rate of healthy weight male (69.12%) higher than male healthy weight (67.92%). However the proportion overweight (10.29%) male higher than female (7.55%). This study did not find any significant relationship between gender and nutritional status of children ( $p>0.05$ ). The same study was done by Aghamolaei (2004) that showed no significant difference in nutritional status between male and female (67).

**Age:** The average age of respondent in this study was 12 years. The results of this study, age was not associated with nutritional status ( $p>0.05$ ). Canadian centre for child protection explain that in this age the children disposed acquires pride and enjoyment from doing something well like academics, sports, music, art, and many outside home activity with friends (66).

**Grade of Class.** The distribution of students in grade 6, 5, 4 were (40.50%) (33.06%), and (26.45%) respectively. The proportion of respondent in underweight grade 4 and 5 (18.05%) was lower than grade 6 (28.57%), and the proportion of respondent healthy weight in grade 4 and 5 higher (70.83%) than grade 6 (65.31%), and also for overweight grade 4 and 5 higher (11.11%) than grade 6 (6.12%). The result from chi-square test found no association between grade class and nutritional status ( $p>0.05$ ).

**Birth Order.** Majority of students (43.80%) was third born child and up in the family, only 26.45 % was first born child, and 29.75% was the second born child. The proportion underweight among children of <3<sup>th</sup> born child was greater than (25.00%) student of  $\geq 3^{\text{th}}$  born child (18.87%), healthy weight also  $\geq 3^{\text{th}}$  born child higher (71.70%) than student <3<sup>th</sup> born child (66.76). (Table 11). But the association between birth order and nutritional status there was no association ( $p>0.05$ ).

**Money for snacking (per day).** They mostly spent between 1,743- 3,785 rupiah daily for buying snack. The lowest was 1000 rupiah, which might not enough

if the student had to pay for the food, because the time of school was last until 13.00pm. and the highest was 6000 rupiah. The results of this study found no association between money for snacking and nutritional status ( $p>0.05$ ). This might be explained that 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 snacking. Because the students who spending money more than 3,785, rupiah has unhealthy weight higher (44.44%) than who spend less than 3,785,- rupiah (29.13%).

**Snacking Habit.** All students had snacking 38.84% onetime per day. 34.71% take snacking two times per day and 26.45% more than two times per day. This study found that the student who has snacking habit more than an equal 3 time per day has healthy weight (74.70%) higher than who has snacking habit less than 3 time per day. But did not find association between snacking habit and nutritional status ( $p>0.05$ ).

Study in Taheran describe that many factors such as breakfast eating habits and snack eating habits, in the school were also influence nutritional status. Stunting and the habit of eating breakfast were related to educational performance of students. Therefore implementation of such programs in the community, such as food intervention and nutritional education may be effective (69).

**Knowledge.** Knowledge toward nutrition showed no significant association with nutritional status among total number in this study ( $p>0.05$ ). this results can be support by Mii (2007), although majority of students had fair level of knowledge (42.98%), and high level of knowledge (34.71%), but did not use their knowledge to make healthy food choice, this showed from no association between knowledge and nutritional status because the nutritional.

**Attitude.** Good level of attitude was found among 41.32% of respondent, fair level 53.72%, and poor level 4.96%. Attitude level toward health and nutrition had no association with nutritional status ( $p>0.05$ ). however, to fulfill nutrition for daily needed of students that the important thing was before go to school the student

should take breakfast, because they will spend time  $\frac{1}{4}$  day in school (68). Children, who go to school without breakfast or have breakfast that is not nutritious enough, will not be able to meet their nutritional needs for growth (73).

### 5.3 Characteristic and Associations of Enabling Factors.

**Accommodation type.** Considering the student's accommodation types, most of the respondent (80.99%) lived with parents, 1.65% live with relative family and other was in orphanage (17.36%). The number was not enough to analyze by chi-square, so researcher regrouping of accommodation type becomes who living with parents and who living with no parents. There was strongly significant association between student living with parent and nutritional status ( $p < 0.05$ )

**Caretakers.** The caretakers were mostly parents (80.99%), especially mothers. Extended family or relative were also caretakers of few students (1.65%). Other was orphanage committee (17.36%).

The results of this study found significant association between the students live with parents was significantly association with nutritional status ( $p < 0.05$ ).

Study in Nepal report that the students who take care by parents was also significantly associated to nutritional status ( $p < 0.05$ ). Feeding practices that affect a child's nutritional status include adaptation of feeding to the child's abilities responsiveness of the caregiver to the child (perhaps offering additional or different foods); and selection of an appropriate feeding context. Psychosocial care is the provision of affection and attention to the child and responsiveness to the child's cues. It includes physical, visual, and verbal interactions (55).

Women's status makes by far the greatest contribution to the regional gap in children's nutritional status (42).

Previous studies indicated that family meals are associated with better overall dietary quality among children. Positive association was for example, parental presence at the evening meal adolescent higher of fruits, vegetable, and daily food (67). In contrast, negative association was if family member did not like healthy foods or did not have enough time to purchase and prepare healthy foods, the adolescent may not be available those food at home (68).

**Family income.** Respondent's monthly family income fluctuated from the lower allowance category (4.95 %) follow by middle monthly income category (65.29%) and the rest were in the higher monthly income category (12.40%). From total sample 17.36% don't know how much their family income because they live in orphanage and haven't parents. The sample's monthly family income had an average monthly income of 452,822, rupiah to 2,282,178 rupiah. The range of monthly income family was 300,000 rupiah to 5,000,000 rupiah. Family income was not significant with nutritional status ( $p>0.05$ ). Study in Pakistan by Shaikh AF (2007), also describe that no relationship between Family income and nutritional status children which living in rural area. However, Moradi (2003) in one study in Taheran explain that family income had a statistically significant association with knowledge and not with practice and attitude (70).

**Total Household member.** Among 3 group of household number were classified 4-7 members were highest 84.00%, 8-11 member were 10.00%, and 2-3 member 6.00% living together in household. In this study the family size was had association indirectly with Nutritional status ( $p=0.0540$ ).

**Having younger children.** The percentage of students having younger brother and sister was 52.07%. And 6.35% from them have younger brother and sister more than 3 brothers and sister. Only 49.21% and 31.75% had one younger and two younger respectively. In this study the have younger was not association with Nutritional status ( $p>0.05$ ).

**Occupation parents.** Concerning the parents occupations, from 98 students still had parents and live with their parents, majority of the father's and mother's occupation were private employee (35.71%) and unemployed or housewife (71.87%) respectively. Only 26.53% of their father were laborer or farmer, and 20.41% and 13.271% of their father worked as government employee and vendor respectively. Only 15.63% of mother were engaged in government employee, 6.25% work as laborer and farmer, and 3.15% were doing private employee.

In this study Father Occupation was had significant association with Nutritional status ( $p < 0.05$ ). But mother occupation no had association with nutritional status ( $p > 0.05$ ).

**Education parents.** Majority of the respondents parents education were in the senior high school (father 59.18% and mother 57.14%), the lowest education was no education (father 3.06% and mother 5.10%) and higher education was bachelor degree or diploma (father 13.27% and mother 11.22%). In this study mother education was had association with Nutritional status ( $p = 0.05$ ). but Father education no had association with nutritional status ( $p > 0.05$ ).

The lowest prevalence of healthy weight (32.79%) was found in children whose mother had low education school level. And highest rate of 67.21% in mother have middle and high education level was also found in that group.

In this study, the mother's education was have association with nutritional status indirectly ( $p = 0.05$ ). The positive and significant association between mother education and child nutritional status indicates the important role of education for women. This is support by the study conducted by the International Food policy Research Institute it had also found that half of the reason why malnutrition fell from 40% to 23% in East Asia over period of 1070 – 1995 was attributable to improvement in women education (71). And Moradi and Shahrebabak (2003) reported that education of mothers concerning nutritional requirements of children make them possible to benefit a proper nutritional program (72).

This study of Moradi and Shahrebabak in Taheran (2003) indicated that 40/2%, 73/6% and 26/9% of mothers had respectively optimum knowledge, attitude and practice. A statistically significant association was found between mother education and maternal nutritional knowledge, attitude and practice. And family income had a statistically significant association with knowledge and not with practice and attitude. There was no association between mother age and knowledge, attitude, practice. And was found a significant positive association between knowledge, attitude, practice. Conclusion their study that Education of mothers concerning nutritional requirements of children make them possible to benefit a proper nutritional program (72).

#### 5.4 Characteristic and Associations of Reinforcing Factor

**Information.** Concerning about the information sources, 121 of respondent got health and nutrition information and health education from school 100% followed by the television 58.68% and family member 47.93%. The lowest percentage sources of information named by respondent came from mass media like news paper, magazine, and etc 4.13%. The results of present study revealed that all sources information did not had association with nutritional status ( $p>0.05$ ).

Concerning about television, 58.68% among student got information about nutrition information from advertisement in television, however, the result was not significant associated with nutritional status level ( $p>0.05$ ). This could be explained that television is a 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 advertisements 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 (74). 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 (75).

Fiona and friends do the research about Food Choice, Nutrition Education and Parental Influence on British and Korean Primary School Children explain that Effective nutrition education should help children to choose a healthy diet through the establishment of positive dietary practices and habits. Children identified parents as the main source of nutritional information. Therefore, parents as well as children need to learn about nutrition in order to give appropriate information or advice to improve the diets of their children. Children preferred exciting, fun, positive and a practical approach to learning about nutrition, such as computer packages and cookery classes. Parents wanted schools to give their children more information about nutrition. This research has shown that nutrition education in schools should be concerned not only to provide nutritional knowledge but also to encourage children to choose healthy food by redesigning nutrition education and school meals (76).

**Aid from school.** Regarding food supplementary support in school in last 3 month only 52.07% student got like biscuit from school. The results of present study revealed that Aid from school have significant association with nutritional status ( $p < 0.05$ ). Result from one study on school feeding program in Durban South Africa showed that supplementation of biscuits fortified with 50% Recommended Dietary Allowance (RDA) of iron, iodine and  $\beta$ -carotene resulted in a significant improvement in micronutrient status and also appeared to have a favorable effect on the antropometric status, morbidity and cognitive function of the rural school children aged 6-11 years. The children who received fortified biscuits also had less class absent because of respiratory and diarrhea-related illnesses (8).

## CHAPTER 6

### CONCLUSION AND RECOMMENDATION

#### 6.1 Conclusion

This study was conducted to determine nutritional status and related factor among elementary school children in Banda Aceh Municipality Nanggroe Aceh Darussalam Province, Indonesia, where a cross sectional study was conducted in this research. The main purposes of research were to identify nutritional status and related factor among elementary school. The data collection was achieved by interviewed of student.

It found that among the student in elementary school. The problem of underweight 22.31%. This applies to both male and female 11.57% and 10.47% respectively. and overweight (2.48%). This problem should not be overlooked and counter measure an expected to be developed.

The variable of in this study were predisposing factors (Socio demographic factors included Grade of Class, Gender, Age, Birth Order, Money spending for snacking, Snacking Habit , Knowledge about health and nutrition, attitude toward nutritional), Enabling factors (Accommodation Type, Occupation parents / caretakers, Education parents / caretakers, family income, Number of Household member, Number of children in family), and Reinforcing factors (Health Information and Sources, Food supplementary support) among elementary school children.

##### 6.1.1 Association between Nutritional Status and Independent variable

Concerning about association between nutritional status and independent variable. There was find some variable have significant association with nutritional status. The significant association with nutritional status was found in accommodation

type ( $p=0.007$ ), who take care the student ( $p=0.007$ ), father occupation ( $p=0.022$ ), mother education ( $p=0.05$ ), total household member ( $p=0.05$ ), and supplementary support from school also have association with nutritional status ( $p=0.042$ ) respectively

## 6.2 Recommendation

### 6.2.1 Recommendation for program implication

1. To avoid students snacking in the school time, it's better to let them bring the meal from home.
2. Periodical monitoring and evaluation of nutritional status of the students should focus on underweight students.
3. Supplementary support from school is still needed, to assist daily intake of students still underweight especially.
4. School feeding programs should combine learning and teaching activities, because it is the need of the community members. Therefore, the advice and continuing support of experts in the field of nutrition, health promotion and agriculture is particularly important for the sustainability to support underweight problem.
5. Health and nutrition education should be done by using teaching materials such promote by television with interesting educational contents, mass media, leaflet and other descriptive pictures that could help the students to easily understand the contents. It is hoped these activities could lead to a good health and nutrition condition of the children.

### 6.2.2 Recommendation for further research

To determine the other causes, a cohort study among overweight and underweight should be conduct by using skin fold anthropometry are suggested.

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## APPENDIX-A QUESTIONNAIRES

### NUTRITIONAL STATUS AND RELATED FACTOR AMONG ELEMENTARY SCHOOL CHILDREN IN BANDA ACEH MUNICIPALITY NANGGROE ACEH DARUSSALAM PROVINCE, INDONESIA

Date Interview : .....  
 Number of Sample : .....  
 Name Sample : .....  
 Grade of School : 4 / 5 / 6

Please inform the student that this questionnaire is for research purpose and all their answers will be kept completely confidential and not exposed to other purpose.

Please fill in the blank or check (x) in the appropriate box to answers the question:

#### **Part -1 Predisposing Factors**

##### **Socio-Demographic factors**

1. Sex : Male / Female
- Weight : ..... Kg
- Height : ..... Cm
2. Date of Birthday : ..... (dd/mm/yy)
3. Birth Order : 1/2/3/4

##### **Money spending for snack buying each day**

4. How much money do you usually spend for snacking every day (in average) from all sources (mother/father/sister/other family? .....(Rupiah)

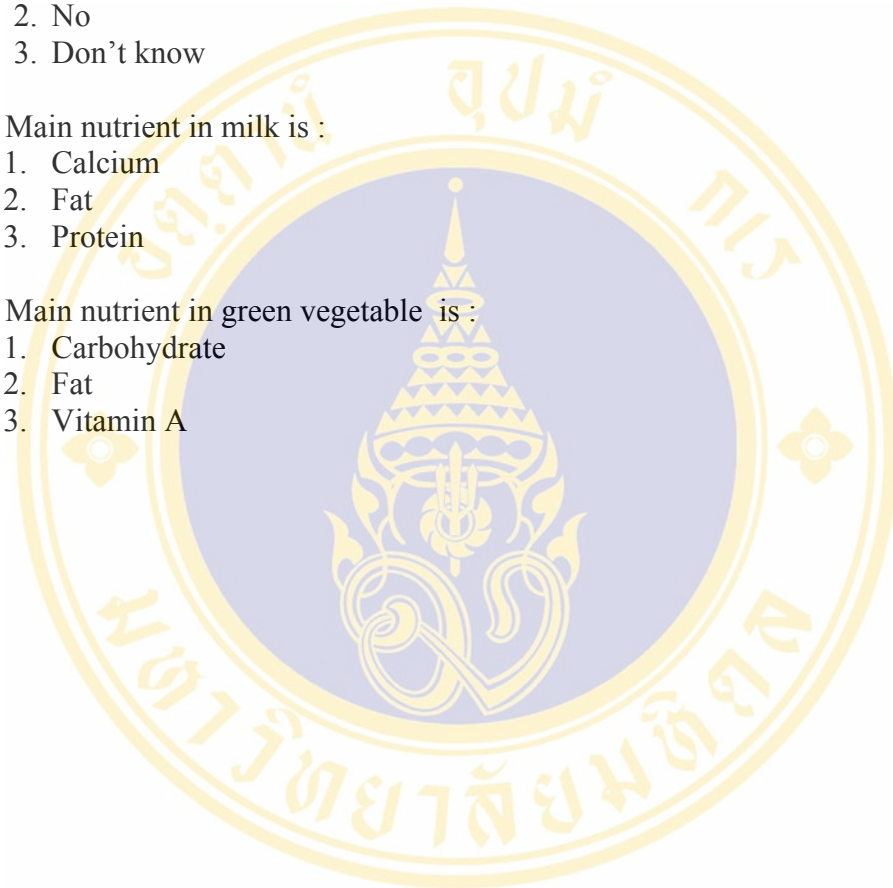
##### **Snacking Habit**

5. How many times do you usually have snackings per day?.....(time/day)

**Knowledge toward nutritional**

1. Do you think that these following signs reflect that you are healthy?(multiple Answer)
  1. Has appropriate weight for age.  Yes  No  Don't Know
  2. Gain weight every month.  Yes  No  Don't Know
  3. Active and do sports.  Yes  No  Don't Know
  4. Had good appetite.  Yes  No  Don't Know
  5. Rarely ill.  Yes  No  Don't Know
  6. Others (specify.....)
  
2. What does nutritious food mean? (Multiple Answer)
  1. Contain vitamins.  Yes  No  Don't Know
  2. 4 healthy 5 excellent.  Yes  No  Don't Know
  3. Healthy and clean foods  Yes  No  Don't Know
  4. Fruit and vegetable.  Yes  No  Don't Know
  5. Others (specify.....)
  
3. The main nutrient in rice, noodle, potatoes is carbohydrate
  1. Yes
  2. No
  3. Don't know
  
4. The main protein resources is :
  1. Fish
  2. Meat/beef
  3. Egg
  4. All above
  
5. The main vitamin resources are
  1. Fruit and vegetable
  2. Rice
  3. Oil
  4. All above
  
6. The main nutrient in oil is fat
  1. Yes
  2. No
  3. Don't know
  
7. Eating a wide variety of vegetables regularly basis is one way to reduce the risk of obesity.
  1. Yes
  2. No
  3. Don't know

8. Fast food like fried chicken have high cholesterol
  1. Yes
  2. No
  3. Don't know
  
9. Main nutrient in biscuit is carbohydrate :
  1. Yes
  2. No
  3. Don't know
  
10. Main nutrient in milk is :
  1. Calcium
  2. Fat
  3. Protein
  
11. Main nutrient in green vegetable is :
  1. Carbohydrate
  2. Fat
  3. Vitamin A



**Attitude toward nutritional**

Please check (✓) in the appropriate box to mark the correct answer of the question:

<b>SA</b>	= Strongly agree
<b>A</b>	= Agree
<b>UN</b>	= Undecided
<b>D</b>	= Disagree
<b>SD</b>	= Strongly disagree

Sl. No	Statement	SA	A	UN	D	SD
1.	Fast food like fried chicken is good to eat every day					
2.	I usually consider nutrition when I choose foods					
3.	Important for my good health to enjoy eating variety of food.					
4.	I am willing to cut down on foods that are not good for me					
5.	I make conscious effort to try drinking milk.					
6.	It is important for my good health to eat 3 meals a day without skipping.					
7.	I like homemade foods better than food in restaurants.					
8.	Eating healthy is just another fashion.					
9.	I do not need to make changes to my diet, as it is healthy enough.					
10.	It is important to eat adequate amount of rice or alternative carbohydrate food as a staple food.					
11.	I eat more when I am bored, frustrated, unhappy or angry.					
12.	I think thin is beautiful					
13.	I like to reward myself with foods					
14.	I like trying new and unusual foods.					
15.	We can eat Instant noodle every day and can make healthy					

## Part 2. Enabling Factors

1. Where is your living now (Accommodation Type) ? (in last 3 month)?
  1. Father and Mother
  2. Your relative (Specify.....)
  3. In orphanage
  4. Other (Specify.....)
  
1. Who is taking care of you?
  1. Parents (Mother and Father)
  2. extended family (grandmother, grandfather, uncle, and ant). (Skip to Q no 7)
  3. Orphanage committee (Skip to Q no 7)
  4. Others (specify.....)
  
2. What is your Father occupation?
  1. Government employee
  2. Private/company employee,
  3. Labor, farmer
  4. Vendor
  5. Unemployed
  6. Others (Please specify .....
  
3. What is your Mother occupation?
  1. Government employee
  2. Private/company employee,
  3. Labor, farmer
  4. Vendor
  5. Unemployed
  6. Others (Please specify .....
  
4. What is your Father's educational level?
  1. No education (illiterate)
  2. Elementary school
  3. Junior school
  4. Senior High school
  5. Bachelor degree or Diploma.
  6. Others
  
5. What is your Mother's educational level?
  - 1, No education (illiterate)
  2. Elementary school
  3. Junior school
  4. Senior High school
  5. Bachelor degree or Diploma.
  6. Others

6. What is your Caretakers occupation?
  1. Government employee
  2. Private/company employee,
  3. Labor, farmer
  4. Vendor
  5. Unemployed
  6. Others (Please specify .....
  
8. What is your Caretaker's educational level? (Skip to Question no 11)
  1. No education (illiterate)
  2. Elementary school
  3. Junior school
  4. Senior High school
  5. Bachelor degree or Diploma.
  6. Others
  
9. How much your parents average income? .....
  
10. How many members in your family? .....
  
11. Do you have younger brother/sister below 10-14 yrs ?
  1. Yes (specify).....
    - 10.1.1. How many Young brother?.....
    - 10.1.2. How many young sister?.....
  2. No

**Part 3. Reinforcing factors** (Health Information and Sources, Food supplementary support)

7. Have you ever received lecture and information about health, hygiene and nutrition on following topics for the last one month (multiple answer).
  - a. In the school/Class.
  - b. Mass media (news paper, magazine)
  - c. leaflet
  - d. Television
  - e. Family member
  - f. Others (specify.....)
  
8. Did you receive some aid like biscuit, milk, and noodle in last 3 month from your school?
  - a. Yes, (specify how many time).....
  - b. No

Please say “thank you” to interviewee for their kind cooperation

## APPENDIX-A

## QUESTIONNAIRES

NUTRITIONAL STATUS AND RELATED FACTOR AMONG ELEMENTARY SCHOOL CHILDREN IN BANDA ACEH MUNICIPALITY NANGGROE ACEH DARUSSALAM PROVINCE, INDONESIA

Nomor responden : .....(Kosongkan)  
 Tanggal Pengisian : .....  
 Nama responden : .....  
 Kelas : 4 / 5 / 6

Kuesioner ini hanya untuk keperluan penelitian, dan semua jawaban di jamin kerahasiaanya dan tidak akan di gunakan untuk keperluan lainnya

## Bagian 1. Faktor Predisposing

## Faktor Sosio Demografi

5. Jenis Kelamin : 1. Laki-laki 2. Perempuan  
 Berat Badan : ..... Kg  
 Tinggi Badan : ..... Cm  
 6. Tanggal Lahir : ..... (tgl/bln/thn)  
 7. Anak Ke : 1/2/3/4

## - Jumlah Uang Saku perhari

8. Berapakah Uang Jajan/uang saku yang anda gunakan setiap hari (Rata-rata) yang kamu gunakan untuk Jajan, baik yang diberikan ibu, Bapak, kakak atau keluarga lainnya? Rp.....

## - Kebiasaan Jajan

12. Berapa kali dalam sehari kamu mengkonsumsi makanan Jajanan, baik membeli di warung atau tempat lainnya? .....(Kali/hari)

## Bagian 2. Pengetahuan tentang Gizi

**Beri tanda (X) untuk Jawaban yang dianggap benar dan sesuai dengan anda.**

13. Apakah menurut kamu bahwa pernyataan berikut berhubungan dengan bahwa dirimu sehat? (Jawab semua pertanyaan)
1. Memiliki berat badan yang sesuai menurut umur  Ya  Tidak  Tidak Tau
  2. Naik berat badan setiap bulan  Ya  Tidak  Tidak Tau
  3. Aktif dan melakukan olah raga  Ya  Tidak  Tidak Tau
  4. Memiliki selera makan yang baik  Ya  Tidak  Tidak Tau
  5. Jarang Sakit  Ya  Tidak  Tidak Tau
  6. Lainnya (sebutkan .....)
14. Apa yang kamu ketahui tentang makanan bergizi? (Jawab semua pertanyaan)
1. Mengandung vitamin  Ya  Tidak  Tidak Tau
  2. 4 Sehat 5 sempurna.  Ya  Tidak  Tidak Tau
  3. Menyehatkan dan bersih  Ya  Tidak  Tidak Tau
  4. Buah dan Sayur.  Ya  Tidak  Tidak Tau
  5. Lainnya (sebutkan.....)
15. Kandungan gizi yang paling utama yang terdapat dalam beras, mi, dan kentang adalah karbohidrat :
4. Ya
  5. Tidak
  6. Tidak Tau
16. Kandungan protein terdapat pada makanan berikut, jawablah manakah jawaban yang benar:
5. Ikan
  6. Daging
  7. Telur
  8. Semua yang disebut diatas
17. Kandungan protein banyak terdapat pada :
1. Sayur dan buah
  2. Beras
  3. Minyak
  4. Semua yang tersebut diatas
18. Kandungan gizi utama pada minyak goreng adalah Lemak :
1. Ya
  2. Tidak
  3. Tidak Tau

19. Mengonsumsi berbagai macam sayur-sayuran setiap hari adalah salah satu cara untuk mencegah resiko obesitas atau kegemukan.
  1. Ya
  2. Tidak
  3. Tidak Tau
  
20. Makanan cepat saji seperti Ayam goreng mengandung tinggi kolesterol/lemak yang berbahaya
  1. Ya
  2. Tidak
  3. Tidak Tau
  
21. Kandungan gizi yang utama dalam biscuit/roti adalah karbohidrat :
  1. Ya
  2. Tidak
  3. Tidak Tau
  
22. Kandungan gizi yang utama dalam susu adalah :
  1. Calcium
  2. Lemak
  3. Protein
  4. Lainnya (sebutkan.....)
  
23. Kandungan gizi yang utama dalam sayuran hijau adalah :
  1. Karbohidrat
  2. Lemak
  3. Vitamin A
  4. Lainnya (Sebutkan.....)

### Bagian 3. Sikap yang berhubungan gizi

Berilah tanda (V) pada kolom yang sesuai dengan dirimu berdasarkan pernyataan berikut :

<b>SS</b>	= Sangat Setuju
<b>S</b>	= Setuju
<b>R</b>	= Ragu-ragu
<b>TS</b>	= Tidak Setuju
<b>TST</b>	= Sangat tidak setuju

Sl. No	Pernyataan	SS	S	R	TS	STS
1.	Makanan cepat saji yang tinggi lemak jahat seperti Ayam goreng bagus apabila dikonsumsi setiap hari					
2.	Saya selalu memperhatikan kandungan gizi dalam makanan apabila saya akan memakan sesuatu makanan					
3.	Sangat penting bagi kesehatan tubuh saya untuk mengkonsumsi berbagai jenis makanan.					
4.	Saya bersedia menghindari makanan apabila makanan tersebut tidak bagus untuk tubuh saya					
5.	Saya selalu berusaha untuk minum susu.					
6.	Sangat penting untuk kesehatan saya untuk makan nasi 3 kali sehari tanpa ada yang terlupa					
7.	Saya lebih menyukai makanan yang dimasak ibu di bandingkan makanan yang di beli di warung nasi					
8.	Makan makan yang sehat adalah hanya untuk lain gaya, bukan kebutuhan tubuh					
9.	Saya tidak perlu melakukan perubahan dalam pola makan saya, sepertinya apa yang saya makan saat ini sudah cukup sehat dan sesuai dengan empat sehat lima sempurna					
10.	Sangat penting untuk mengkonsumsi nasi atau makanan yang mengandung karbohidrat dengan jumlah yang cukup setiap hari					
11.	Saya lebih banyak makan ketika saya bosan, frustrasi, tidak bahagia dan ketika saya marah.					

12.	Menurut Saya bahwa kurus dan kerempeng itu cantik dan indah,makanya saya tidak perlu makan					
13.	Saya suka menghukum dan mengganjar diri saya dengan makanan					
14.	Saya suka mencoba makanan baru dan makanan yang aneh yang belum pernah saya makan					
15.	Kita dapat mengkonsumsi mie instant setiap hari karena dapat membuat badan lebih sehat					

#### Bagian 4. Faktor Enabling

- Type Accommodation
  1. Dimanakah kamu tinggal sekarang? (sejak 3 bulan terakhir)?
    5. Bersama Orang tua kandung
    6. Keluarga atau Famili (sebutkan siapa.....)
    7. Di Panti Asuhan/ Asrama penampungan
    8. Lainnya (Sebutkan,.....)
  9. Siapakah yang menjagamu/yang menjadi tanggung jawab atas dirimu saat ini?
    1. Orang tua (Ibu dan Ayah)
    2. Sanak Keluarga (Nenek, Kakek, Paman, bibi, dll). (Langsung ke pertanyaan no 7)
    3. Pengurus Asrama/Panti ( Langsung ke pertanyaan no 7)
    4. Lainnya (sebutkan.....)
  10. Apakah pekerjaan Ayahmu?
    1. Pegawai negeri
    2. Swasta/perusahaan pribadi,
    3. Tukang, Petani
    4. Penjaja/Jualan
    5. Tidak bekerja
    6. Lainnya (sebutkan.....)
  11. Apakah pekerjaan Ibumu?
    1. Pegawai negeri
    2. Swasta/perusahaan pribadi,
    3. Tukang, Petani
    4. Penjaja/Jualan
    5. Tidak bekerja /Ibu rumah tangga
    6. Lainnya (sebutkan.....)

12. Apakah pendidikan terakhir ayah mu?
  1. Tidak sekolah/ tidak tamat SD
  2. Sekolah Dasar (MIN/SD)
  3. SMP/ MTsN
  4. SMA/MAN
  5. Sarjana atau Diploma.
  6. Lainnya (sebutkan.....)
13. Apakah pendidikan terakhir Ibu mu?
  1. Tidak sekolah/ tidak tamat SD
  2. Sekolah Dasar (MIN/SD)
  3. SMP/ MTsN
  4. SMA/MAN
  5. Sarjana atau Diploma.
  6. Lainnya (sebutkan.....)
14. Apakah pekerjaan orang yang menjagamu saat ini?
  1. Pegawai negeri
  2. Swasta/perusahaan pribadi,
  3. Tukang, Petani
  4. Penjaja/Jualan
  5. Tidak bekerja
  6. Lainnya (sebutkan.....)
15. Apakah pendidikan terakhir yang menjagamu/wali?
  1. Tidak sekolah/ tidak tamat SD
  2. Sekolah Dasar (MIN/SD)
  3. SMP/ MTsN
  4. SMA/MAN
  5. Sarjana atau Diploma.
  6. Lainnya (sebutkan.....)
16. Kamu tau tidak?berapa kira-kira pendapatan orang tua kamu/gaji ibu dan bapak perbulan?Rp.....
17. Berapakah Jumlah seluruh anggota keluarga yang tinggal di rumahmu?  
.....
18. Apakah kamu memiliki Adik (kira-kira berumur 10-12 tahun) ?
  1. Ya (sebutkan berapa orang).....
    - 10.1.1. Berapa orang Adik laki-laki?.....
    - 10.1.2. Berapa orang adik perempuan?.....
  2. Tidak

**Bagian 5. Faktor Reinforcing** (Sumber Informasi Kesehatan dan Gizi, Bantuan Makanan Tambahan)

19. Apakah selama 3 bulan terakhir ini kamu menerima pelajaran dan Informasi tentang kesehatan, hygiene, kebersihan diri, dan gizi (dapat di jawab lebih dari satu jawaban).
- g. Di sekolah /Kelas/guru.
  - h. Mass media (surat kabar, majalah)
  - i. Brosur/leaflet
  - j. Televisi
  - k. Anggota Keluarga
  - l. Lainnya (sebutkan.....)
20. Apakah kamu menerima bantuan seperti biscuit/roti, susu, mie instan selama 3 bulan terakhir ini dari sekolah?
- c. Ya, (sebutan berapa kali dalam seminggu?.).....
  - d. Tidak

Terima Kasih atas Kebaikannya untuk mengisi Kuesioner ini

## BIOGRAPHY



<b>NAME</b>	Badrialaily
<b>DATE OF BIRTH</b>	March 13 <sup>th</sup> , 1977
<b>PLACE OF BIRTH</b>	Lhokseumawe, Aceh, Indonesia
<b>INSTITUTION ATTENDED</b>	Bogor Agricultural Institute, Indonesia Nutrition Community and Family Resources Bachelor of Nutrition Community 2001 - 2004 Mahidol University, Thailand ASEAN Institute of Health Development Master of Primary Health Care Management 2007-2008.
<b>FELLOWSHIP</b>	Asian Development Bank - Decentralization Health Services (ADB-DHS1 Loan Aceh)
<b>PRESENT POSITION</b>	Nutritionist in Bireuen District Health Officer, Aceh, Indonesia