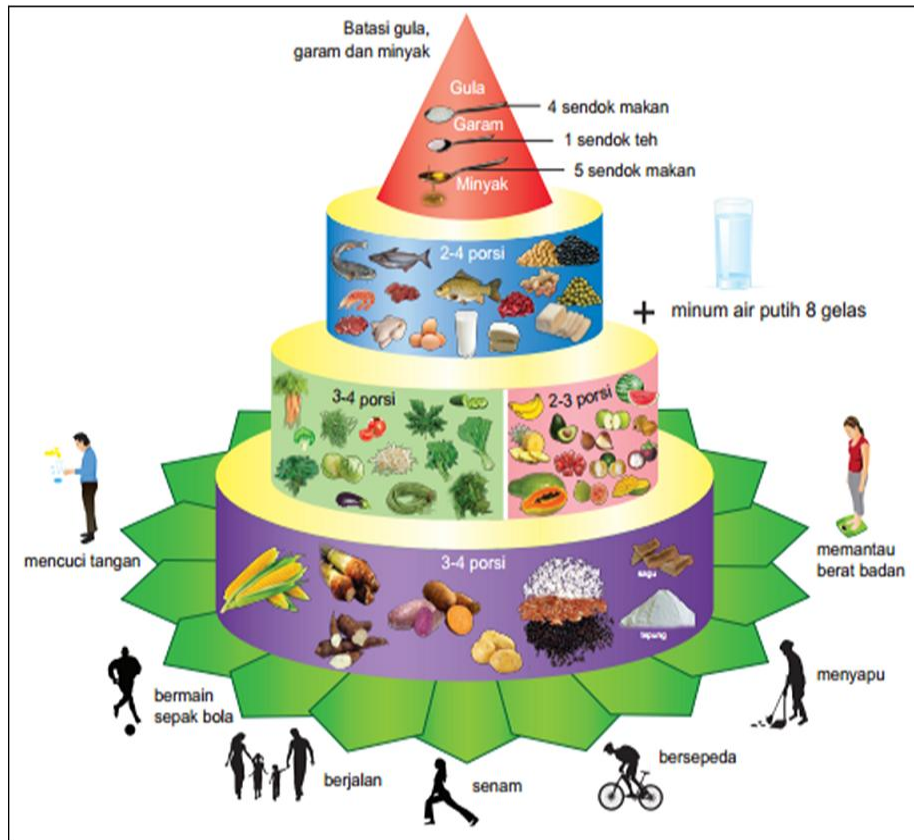


RESEARCH REPORT IN307

STUDY OF FOOD HABITS AND KNOWLEDGE-ATTITUDE-PRACTICE ON INDONESIAN DIETARY GUIDELINES AND ITS IMPACT ON NUTRITIONAL STATUS OF SCHOOLCHILDREN IN CIANJUR, INDONESIA



Guntari Prasetya, SGz, MSc
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Department of Community Nutrition
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Guntari Prasetya, SGz, MSc
Prof. Dr. Ir. Ali Khomsan, MS



Department of Community Nutrition
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Bogor Agricultural University
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SUMMARY

Indonesia currently has fairly complex nutritional problems. Undernutrition and overnutrition known as double-burden of malnutrition problems remain unfinished and become emerging. The emergence of undernutrition and overnutrition are mainly caused by nutritionally imbalanced dietary patterns (food habits). The nutrition knowledge, attitude, and practices (KAP) and balanced diet play an important role to address these problems. The Ministry of Health of the Republic of Indonesia (2014) has developed new Indonesian Dietary Guidelines (known as *Pedoman Gizi Seimbang/PGS* in Indonesia) as a recommendation for a balanced diet and healthy lifestyle in all age groups. Indonesian Dietary Guidelines consist of 1) eat a variety of foods, 2) consume vegetables and fruits, 3) consume high-protein foods, 4) consume a variety of staple foods, 5) limitation of sweet, salty, and fatty foods, 6) breakfast regularly, 7) drink enough water, 8) read food label, 9) wash hands with soap, and 10) regular physical activity. Indonesian Dietary Guidelines are essential to be introduced and implemented to schoolchildren; hence, schoolchildren are expected to have optimal nutritional status.

The study aimed to determine the relationship between food habits, KAP of Indonesian Dietary Guidelines, and nutritional status of schoolchildren. The specific objectives of this study were as follows: (1) to assess the exposure of Indonesian Dietary Guidelines to schoolchildren; (2) to analyze the KAP of schoolchildren and mothers on Indonesian Dietary Guidelines; (3) to assess the relationship between schoolchildren's KAP and mothers' KAP on Indonesian Dietary Guidelines; (4) to assess the relationship between breakfast habits, consumption frequency (protein-source foods, vegetables, fruits, and snacks), and nutritional status of schoolchildren; and (5) to assess the relationship between KAP of schoolchildren and mothers on Indonesian Dietary Guidelines, children's physical activity, household socio-economic status, and the nutritional status of schoolchildren.

The study was conducted with a cross-sectional design. The total samples were 210 schoolchildren (≥ 70 schoolchildren at 5th-grade elementary school, ≥ 70 schoolchildren at 8th-grade junior high school, and ≥ 70 schoolchildren at 11th-grade senior high school). The primary and secondary data were collected in this study. The primary data collected from the respondents (schoolchildren and mothers) were as follows: 1) schoolchildren's characteristics and household socio-economic status, 2) nutritional status of schoolchildren, 3) physical activity using 2x24-h activity recall (sport activities, sitting time, and physical activity levels), 4) breakfast habits using 1x24-h breakfast recall (quantity and quality) and consumption frequency of protein-source foods, vegetable, and fruits, and snacking habits (semi-quantitative food frequency questionnaire/SQ-FFQ) of schoolchildren, and 5) KAP of schoolchildren and mothers on Indonesian Dietary Guidelines.

Secondary data were collected from the school, i.e., school profile, schoolchildren's exposure to Indonesian Dietary Guidelines (books/learning materials/information related to

knowledge about food and nutrition). Besides that, focus group discussion (FGD) regarding the strategy and implementation of Indonesian Dietary Guidelines was conducted and attended by school representatives (teachers and school committees) and staffs of related institutions (Education Office and Health Office of Cianjur District). The total number of FGD participants was 15 people in each school. The study started from January to December 2018 that included a location survey, research permits, data collection, data processing, data analysis, report writing, and seminars.

The data analyses included: (1) estimation of basic statistics (mean and standard deviation) for all quantitative variables and (2) estimation of proportion for all categorical variables. The data were analyzed using SPSS. The data on food consumption and habits were analyzed for frequency distribution, size distribution, and tabulation of the types and the amount of food consumed in a daily/weekly basis. Descriptive statistics were used to analyze the respondents' socio-economic characteristics, physical activity, and nutritional status (anthropometry). The multi-regression analysis was performed to analyze the factor (KAP of schoolchildren and mothers on Indonesian Dietary Guidelines) affecting nutritional status. Besides that, the association between schoolchildren's KAP and mothers' KAP was presented by using Pearson's/Spearman's correlations. The analyses of qualitative data (school profiles and information related to the strategy and implementation of Indonesian Dietary Guidelines) were in the form of images and recordings. Frequency and mean were calculated for continuous variables. The findings were then presented in the form of tables, charts, and graphs.

The results of this research were as follows:

- A total of 60%-75% of schoolchildren had normal nutritional status, and the number of thin schoolchildren was only 4-7%. The number of overweight/obese elementary schoolchildren (33%) was higher than the ones in junior high school (20%) and senior high school (15%).
- Regarding the understanding of the four principles of balanced nutrition, 91.7% of elementary schoolchildren correctly answered that the first principle of balanced nutrition was to eat a variety of foods. The proportion of the elementary schoolchildren was higher ($p < 0.05$) than the junior high schoolchildren (74.3%) and senior high schoolchildren (78.6%). The second principle of the Indonesian Dietary Guidelines was getting used to clean-living habits. The proportion of elementary schoolchildren who correctly answered the question (88.9%) was relatively similar with and not significantly different ($p > 0.05$) from the proportion of junior high schoolchildren (85.7%) and the proportion of senior high schoolchildren (80.0%). Regarding the third and fourth principles (performing physical activity, and maintaining and monitoring body weight within normal cut-off points), there were no differences in proportion between the schoolchildren in elementary school, junior high school, and senior high school. Overall, it can be interpreted that the

schoolchildren have a good understanding of the four principles of balanced nutrition inherent to the Indonesian Dietary Guidelines.

- The proportion of elementary schoolchildren that had seen the picture of “Balanced Nutrition *Tumpeng* (Pyramid)” was only 30.6%. The proportion was significantly smaller ($p < 0.01$) than junior high schoolchildren (75.7%) and senior high schoolchildren (65.7%). Most schoolchildren (70.0%) in the elementary school, junior high school, and senior high school knew that the picture was the Balanced Nutrition *Tumpeng*.
- The proportion of elementary schoolchildren that had seen My Plate picture was only 41.7% while the proportion of junior and senior high schoolchildren that had seen the picture were 41.4% and 51.4%, respectively. Many schoolchildren did not even know the name of the picture. Only 6.9%-16.7% of schoolchildren correctly answered that the picture was My Plate.
- Poor IDG knowledge (score < 60) was mostly found in elementary schoolchildren (15.3%), while good IDG knowledge (score > 80) was mostly found in junior high schoolchildren (35.7%) and senior high schoolchildren (35.7%). The mean score of elementary schoolchildren (72.6), junior high schoolchildren (77.5), and senior high schoolchildren (77) indicated that all of them belonged to moderate knowledge category (score of 60-80). The comparison test indicated that the elementary schoolchildren’ scores were lower than the junior/senior high schoolchildren ($p < 0.05$).
- The positive attitudes towards IDG were more commonly found among elementary schoolchildren (73.6%) than junior high schoolchildren (55.7%) or senior high schoolchildren (57.1%). The statistical tests showed that the mean attitude score of the elementary schoolchildren (84.4) was significantly higher than junior high schoolchildren (81.6) and senior high schoolchildren (81.7).
- Most elementary schoolchildren (65.3%) had good IDG practices. Meanwhile, the junior and senior high schoolchildren with good IDG practices were only 45.7% and 18.6%, respectively. The ANOVA showed that the mean score of IDG practices between elementary schoolchildren (81.6) and junior high schoolchildren (79.4) was not significantly different. However, their scores were different from the mean score of IDG practices in senior high schoolchildren (75.8).
- The majority of schoolchildren’s mothers in the elementary school (97.2%), junior high school (100%), and senior high school (97.1%) had good scores regarding IDG knowledge, and only a few schoolchildren’s mothers in elementary school (2.8%) and senior high school (2.9%) had moderate scores.
- There were 90.3%, 95.7%, and 84.3% of schoolchildren’s mothers in the elementary school, junior high school, and senior high school that had positive attitudes towards IDG messages. The distribution of mothers was not significantly different, with a mean score of > 80 .

- There were 72.2%, 75.7%, and 61.4% of schoolchildren's mothers in the elementary school, junior high school, and senior high school that had good practices on IDG messages. The rest of them (24.3%-38.6%) had moderate IDG practices.
- The schoolchildren's attitude was significantly correlated with their practices on IDG messages ($p < 0.01$) at all school levels. It indicated that the more positive the attitude of the schoolchildren, the better the practices. The similar result was also found among the schoolchildren's mothers. The attitudes of the mothers of junior and high schoolchildren were also significantly correlated with their practices on IDG messages ($p < 0.01$).
- Within one day, schoolchildren spent their time sitting for about 11-13 hours, while 7-8 hours were spent for nighttime sleeping. Thus, in one day, the time spent on other activities besides sitting and sleeping were about 3-4 hours. Elementary schoolchildren had a longer sleeping time (8.2 hours) than junior high school schoolchildren (7.7 hours) and senior high schoolchildren (7.0 hours), and these results were significantly different between groups ($p = 0.001$).
- IDG knowledge of schoolchildren was correlated significantly with the nutritional status of schoolchildren in elementary school ($r = 0.316$, $p = 0.007$). Nutritional status of the senior high schoolchildren had a significant correlation with IDG practice of the schoolchildren ($r = 0.283$, $p = 0.018$) and IDG practice of their mothers ($r = 0.279$, $p = 0.020$). Despite these factors, physical activity and household socio-economic status had no relationship with nutritional status of schoolchildren.

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We would like to thank the Head of the Education Office and Health Office of Cianjur Regency who had facilitated this research from the beginning to the dissemination of the research results. The well-established cooperation between IPB University, the Education Office, and Health Office of Cianjur Regency with the funding from the Neys Van-Hoogstraten Foundation is expected to continue.

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1. INTRODUCTION

1.1. Background

Indonesia currently has fairly complex nutritional problems. From various data sources, according to the Ministry of Health of the Republic of Indonesia/MoH RI (2017), the development of nutritional problems in Indonesia can be classified into three groups; i.e. publicly-controlled nutritional problems, unfinished nutritional problems, and emerging nutritional problems (nutritional problems that have increased and threaten people's health).

Nutritional problems that can already be controlled are vitamin A deficiency (VAD) in children under five, iodine deficiency disorders (IDDs), and nutritional anemia in children aged 2-5 years. The treatment of vitamin A deficiency problem in children under five has been intensively implemented since the 1970s, through the distribution of vitamin A capsules every six months and increased promotion of food consumption of vitamin A sources. The last two surveys in 2007 and 2011 showed that the national proportion of children with serum retinol less than 20 µg was already below the threshold of public health problem. The prevention of IDDs has been executed since 1994 by requiring that all salt in the market's circulation should contain at least 30 ppm of iodine. The data regarding iodine status of schoolchildren as an indicator of IDDs over the past 10 years show consistent results. The median of urinary iodine excretion (UIE) from the last three surveys ranged from 200 g/L to 230 g/L, and the proportion of children with UIE <100 g/L was below 20%. The third nutritional problem that can already be controlled is nutritional anemia in children aged 2-5 years. The prevalence of anemia in children has decreased; i.e. from 51.5% (1995) to 25.0% (2006) and 17.6% (2011) (MoH RI 2017). From the explanation, nationally, it can be said that the VAD, IDDs, and anemia are no longer public health problems.

Furthermore, the unfinished nutritional problems are undernutrition and stunting. In 2010, the prevalence of stunted children was 35.6%, meaning that one out of three children was most likely stunted. Meanwhile, the prevalence of undernutrition has decreased, from 31% (1989) to 17.9% (2010) (MoH RI 2017). Meanwhile, the nutritional problem that threatens public health (emerging nutritional problem) is overnutrition. The prevalence of overnutrition, either in children group or adult group, increases almost one percent per year. The data of Basic Health Research (Riskesdas) in 2007, 2010, and 2013 showed a tendency of overnutrition in all age groups. The results of Riskesdas in 2013 indicated that 18.8% of children aged 5-12 years, 10.8% of adolescents aged 13-15 years, and 7.3% of adolescents aged 16-18 years had overnutrition problem (MoH RI 2013).

According to Kurniasih *et al.* (2010), the main cause of the emergence of undernutrition and overnutrition is a nutritionally imbalanced dietary pattern. Undernutrition occurs because the nutrient intakes are below the requirement, whereas overnutrition happens because the

nutrient intakes exceed the requirement. Besides low nutrient intakes, undernutrition may occur due to poor sanitation of the environment and personal hygiene that facilitate the incidence of infectious diseases, especially diarrhea and acute respiratory tract infections (ARTIs). As for overnutrition, it occurs mainly because of the dietary pattern that is energy/calorie-dense and exceeding the requirement for the activity, thereby causing obesity. Based on MoH RI (2013), the proportion of Indonesian population with physical activities categorized as sedentary in general reached 26.1% with imbalanced dietary pattern; proportion of insufficient fruit and/or vegetable consumption behaviors was 93.5%; and the proportion of risky-food consumption behaviors among people aged ≥ 10 years were as follows: flavoring as the most widely consumed (77.3%), followed by sweet foods and beverages (53.1%) and fatty foods (40.7%).

The results of a study by Hermina and Prihatini (2016) show that almost all Indonesian people consume vegetables (94.8%), but only a few of them consume fruits (33.2%). The mean consumption of vegetables is 70.0 g/person/day, and the mean consumption of fruits is 38.8 g/person/day. Total consumption of vegetables and fruits of the population is 108.8 g/person/day. When compared with the recommended sufficiency according to the balanced nutrition guidelines, the consumption of vegetables and fruits is still low. The recommended sufficiency intake of fruit and vegetable for adolescents (13-18 years), adult, and elderly age groups is 400-600 g/person/day (5 servings/day), consisting of at least 250 g of vegetables and 150 g of fruits. As for the children under five, pre-school (5-6 years), and schoolchildren (6-12 years) age groups, the sufficiency is 300-400 g/person/day (MoH RI 2014).

There are 97.1% of the population in Indonesia with low vegetable and fruit consumption. If seen from the age groups, the adolescent has the highest proportion of people with low vegetable and fruit consumption (98.4%) (MoH RI 2014). It is similar to the results of study on adolescents in Bahrain, which indicated that although the mean energy intake of the students was close to the recommended dietary allowance, about 36-50% of them had excess energy intake derived from total fat, saturated fat, and cholesterol. The students also had a habit of eating sweet foods, snack, and soft drinks but rarely consumed milk, vegetables, and fruits (Gharib and Rasheed 2011).

Various studies have shown that the dietary pattern that tends to be low in fiber but high in fat, cholesterol, sugar, and sodium, as well as low physical activity and smoking habits are the risk factors associated with obesity, metabolic syndrome, and other non-communicable diseases (Esmailzadeh *et al.* 2007; Soewondo *et al.* 2010; Mozaffarian *et al.* 2012; MoH RI 2013; Sartika 2011). Overweight and obesity can occur among different age groups and sexes (Rimbawan and Siagian 2004). According to Khomsan (2004), obese children are definitely overweight, but overweight children are not necessarily obese. Fukuda *et al.* (2001) stated that the age of 10-12 years was the last critical period of obesity occurrence. The risk is higher among girls than boys. Approximately 30% of obese adult women are obese in early adolescence, whereas the incidence is found in only 10% of men.

The children who are obese in childhood will be at a higher risk of being obese (61-70%) in adulthood (Tarro *et al.* 2014).

A study by Ekawidyani *et al.* (2015) reported that the prevalence of overnutrition among schoolchildren was 38.5%, consisting of 20.8% overweight and 17.7% obese children. The normal subjects were more likely to have breakfast every day than the overweight/obese subjects (64.3% and 56.3%, respectively). The subjects frequently consumed fast food 0.2-2.0 times/week. The most frequently consumed fast foods among the subjects were sausage and nugget. Junk food was consumed 1.0-3.0 times/week. The most frequently consumed junk food among the subjects was candy. There was a significant association between the mother's occupation and food habit. Children food habit was more likely to become better if their mother did not work (OR=0.194, CI 95%: 0.052-0.724). There was a significant association between children's pocket money and nutritional status. The children who had pocket money more than IDR 10,000 were 2.5 times at risk of becoming overweight/obese than those who had pocket money less than or equal to IDR 10,000 (OR=2.459, CI 95%: 1.230-4.916). The mother's low education level became a protective factor against overnutrition (OR=0.396, CI 95%: 0.192-0.815).

The results of a follow-up study on obese children in Japan have indicated that 54.7% of children who were obese in their childhood will remain obese until adulthood. Obese children will also be at risk of developing early degenerative diseases, such as diabetes mellitus and coronary heart disease. The data show that globally, 44% of diabetes, 23% of ischemic heart disease, and 7-41% of certain cancers occur due to overweight and obese (WHO 2012). Studies on overweight children and adolescents show that they have an increased risk of developing cardiovascular diseases in their adulthood (Must *et al.* 1992; Oren *et al.* 2003; Wright *et al.* 2001).

Some studies show that obesity is also affected by the breakfast pattern. Someone who does not have breakfast will feel hungrier in the afternoon and at night than those who have breakfast. Excessive dietary intake with low physical activity at night will result in increased storage of glucose (glycogen) and fat in the body, thereby triggering the onset of obesity (Castro 2004). The results of a study by Silvia (2007) showed that the risk of obesity increased three times higher among subjects with irregular breakfast habits than those who were accustomed to having breakfast regularly. Besides that, the risk of having abnormal body mass index (BMI) increased two times higher among subjects with irregular breakfast habits than those with regular breakfast habits. The data compiled in Risesdas in 2010 from 35,000 people indicated that the prevalence of irregular breakfast habits among children and adolescents reached 16.9% to 59%, while the prevalence among adults reached 31.2%. Meanwhile, 44.6% of schoolchildren consumed low-quality breakfast (MoH RI 2010).

Besides breakfast habits, Gustam (2012) stated that dehydration could be a risk factor for obesity in children and adolescents. Electrolyte imbalances in the body may trigger an increase in appetite and consumption of fatty foods; thus, the fluid intake in the body

continues to decline. Santoso *et al.* (2011) also stated that obese individuals were more susceptible to water insufficiency than non-obese individuals. According to Jequier and Constants (2010), mild dehydration (i.e. 1-2% loss of body fluid) might cause impaired cognitive function, lack of concentration, and decreased physical capacity. It was also reinforced by a review of study conducted by Lieberman (2007) who stated that a deficiency of 1% of fluid might decrease cognitive function or the concentration while studying. A study conducted by Briawan *et al.* (2011) stated that there were still 70.9% of male students and 49.0% of female elementary students with drinking-water intake below 2,000 ml. Besides that, 67.4% of male students and 62.8% of female students were likely to have mild dehydration.

Obesity is also often associated with decreased physical activity (Pramudita 2011; Suryaalamasyah 2009). The studies in several countries, including the United States of America, indicate that there has been a decrease in physical activity among young people in recent decades, which is in line with the increased prevalence of obesity. Similarly, a comparative study in Australia on children aged 10-11 years from 1985 to 1997 also showed that there was a decrease in physical activity (Dollman *et al.* 1999 in Yeung & Hills 2007).

The understanding and practice of a healthy lifestyle are required to prevent undernutrition and overnutrition, among others, with a dietary pattern using the principle of balanced nutrition. Balanced nutrition is a daily meal composition containing nutrients in types and quantities appropriate to the body's needs by considering the following principles: 1) diversity or variety of food in the diet; 2) hygiene; 3) physical activity; and 4) normal body weight (Kurniasih *et al.* 2010; MoH RI 2014). Adoption of balanced nutrition principle is expected to improve one's nutritional status and achieve optimal nutritional status (BAPPENAS 2011). Optimal nutrition is essential for normal growth, as well as the physical and intellectual developments of infants, children, and all age groups. Good nutrition makes the body weight normal and healthy, makes the body not susceptible to infectious diseases, increases work productivity, and becomes protected from chronic diseases and premature death (MoH RI 2014).

Indonesian Dietary Guidelines (IDG), sometimes called balanced nutrition guidelines, are essential for preparing a healthy lifestyle to deal with "the double burden of malnutrition problem"; i.e., undernutrition and overnutrition that occur together in poor countries (Soekirman 2014). IDG (known as *Pedoman Gizi Seimbang/PGS* in Indonesia) is a realization of the recommendations from the World Food Conference in Rome 1992. There are 10 nutrition-related messages contained in Indonesian IDG, unlike Japan and the Philippines that emphasize only five items of messages. The number of messages to be delivered does not matter, because the more important thing is how the message can be socialized (Khomsan and Faisal 2008).

IDG is a basic guideline about a nutritionally balanced diet arranged as a guide for good and proper practices in food consumption in the community. IDG is a guideline for diet and healthy lifestyle for all age groups based on principles of a variety of food consumption,

health and clean lifestyle, regular physical activity, monitoring and maintaining normal body weight. IDG consists of the following messages:

1. **Eat a variety of foods.** Be grateful and pleasant in eating a variety of foods. This message is achieved by consuming five food groups every day or at each mealtime. Those five food groups are staple foods, food sources of animal or plant protein, vegetables, fruits, and water. Consumption of more than one type of food in each food group will be more beneficial. Being grateful and pleasant in eating a variety of foods would encourage good eating behavior, then those ingested foods will be digested and absorbed properly.
2. **Consume vegetables and fruits.** Consume plenty of vegetables and sufficient fruits. World Health Organization recommends daily consumption of vegetables and fruits for a healthy life in the amount of 400 g/person that consists of 250 g of vegetables (equal to 2 ½ portions or 2 ½ glasses of cooked and rinsed vegetables) and 150 g of fruits (equal to 3 medium-sized bananas, 1 ½ medium pieces of papaya, or 3 medium-sized oranges. Recommended consumption of vegetables and fruits for Indonesian people is about 300-400 g/person/day for toddlers and schoolchildren, and 400-600 g/person/day for adolescents and adult. Approximately two-thirds of the recommended amount is vegetable consumption.
3. **Consume high-protein foods.** Eat high-protein foods regularly. A nutritionally balanced diet can be achieved by consuming two food groups (food sources of animal protein and plant protein) together with other food groups every day; thus, the quantity and quality of food consumption will be good and completely provided. The daily amount of animal and plant protein needed is 2-4 portions, which depends on the age group and physiological conditions.
4. **Consume a variety of staple foods.** The way to realize the diverse staple-food consumption patterns is to consume more than one type of staple food in a day or in one meal. The main staple food of Indonesian people is rice, and now there is an increasing trend of wheat flour (instant noodle) consumption. Indonesia also has a variety of food sources of carbohydrates such as corn, sweet potatoes, cassava, taro and others in which the consumption of these food sources is still encouraged to increase.
5. **Limitation of sweet, salty, and fatty foods.** Regulation of the Minister of Health Number 30 of 2013 on Inclusion of Information Regarding Sugar, Salt and Fat Contents and Health Messages for Processed Foods and Fast Foods mentions that the consumption more than 50 g (four tablespoons) of sugar, more than 2000 mg (one teaspoon) of sodium, and more than 67 g (five tablespoons) of total fat/oil per person per day will increase the risk of hypertension, stroke, diabetes, and heart attack. The information on sugar, salt, and fat contents and the health messages listed on the food label and fast foods must be known and easily read by

consumers. People need to be educated on reading the food label, knowing low-sugar, low-salt, and low-fat foods, and cooking by reducing salt and sugar. On the other hand, the processed-food entrepreneurs are required to include the nutritional value information on the food label so that people can choose healthy food according to the needs of each family member. Food label and advertisement must follow the Indonesian Government Regulation Number 69 of 1999.

6. **Breakfast regularly.** Breakfast is a meal and drinking activity performed from the time of waking up in the morning until 9 o'clock to meet half of the daily nutritional requirement (15-30% of nutritional requirement) in order to realize a healthy, active, and productive life. Breakfast supplies the body with nutrients that are needed for thinking, working, and doing physical activities optimally after waking up in the morning. For schoolchildren, sufficient breakfast is proven to increase learning concentration and stamina. For teenagers and adults, sufficient breakfast is proven to prevent obesity. Getting used to eating breakfast also means getting used to being disciplined to get up early and do morning activities and to be prevented from overeating when eating snacks or lunch.
7. **Drink enough water.** Water is required for optimal growth and development. Thus, the water balance needs to be maintained by regulating the balance of the amount of water intake and output. The percentage of water content in the child's body is higher than the adult body; thereby, the child needs more water for each kg of the body weight than the adult. Various factors can affect the water requirement such as growth stage, metabolic rate, physical activity, respiratory rate, the temperature of the body and environment, air humidity, the amount and type of solids released by the kidneys, and food consumption patterns.
8. **Read the food label.** All the detailed information on the label of packaged food helps the consumers know the ingredients contained in the food. Besides that, it can estimate the danger that may occur to high-risk consumers because they have certain diseases. Therefore, it is recommended to read the label of a packaged food, especially the description regarding nutritional content information and expiration date before buying or consuming the food.
9. **Wash hands with soap.** October 15 is the Global Handwashing Day with Soap launched by the United Nations as one of the ways to prevent the spread of disease. The importance of washing hands well and properly using soap is to maintain overall cleanliness, to prevent germs and bacteria from moving from hand to the food that will be consumed, and also to prevent the body to be exposed to germs.
10. **Regular physical activity.** Regular physical activity will maintain a person's fitness. Physical activity can also maintain a normal weight. Healthy food consumption

patterns accompanied by the physical activity will help control weight so that the body will become healthier.

Behaviors concerning IDG still have not been applied thoroughly. Many people still do not know about IDG. It indicates that IDG-related information is still not widespread in the community; thereby, the people's knowledge regarding IDG is still low (Permenkes Number 41 of 2014). The results of a study conducted by Prabandari (2010) showed that 61.4% of Bogor Agricultural University students had moderate level of knowledge regarding IDG, and the study conducted by Afianti (2008) showed that 75.8% of Bogor Agricultural University students had a low level of knowledge regarding IDG.

Implementation of IDG is widely required in all age groups. In schoolchildren, IDG needs to be introduced and implemented to support their optimal nutritional status and academic achievement. Therefore, identification of dietary patterns (food habits), physical activity, and nutritional status, as well as their associations with schoolchildren's and mothers' knowledge, attitudes, and practices on IDG should be performed to find out the strategy and obstacles in the implementation of IDG for schoolchildren.

1.2. Research Questions

1. Have schoolchildren in Cianjur been exposed to the Indonesian Dietary Guidelines?
2. Do food habits (breakfast and consumption frequency) have a relationship with nutritional status of the schoolchildren?
3. Does knowledge, attitude, and practice (KAP) of the schoolchildren and their mothers on Indonesian Dietary Guidelines have a relationship with nutritional status of schoolchildren?

1.3. Objectives

The overall objective:

The study aimed to determine the relationship between food habits, KAP of Indonesian Dietary Guidelines, and nutritional status of schoolchildren.

Specific Objectives:

1. To assess the exposure of schoolchildren in Cianjur to the Indonesian Dietary Guidelines
2. To analyze the knowledge, attitude, and practices (KAP) of the schoolchildren and mothers on Indonesian Dietary Guidelines
3. To assess the relationship between schoolchildren's KAP and mothers' KAP on Indonesian Dietary Guidelines

4. To assess the relationship between breakfast habits, consumption frequency (protein-source foods, vegetables, fruits, snack habits), and nutritional status of the schoolchildren
5. To assess the relationship between KAP of schoolchildren and their mothers on Indonesian Dietary Guidelines, children's physical activity, household socio-economic status, and the nutritional status of schoolchildren

2. CONCEPTUAL FRAMEWORK

The advancement of a nation is an implementation of the achievement of high levels of health, intelligence, and work productivity in human development. These three things are influenced by one's nutritional status. Dietary pattern is an important behavior that can influence the nutritional status formed from the base of knowledge, attitude, and practice on nutrition. Food consumption, either its quality or quantity, may influence the level of individual health. Optimal nutrition is essential for one's physical growth and development.

The application of balanced nutrition in schoolchildren on knowledge, attitude, and practice aspects may have implications on eating habits, physical activity, and nutritional status of the children. The government through MoH RI (the Regulation of MoH RI Number 41 Year 2014) had tried to raise public awareness of the importance of nutrition through proper and community-based information, education and communication (IEC); i.e., IDG (called *Pedoman Gizi Seimbang*/PGS in Indonesia). IDG is a basic guideline about a nutritionally balanced diet, which is arranged as a guide for a good and proper practice of food consumption in the community. IDG consists of 1) Eat a variety of foods, 2) Consume vegetables and fruits, 3) Consume high-protein foods, 4) Consume a variety of staple foods, 5) Limitation of sweet, salty, and fatty foods, 6) Breakfast regularly, 7) Drink enough water, 8) Read food label, 9) Wash hands with soap, and 10) Regular physical activity.

In accordance with the balanced nutrition messages, the food habits, breakfast habits, and the consumption frequency of protein-source foods, vegetables, fruits, and snacks are required full attention from children, their parents (mothers), and the schools. A nutritionally imbalanced diet may lead to undernutrition or overnutrition known as double burden of malnutrition. Undernutrition can lead to certain infectious diseases (diarrhea and upper respiratory tract infection/URTI) and nutrient deficiencies (nutritional anemia, VAD, IDD, and protein-energy malnutrition/PEM). Meanwhile, overnutrition with a diet low in fiber but high in fat, cholesterol, sugar, and sodium may lead to overweight, obesity, metabolic syndrome, and other non-communicable diseases (heart disease, diabetes mellitus, and stroke) with or without other risk factors such as low physical activity and smoking habits.

Besides breakfast habits, the habit of eating vegetables and fruits in children needs to be improved. The research results of Hermina and Prihatini (2016) indicated that almost all Indonesian people consumed vegetables (94.8%), but only a few of them consumed fruits (33.2%). Total consumption of vegetables and fruits of the population is 108.8 g/person/day. If it is compared with the recommended allowance according to balanced nutrition guidelines, the consumption of vegetables and fruits is still low. Therefore, IDG needs to be introduced and implemented from an early age so that the messages and expected goals can be sustainably achieved in all age groups. In the school-age range, children need to recognize, know, understand, and apply the IDG messages in daily life to have a positive

impact on nutritional status. Identification of dietary patterns (food habits), physical activity, children's nutritional status, and KAP of schoolchildren and their mothers on IDG need to be done; thus, the appropriate and suitable form of strategy and implementation of IDG messages in schoolchildren can be obtained. The following diagram is a conceptual framework of this study (Figure 1).

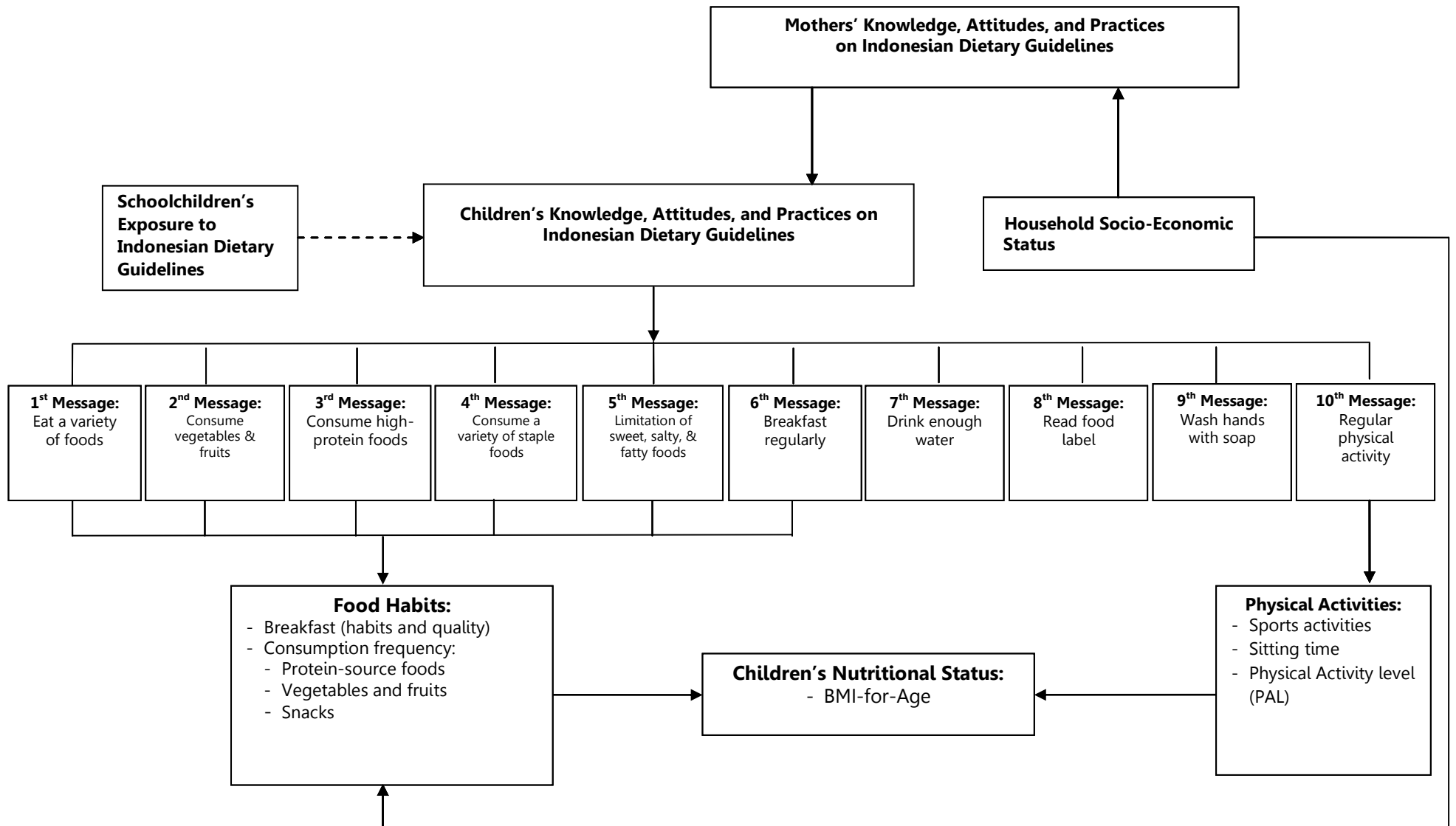


Figure 2.1. Conceptual Framework

3. METHOD

3.1. Research Design, Location, and Time

The study used a cross-sectional study design, and it will be conducted in three selected state schools (elementary school, junior high school, and senior high school) in Cianjur District, West Java Province, Indonesia. The study was conducted from April 2018 to March 2019 that included a location survey, research permits, data collection, data processing, data analysis, report writing, and seminars.

Visitation to schools was conducted in the area of Cianjur District. Based on information from the Office of Nation Unity in Cianjur, some schools in the area could be the research samples. Four schools were then visited; i.e., SMA Negeri 1 (Senior High School), SMA Negeri 2 (Senior High School), SMP Negeri 1 (Junior High School), and SD Negeri Ibu Dewi 6 (Elementary School).

3.2. Sample

The school population in this study was schoolchildren and their mothers from four selected schools in Cianjur District, West Java Province – Indonesia. The selected respondents were the 5th-grade schoolchildren of SDN Ibu Dewi 6, the 8th-grade schoolchildren of SMPN 1 Cianjur, and the 11th-grade schoolchildren of SMAN 1 and SMAN 2 Cianjur.

The minimum number of respondents was 210 pairs of schoolchildren and their mothers, that consisted of 70 pairs of schoolchildren and their mothers in each school. Based on the data collection of our survey, the total respondents interviewed were 217 pairs of schoolchildren and their mothers that consisted of 75 pairs of children and mothers from SDN Ibu Dewi 6, 72 pairs of children and mothers from SMPN 1 Cianjur, 35 pairs of children and mothers from SMAN 1 Cianjur, and 35 pairs of children and mothers from SMAN 2 Cianjur. As for focus group discussion (FGD), there were 34 participants from elementary school and junior high school and 16 participants from senior high schools.

Five participants from a total of 217 participants had been excluded due to the nutritional status below -6SD, food intake below 100 kcal or over 2,000 kcal, and missing data of the food frequency questionnaire. At the end of research, 212 eligible participants consisting of 72 elementary schoolchildren, 70 junior high schoolchildren, and 70 senior high schoolchildren had been analyzed.

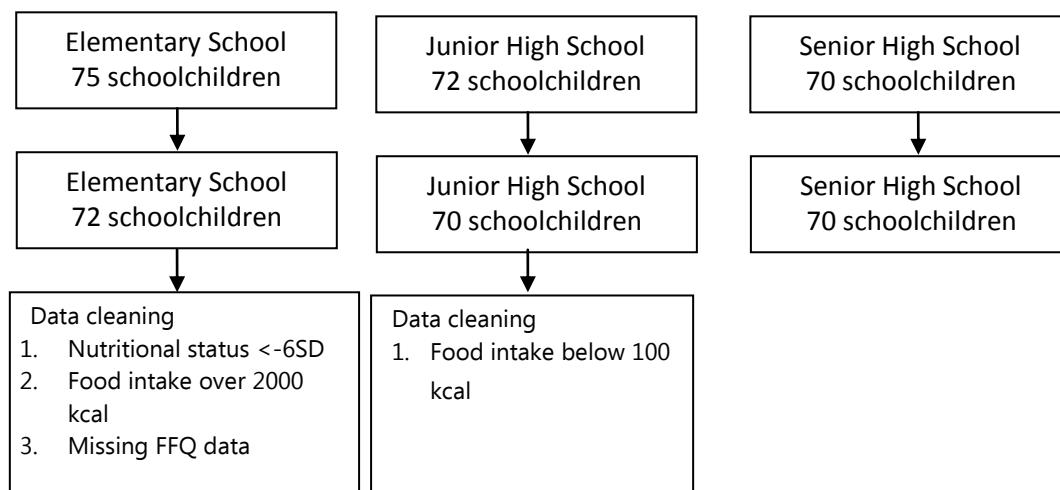


Figure 3.1. Enumerator with participants in the Elementary School

3.3. Data Collection

The quantitative data were collected from August to September 2018. The schedule of data collection on each school was adjusted based on the activities of children and teachers. The interviews were conducted at school on the periods that had already been decided by the teachers.

Before starting the interviews, interviewers gave the schoolchildren some explanations regarding the objectives of the study, what the interviewers would do to respondents, the benefits of the study, the respondents' right to refuse, and incentive for respondents. The respondents who agreed to participate were asked to sign the informed consents. The anthropometric measurements were conducted simultaneously to all respondents before starting the interview process. The self-administered questionnaires for the mothers were given to schoolchildren to be filled at home by the mothers. The instructions on how to fill the questionnaires were clearly written down and also explained to the schoolchildren. The questionnaires were given back to enumerators (interviewers) the next day.



Figure 3.2. Data collection in the Junior High School

As for FGD, it was conducted for two days in two government agency offices, namely the District Education and Culture Office (for elementary and junior high school levels) and the District Health Office (for senior high school level). The FGD began by a brief explanation about Dietary Guidelines delivered by a research team member (Prof. Ali Khomsan). The FGD collected information from the audiences regarding the strategies and implementations of Dietary Guidelines at school. The FGD participants consisted of school elements (i.e., teachers, headmasters, and school committees), the Puskesmas Officers, the District Education and Culture Officers, and the District Health Officers.



Figure 3.3. Focus group discussion (FGD)

The qualitative data as the result of FGD gathered information about efforts/strategies and constraints in implementing the dietary guidelines for schoolchildren. The qualitative data resulted from FGD were collected through written notes and voice recording during the FGD process. Some inputs or recommendations from the FGD were listed below:

- The Dietary Guidelines had not been socialized to the schoolchildren and teachers. Teachers had an important role in succeeding the implementation of Dietary Guidelines for schoolchildren. Thus, any kinds of socialization (seminar/training) are very necessary by the teachers to be then delivered to the schoolchildren. Messages of Dietary Guidelines had been partially delivered by the teachers to the schoolchildren through many activities at school such as bringing home-packed meal to school, briefing on how to choose a safe and healthy snack, messages on consuming variety of foods, and body weighing activity.
- School parties (teachers, school principals, and school committee) and related agencies (District Education and Culture Office and District Health Office) welcomed the socialization program and efforts to implement the Dietary Guidelines to support the schoolchildren's health maintenance and academic achievements.
- Habituation on balance nutrition practices could be effectively implemented if the exposure was carried out in line with schoolchildren's learning process. Seminar, training, or workshop are needed and must be conducted routinely so that teachers' knowledge, attitude, and practices regarding the Dietary Guidelines will be improved.
- In the future, it is expected that learning materials regarding Dietary Guidelines to be fully structured for elementary schoolchildren, junior high schoolchildren, and senior high schoolchildren. Besides teachers, parents also had an important role in achieving that expectation.

Some constraints experienced by the research team and enumerators during the data collection were as follows:

- a. For elementary and junior high school level, the research team only chose one school as study target for each school level. However, for senior high school level, the school suggested to increase the number of targets into two high schools (SMAN 1 and SMAN 2 Cianjur) due to the tight schedule of learning activities. The research team then decided to choose SDN Dewi 6, SMPN 1, SMAN 1, and SMAN 2 as the study sites.
- b. The self-administered questionnaires for the mothers were sent through the schoolchildren. There were some less obedient schoolchildren during the mother's questionnaires collection; thereby the coordination between enumerators and teachers was needed to have the questionnaires collected in the next few days. In

the end, all the questionnaires for schoolchildren and the mothers could be collected completely.

3.4. Data Analysis and Management

The data analysis consisted of data entry, editing, cleaning, statistical analysis, and dummy table construction. It will be conducted using Microsoft Excel and SPSS software. The quantitative data analysis covered the calculation of mean, standard deviation, frequency, or proportion. The qualitative data (FGD records and schools' profiles) were analyzed descriptively. The data analyses were then performed. The results of the study were presented in the form of tables and figures.

The numerical data were analyzed using the Analysis of Variance (ANOVA), and categorical data were analyzed using the Kruskal-Wallis test. The correlation was analyzed using Pearson's correlation test for numerical data and Spearman's test for the categorical and ordinal data.

4. DESCRIPTION OF THE STUDY SITES

4.1. Geography and Climate

Cianjur Regency is geographically located between 6^o21'-7^o25' South Latitude and 106^o42'-107^o25' East Longitude, around 65 km from the capital of West Java Province (Bandung) and 120 km from the Capital City (Jakarta). Cianjur Regency is at an altitude of 2,962 m a.s.l and a slope of 0-40%. Its regional boundaries are as follows:

- a. Bogor Regency and Purwakarta Regency in the north;
- b. Purwakarta Regency, Bandung Regency, West Bandung Regency, and Garut Regency in the east;
- c. The Indian Ocean in the south;
- d. Sukabumi Regency in the west.

Cianjur Regency consists of 32 subdistricts with a total area of 361,434.98 ha, and the largest subdistrict is Cidaun with a total area of 29,551.23 ha. Cianjur Regency has 354 villages and six *kelurahan* (urban village) (BPS Kabupaten Cianjur 2018a).

Cianjur Regency has a tropical climate with an average annual rainfall of 1,000-4,000 mm and an average of 150 rainy days a year. The tropical climate makes the natural conditions of Cianjur Regency fertile and makes the Regency contain diverse potential natural resources as a basic capital of development and promising investment potential. Agricultural lands for food crops and horticulture, animal husbandry, fisheries, and plantations are life sources of the people.

4.2. Population and Employment

The total population of Cianjur Regency in 2016 was estimated to be 2,253,784 people, consisting of 1,159,421 men and 1,094,363 women with an average population density of 624 people/km². The sex ratio was 105,94, which meant that there were 105 or 106 males for every 100 female population. If observed based on the subdistrict, Cugenang and Sukaluyu Subdistricts had the highest sex ratio (109.62 and 108.60, respectively) while Cijati Subdistrict had the lowest sex ratio (102.04). All subdistricts had a sex ratio above 100, which meant that the male population was higher than the female population (BPS Kabupaten Cianjur 2017).

The largest population was in Cianjur Subdistrict (164,548 people) or 7.30% of the total population of Cianjur Regency, followed by Karangtengah Subdistrict with 139,502 people (6.19%) and Cibeber Subdistrict with 119,977 people (5.32%). Meanwhile, the smallest population was in Campakamulya Subdistrict with 24,318 people (1.08%) and Leles Subdistrict with 32,701 people (1.45%). The highest population density was in Cianjur

Subdistrict with 6,292 people/km², and the lowest population density was in Naringgul Subdistrict with 164 people/km² (BPS Kabupaten Cianjur 2017).

The number of productive age population (15-64 years) was 1,466,290 people, and the number of non-productive age population (0-14 years and over 65 years) was 777,614 people. This figure resulted in a dependency ratio of 53.03, which meant that every 100 productive age people supported 53 non-productive age people (BPS Kabupaten Cianjur 2017).

Based on the results of the National Labor Force Survey (Sakernas) in 2015, there were 960,166 people aged 15 years and over who were included in the labor force. The population was divided into two categories; i.e., working (863,592 people) and open unemployment (96,574 people). The majority of the labor force (35.97%) worked in the agriculture, forestry, hunting, and fisheries sectors while the rest (27.95%) worked in the wholesale, retail, restaurant, and hotel sectors. Thus, the agricultural sector still dominates the largest employment absorption, which is followed by the trade sector.

The Labor Force Participation Rate (LFPR) was 89.94%, and the Open Unemployment Rate (OUR) was 10.06%. The LFPR in 2015 was higher than the previous year, and thereby the OUR was reduced. More than half of the labor force that worked were elementary-school graduates, and most of them were in the age groups of 35-39 years and 40-44 years.

4.3. Education

The development policy in the social sector is related to various aspects. Besides affecting the economy, the policy also affects the socio-political aspects of the community. The success of development in the social sector can not only be seen from the physical aspect, but it must be seen as a whole (i.e., physical and mental aspects). The physical aspect includes the development of facilities and infrastructure.

Education is one of the basic needs of a smart and prosperous community. Based on the basic education data in 2017, Cianjur Regency had 1,473 units of elementary school/Islamic elementary school, 429 units of junior high school/Islamic junior high school, and 261 units of senior high school/Islamic senior high school/vocational high school.

The School Participation Rate (SPR) of Cianjur Regency for the elementary school age group was 99.2%, and the SPR for the junior high school was 90.48%. However, the SPR for the senior high school was 62.04%. It means that the opportunity for people in Cianjur Regency to access the education at the senior high school level is still low, different from the elementary school or junior high school age group that has reached >90%. The difference in opportunities to access education is very significant, especially in the senior high school age group (16-18 years). If observed from the sex, boys and girls have relatively equal opportunities in accessing the education according to their age groups (BPS Kabupaten Cianjur 2018b).

4.4. Health (morbidity rate, infant mortality rate, MMR, and nutritional status)

There were four hospitals in Cianjur Regency in 2016; i.e., Cianjur Class B Regional General Hospital in Cianjur Regency, Cimacan General Hospital in Cipanas Subdistrict, RSDHC in Karangtengah Subdistrict, and Regional General Hospital in Pagelaran Subdistrict. Other health facilities were 44 Puskesmas in Cianjur Regency, which consisted of eight Puskesmas with inpatient wards and 24 Puskesmas without inpatient wards. The highest number of death cases in Cianjur Class B Regional General Hospital in 2016 were stroke (291 cases) and low birth weight (192 cases). The coverage of active family planning participants in 2015 was 70.87%, higher than the coverage in 2014 (67.05%) (BPS Kabupaten Cianjur 2017).

Maternal Mortality Ratio (MMR) is one of the important indicators of public health levels. This indicator is influenced by general health status, education, and health services during pregnancy and childbirth. The improvement of health services greatly affects the MMR, making the MMR an indicator of the success of the health sector development. The number of live births in Cianjur Regency was less than 100,000, and thereby the MMR could not be estimated. Although not significant, there was an increase in the number of maternal deaths in 2015 compared to the previous year; i.e., from 45 deaths/100,000 live births in 2013 to 49 deaths/100,000 live births in 2014 and 2015. Most maternal deaths occurred during childbirth and pregnancy, each at 35%.

The pattern of outpatient disease for infants in Puskesmas is dominated by three diseases; i.e., diarrhea and gastroenteritis, non-specific acute upper respiratory tract infections, and other upper respiratory tract diseases.

5. HISTORY OF BALANCED NUTRITION IN INDONESIA

The development of nutrition in Indonesia has been started since the 1950s. The concept of balanced nutrition in Indonesia has been introduced by Prof. Dr. Poerwo Soedarmo, who is often referred as the Father of Nutrition in Indonesia with the slogan Four Healthy Five Perfect (FHFP) or known as *Empat Sehat Lima Sempurna* in Indonesia. The concept was the result of an adaptation of the "Basic Four" principle in the United States which began to be developed in the 1940s. This guideline has been widely known by the public until now. However, with the advancement of nutritional science and the development of different theories regarding protein requirement, a paradigm shift emerges in the concepts and strategies of the management of nutritional problems, from an emphasis on food quality aspect (protein) in the 1950s to quantity aspect (energy) in the 1970s related to the balance of protein and energy intakes. In the 1990s, the attention returned to quality but with an emphasis on the vitamin and mineral (micronutrients) requirements (Martorell 2000 in Nuryati 2006 in Aswatini *et al.* 2008). The paradigm shift leads to the understanding that our bodies not only require protein and calories to live healthily but also vitamins and minerals contained in a large amount in vegetables and fruits in balanced-nutrition dietary patterns (Aswatini *et al.* 2008).



Figure 5.1. Visualization of Four Healthy Five Perfect in the 1950s (right) and the 1970s (left)

The FHFP slogan contains five food groups; i.e., (1) staple food, (2) protein-source foods, (3) vegetables, (4) fruits, and (5) milk. These five food groups have been embodied in a circular logo that places the first to fourth food groups on the inner side of the circle that surrounds the fifth group (milk) in the middle (Pakpahan 2015). FHFP is still considered good nutritional guidelines, but it is considered to have caused misunderstanding among people. Milk as a complement is considered mandatory for consumption. Other facts are people

being more physically inactive and also the high consumption of fat that requires a balanced intake of fiber from vegetables. Besides that, people consider that FHFP foods do not need to be consumed at once in one meal, but the foods must be consumed alternately.

The MoH released the General Guidelines of Balanced Nutrition (GGBN) in 1995 through the Directorate of Community Nutrition Development. These guidelines were compiled to fulfill one of the recommendations of the International Nutrition Conference in Rome in 1992. GGBN is a further elaboration of FHFP guidelines containing messages related to the prevention of undernutrition and overnutrition problems, which have begun to appear in Indonesia over the past 20 years (Almatsier 2002 in Dedeh 2011).

GGBN is a food composition that guarantees the balance of nutrients, which can be achieved by consuming a variety of foods every day. Each food can complement each other regarding the nutrients it contains. The food grouping is simplified based on three main functions of nutrients as follows: 1) energy source; 2) source of builder substances; and 3) source of regulatory substances. Energy sources are required by the body in a larger amount than the requirement of the builder and regulatory substances, while the regulatory substances are needed in a larger amount than the builder substances (Almatsier 2002 in Dedeh 2011).

Energy sources are obtained from rice, corn, cereals/grains, cassava, potatoes, and other food sources of energy. The regulatory substances are obtained from vegetables and fruits, while the builder substances are obtained from legumes, animal-source food and its processed products. The three classes of food ingredients in the basic concept of balanced nutrition are visualized in a cone form (food guide pyramid) in sequence according to the amount of food required by the body. The base of the cone describes the energy source (i.e., the most consumed food group). The middle part describes the sources of regulatory substances while the top of the cone describes the sources of builder substances that are relatively least consumed on a daily basis (Dedeh 2011).

By observing the existing developments, the MoH completed the 1994 GGBN revision in 2002. The form of GGBN logo in 2002 was still the same as the one in 1994 (i.e., cone or *tumpang*) but it consisted of four parts. The revisions were as follows: 1) The cone that was previously composed of three levels turned into four levels (i.e., food sources of energy/carbohydrates at the bottom level, fruits and vegetables at the second level, sources of animal and plant protein at the third level, and fat and oil groups at the fourth level); 2) At the third level, the food sources of animal protein (builder substances) previously combined with the food sources of plant protein were separated; 3) The placement of oil and fat at the highest peak of cone, which did not exist in the previous GGBN; and 4) There were instructions for the use of each food group in portion size and the words "use as needed" for oil and fat (Pakpahan 2015).

GGBN contains 13 basic messages, which are expected to be used by the people as a guideline for preparing the balanced and safe daily food to achieve and maintain optimal

nutritional status and health. The basic messages are as follows: 1) eat a variety of foods, 2) eat foods to meet the energy requirement, 3) eat food sources of carbohydrates half of the energy requirement, 4) limit consumption of fat and oil to one quarter of energy requirement, 5) use iodized salt, 6) eat food sources of iron, 7) give only breast milk to infants until the age of four months and add the complementary foods afterwards, 8) get used to having breakfast, 9) drink enough clean water, 10) perform regular physical activity, 11) avoid alcoholic drinks, 12) eat foods that are safe for health, and 13) read the nutrition facts label on packaged foods (MoH RI 2003).

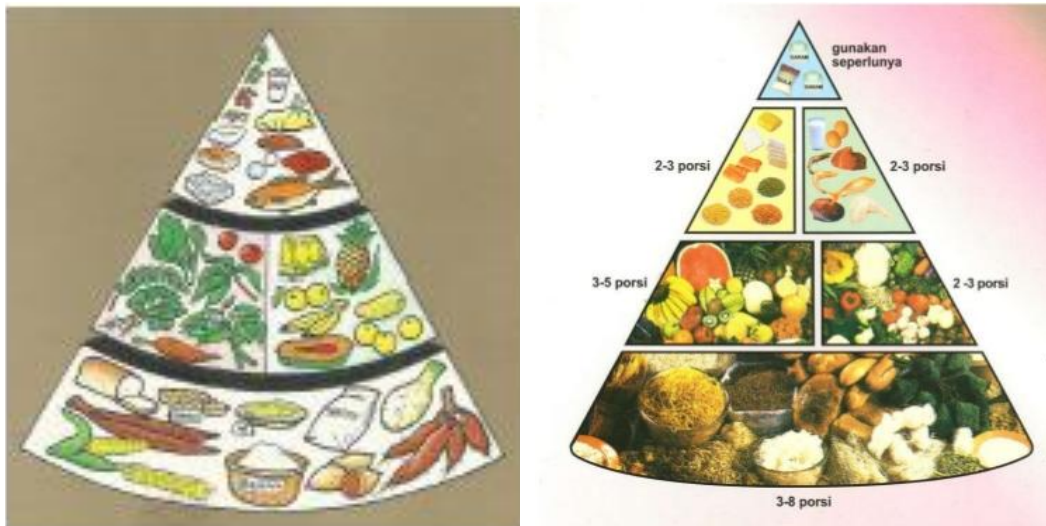


Figure 5.2. Changes in the logo of Balanced Nutrition *Tumpeng* from 1994 to 2002

The aim of the GGBN implementation had not fully achieved because various problems were still found, such as imbalanced food consumption in the community and inadequate clean and healthy living behavior. After noting these problems, the Directorate of Nutrition Development of the MoH RI held a workshop on January 27, 2014. The workshop was held to obtain inputs from government and non-government experts, cross-sectoral parties, cross-program parties, and professional organizations in dealing with public nutrition issues. Therefore, the Indonesian Dietary Guidelines (IDG) were prepared and completed.

IDG is an improvement of the old guidelines. It has four pillars of principle to realize its objectives, namely consumption of diverse foods, getting used to clean living behavior, performing physical activity, and maintaining and monitoring body weight within normal cut-off points. There are ten messages that must be applied in daily life to achieve balanced nutrition; i.e., (1) eat a variety of foods, (2) consume vegetables and fruits, (3) consume high-protein foods, (4) consume a variety of staple foods, (5) limitation of sweet, salty, and fatty foods, (6) breakfast regularly, (7) drink enough water, (8) read food label, (9) wash hands with soap, and (10) regular physical activity (MoH RI 2014).

The principle of IDG in Indonesia is currently visualized in the form of "Balanced Nutrition *Tumpeng* or Pyramid (BNT)" and "My Plate: One-Meal Portion". BNT is intended as

a simple description and explanation regarding the guidelines for the portion size of foods and drinks and daily physical activity, including washing hands before and after eating and monitoring body weight.



Figure 5.3. The 2014 Balanced Nutrition *Tumpeng* logo

In BNT, there are four sequential layers from bottom to top. The more upward, the smaller the size of the layer. The four layers show that balanced nutrition is based on the principle of four pillars; i.e., a variety of foods, physical activity, personal and environmental hygiene, and weight monitoring. The size of the *tumpeng* that becomes smaller towards the top means that the foods in the uppermost layer (sugar, salt, and fat) are needed in very small amount or needed to be limited. In each food group, the recommended portion size for each food is written. For example, “3-4 portions a day” is written in the vegetable group, meaning that 3-4 bowls of vegetables a day are recommended to be consumed by adolescents or adults. The weight of one bowl of vegetables is around 75 g; thereby, it is necessary to eat about 300 g of vegetables a day. There is a plus sign (+) followed by a picture of one glass of water and the words “8 glasses” on the right side of the *tumpeng*, which means that every teenager or adult is encouraged to drink around eight glasses of water a day (MoH RI 2014).

Besides food and drinks, there is also a message of washing hands before and after eating in the BNT picture that is visualized by a picture of washing hands using running water. There are also various physical activity silhouettes (including sports) and weight-weighing activities. Physical activities are recommended to be performed at least three times a week, and the weight is recommended to be monitored every month (MoH RI 2014).

“My Plate: One-Meal Portion” is intended as a guideline that shows the portion of foods and drinks at each meal (e.g., breakfast, lunch, and dinner). The visual of My Plate illustrates a healthy eating recommendation in which half (50%) of the total amount of food at each meal consists of vegetables and fruits, and the other half consists of staple foods and protein-source foods. My Plate also recommends that the portion of vegetables should be more than the portion of fruit, and the portion of staple food is more than the portion of protein-source foods. It also recommends the need to drink every time we eat, either before, during, or after eating. Although there is only one glass picture in My Plate, it does not mean that we should only drink one glass of water at each meal. The amount of water we drink can be adjusted to the requirement; for example, one glass of water before eating and one more glass after eating (MoH RI 2014).

Eating and drinking are meaningless if the foods and beverages are not clean and safe, including the hands and cutlery. Therefore, in line with the balanced nutrition principle, washing hands before and after eating are also recommended in My Plate picture. Recommendations regarding physical activity and weight monitoring are not needed in My Plate because it is a guide for each meal. Both of these things are sufficiently visualized in the picture of BNT (MoH RI 2014).

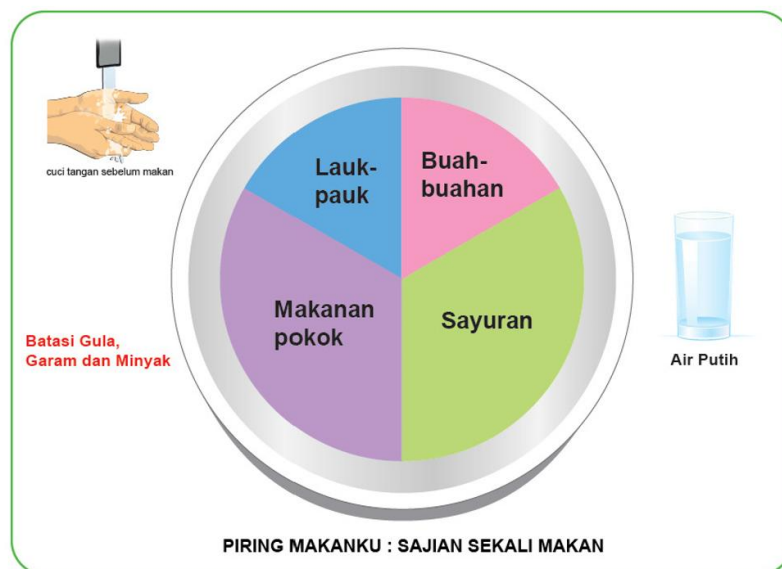


Figure 5.4. The 2014 My Plate logo

6. HOUSEHOLD SOCIO-ECONOMIC STATUS

6.1. Household Socio-Economic Status

The research results in Table 6.1 shows that the mean age of fathers and mothers of elementary schoolchildren are 42.9 years and 38.7 years, respectively. The results indicated that the age of elementary schoolchildren's parents was the youngest compared to the age of junior or senior high schoolchildren's parents. According to Statistical Central Bureau-Indonesia/BPS (2014), the residents who are officially productive at work are those aged 15 to 64 years. Most of the schoolchildren's parents ($\geq 50\%$) in elementary school, junior high school, and senior high school were classified as middle adulthood (41-60 years), which indicated that the fathers were at the productive age for working. The age of the fathers and mothers will affect the work productivity levels and will eventually have an impact on family income. The results of a study by Wardani & Roosita (2008) showed that the people's ability to earn income increased with increasing age in the productive age range.

Table 6.1. Distribution of fathers' and mothers' ages

Age	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Father's age (years)						
- Early adulthood (20-40)	34	48.6	14	21.2	2	3.0
- Middle adulthood (41-60)	35	50.0	50	75.8	61	91.0
- Late adulthood (>60)	1	1.4	2	3.0	4	6.0
- Mean \pm SD	42.9 \pm 6.9		46.8 \pm 7		49.5 \pm 7.1	
Mother's age (years)						
- Early adulthood (20-40)	49	68.1	30	42.9	20	28.6
- Middle adulthood (41-60)	23	31.9	40	57.1	50	71.4
- Late adulthood (>60)	0	0.0	0	0.0	0	0.0
- Mean \pm SD	38.7 \pm 5.8		41.6 \pm 6.2		45 \pm 6.2	
Family size (people)						
- Small (≤ 4)	33	45.8	34	48.6	30	42.9
- Moderate (5-6)	36	50.0	32	45.7	35	50.0
- Large (≥ 7)	3	4.2	4	5.7	5	7.1
- Mean \pm SD	5 \pm 1		5 \pm 1		5 \pm 1	

Based on family size, 50% of the families of elementary and senior high schoolchildren were classified as moderate-sized families, while 45.7% of the families of junior high schoolchildren were classified as moderate-sized families. Family size can indirectly affect children's nutritional status. Poverty level and money allocation to each family member will affect children's food consumption and have an impact on children's nutritional status. According to Jannah (2017), there is an association between family size and money allocation for family members. The greater the number of family members, the smaller the allocation of money to each family member.

Parents' education determines the types of parents' occupation. It will affect the family income or socio-economic status and have an impact on food supply. Table 6.2 shows that most of the schoolchildren's parents have a quite good education (i.e., senior high school or university graduates). Most of the fathers in the families of elementary and junior high schoolchildren were senior high school graduates, and 47.8% of the fathers in the families of senior high schoolchildren were university graduates. The higher the person's education, the higher the knowledge level. High knowledge level then drives behavior change in a better direction. Parents with good education tend to give more attention to their children's education. Most of the mothers (>45%) in the families of elementary, junior high, and senior high schoolchildren were senior high school graduates. High education of the parents will make them have good occupations, which will affect the family income (Shah *et al.* 2014).

Table 6.2. Distribution of fathers' and mothers' education

Education	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Father's education						
- Elementary school	2	2.9	4	6.1	4	6.0
- Junior high school	5	7.1	4	6.1	3	4.5
- Senior high school	33	47.1	29	43.9	28	41.8
- University	30	42.9	29	43.9	32	47.8
Mother's education						
- Elementary school	3	4.2	6	8.6	8	11.4
- Junior high school	8	11.1	5	7.1	5	7.1
- Senior high school	41	56.9	38	54.3	32	45.7
- University	20	27.8	21	30	25	35.7

Table 6.3 shows that most of the fathers (>38%) in the families of schoolchildren in elementary school, junior high school, or senior high school work as entrepreneurs or traders. The fathers' occupation as a civil servant/member of Armed Forces of the Republic Indonesia (AFRI)/police ranked second after entrepreneur in the families of junior and senior high schoolchildren, while private employee ranked second in the families of elementary schoolchildren. These results were different from the mothers' occupations. The proportion of mother's occupation as an entrepreneur ranked second in the families of elementary schoolchildren. Most of the mothers did not work (>50%), either in the families of schoolchildren in elementary school, junior high school, or senior high school. These results were similar to a study by Anggiruling (2019), which indicated that most of schoolchildren's mothers did not work. The working father and non-working mother tend to have children with normal nutritional status. Non-working mothers tend to have more time to pay attention to children than working mothers (Khattak *et al.* 2017).

Table 6.3. Distribution of fathers' and mothers' occupations

Occupation	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Father's occupation						
- Entrepreneur/trader	34	48.6	30	45.5	26	38.8
- Private employee	15	21.4	11	16.7	15	22.4
- Civil servant/AFRI/Police	10	14.3	21	31.8	17	25.4
- Other occupations*	9	12.8	4	6.0	9	13.5
- Not working	2	2.9	0	0.0	0	0.0
Mother's occupation						
- Not working/housewife	42	58.3	43	61.4	38	54.3
- Entrepreneur/trader	13	18.1	5	7.1	10	14.3
- Private employee	8	11.1	9	12.9	3	4.3
- Civil servant/AFRI/Police	4	5.6	8	11.4	15	21.4
- Other occupations*	5	7.0	5	7.1	4	5.7

Note: *laborer, service sector jobs (tailor, driver, *ojek* driver, and repairman)

The income level also determines the foods to be purchased. Income is one of the factors determining the quality and quantity of the food consumed. The results of a study by Rachman *et al.* (2017) showed that there was an association between income and children's food consumption. The higher the income, the higher the opportunity to choose nutritious and good food. Based on the categories in Table 6.4, most of the household income in the families of schoolchildren in elementary school, junior high school, or senior high school belonged to IDR 2,500,000-5,000,000 income category. Based on the statistical analysis, there were significant differences between the mean household income of schoolchildren in the elementary school, junior high school, and senior high school. The mean household income of senior high schoolchildren was IDR 7,861,429. This income was higher than the household income of junior high schoolchildren (IDR 6,485,543) and elementary schoolchildren (IDR 5,561,111). In relation to the results in Table 6.3, the proportion of non-working mothers in the families of senior high schoolchildren was less than the non-working parents of elementary schoolchildren and junior high schoolchildren. Therefore, the total income of the parents in the families of senior high schoolchildren was higher due to the additional income from the schoolchildren's mothers.

Table 6.4. Distribution of household income (per month)

Household income (IDR)	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
≤ 2,500,000	17	23.6	14	20	6	8.6
2,500,001-5,000,000	29	40.3	30	42.9	20	28.6
5,000,0001-7,500,000	13	18.1	11	15.7	15	21.4
7,500,001-10,000,000	8	11.1	8	11.4	19	27.1
>10,000,000	5	6.9	7	10	10	14.3
Mean±SD	5,561,111±4,785,617		6,485,543±9,826,089		7,861,429±6,176,957	
Median	5,000,000		4,500,000		6,900,000	
Kruskal-Wallis test	0.001					

Table 6.5 shows the proportion of per capita income in the families of elementary schoolchildren, junior high schoolchildren, and senior high schoolchildren based on the poverty line. Per capita income is calculated by dividing the monthly household income by the number of family members. The poverty line of Cianjur Regency from 2015 to 2019 was IDR 340,882. Most of the household income of elementary schoolchildren, junior high schoolchildren, or senior high schoolchildren was not classified as poor, only less than 13% was classified as poor. The highest proportion of non-poor household (95.7%) was found in the families of senior high schoolchildren.

Table 6.5. Distribution of per capita income by poverty line

Household income (IDR)	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Poor (\leq IDR 340,882)	8	11.1	9	12.9	3	4.3
Not poor ($>$ IDR 340,882)	64	88.9	61	87.1	67	95.7

Note: BPS 2019 – Poverty Line by Regency/City 2015-2018

6.2. Schoolchildren's Characteristics

Based on Table 6.6, the proportions of male and female schoolchildren are not much different. The elementary schoolchildren group mostly consisted of male schoolchildren, while the proportion of female schoolchildren was higher than male schoolchildren in the junior and senior high school groups. Children experience significant growth process in social, cognitive, and emotional fields. The schoolchildren in this study were divided into two age groups (i.e., school-aged children and adolescent). According to Mahan and Raymond (2017), school-aged children are those aged 5-12 years, while children aged 12-21 years are categorized as adolescents. In this study, the elementary schoolchildren that became the respondents had a mean age of 10.7 years for boys and 10.5 years for girls. The female schoolchildren in the junior high school group had a mean age of 13.4 years, while the mean age of the male schoolchildren was 13.5 years. The mean age of male schoolchildren in senior high school (16.6 years) was higher than the female schoolchildren (16.4 years). Based on the age group, the growth period of school-aged children is relatively stable. Their growth speed is not as fast as infants or adolescents. The growth of schoolchildren is different from adolescence, where the changes in cognitive and emotional function occur. The peer influence is stronger than family (Mahan and Raymond 2017).

Based on the birth order, most of the schoolchildren that became the research subjects were the first children. In the elementary school group, 46.8% of schoolchildren were the first children and only 11.2% of children who belonged to the "≥ fourth child" category. These results were similar to the proportion of birth order in the junior and senior high school groups. The highest proportion was found in the "first child" category, and the lowest proportion was in the "≥ fourth child" category.

Table 6.6. Distribution of schoolchildren by sex and age

Sex and age	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Sex						
- Boys	42	58.3	30	42.9	33	47.1
- Girls	30	41.7	40	57.1	37	52.9
Age (years)						
- Boys	10.7±0.5		13.5±0.4		16.6±0.4	
- Girls	10.5±0.4		13.4±0.7		16.4±0.6	
Birth order						
- First child	35	48.6	28	40	30	42.9
- Second child	14	19.4	23	32.9	23	32.9
- Third child	15	20.8	14	20	12	17.1
- ≥Forth child	8	11.2	5	7.1	5	7.1

Pocket money is an amount of money given to children by their parents daily, monthly, weekly, or monthly for the children's needs (Shah *et al.* 2014). Table 6.7 shows that schoolchildren's pocket money consists of meal money, transportation money, and phone credit money. Meal money was the money allocated by schoolchildren to buy food for one day. The mean meal money of schoolchildren in elementary school, junior high school, and senior high school were IDR 12,472, IDR 23,971, and IDR 32,214, respectively. Based on the comparison test, there was a difference in meal money between schoolchildren in elementary school, junior high school, and senior high school. The higher the school level, the greater the meal money. It might be due to the time span of schoolchildren being in school that got longer with the higher education levels. Besides buying snacks, the junior and senior high schoolchildren spent their meal money to buy lunch because they were at school until early evening. It was different from the elementary schoolchildren, who were at school only until noon. The elementary schoolchildren spent the meal money only to buy snacks during breaks, not to buy lunch.

Based on transportation money, there was a significant difference between the schoolchildren in elementary school, junior high school, and senior high school. Senior high schoolchildren had the highest transportation money (IDR 8,435). The money was spent on urban transportation and *ojek* (motorcycle taxi) costs, or it was spent to buy gasoline because several senior high schoolchildren brought vehicles (motorcycle) to school. The proportion of schoolchildren who did not get transportation money in elementary school group was 40.3%. The schoolchildren were taken to school and picked up from school by their parents, or they were on foot; thereby, they did not spend money on transportation. This condition was similar to the money allocation for phone credit. Most elementary schoolchildren did not purchase phone credit. It might be caused by the fact that not all elementary schoolchildren used mobile phones. The highest phone credit money was found in senior high schoolchildren group in which 48.6% of them had phone credit money more than IDR

15,000/day. The phone credit money was mostly used by senior high schoolchildren to buy internet data packages.

The adolescents that have a lot of pocket money will usually consume modern foods (e.g., fast foods) more often than those that have high prestige among their peers (Estetika 2017). The lack of advice and direction from the parents on how to spend pocket money will encourage the children to use it freely (Rosyidah and Andrias 2013). Based on a study by Anggiruling (2019), there was no association between parents' income and student's pocket money. Low-income parents might give higher pocket money than those with higher income. This condition might be caused by the lack of parents' knowledge or nutrition practices (e.g., parents did not accustom their children to breakfast), and thereby the children were given more pocket money to replace breakfast.

Table 6.7. Distribution of schoolchildren by pocket money

Pocket money	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Meal money						
☐ ≤ IDR 10,000	46	63.9	0	0	0	0
☐ > IDR 10,000-IDR 15,000	12	16.7	13	18.6	7	10
☐ > IDR 15,000-IDR 20,000	9	12.5	26	37.1	12	17.1
☐ > IDR 20,000-IDR 25,000	2	2.8	13	18.6	17	24.3
☐ > IDR 25,000	3	4.2	18	25.7	34	48.6
- Mean±SD	12,472±5,704 ^a		23,971±9,100 ^b		32,214±19,891 ^c	
- ANOVA test	0.001					
Transportation money						
☐ No transportation money	29	40.3	20	28.6	8	11.4
☐ IDR ≤ 2,000	25	34.7	12	17.1	7	10
☐ > IDR 2,000-IDR 5,000	13	18.1	25	35.7	21	30
☐ > IDR 5,000	5	6.9	13	18.6	34	48.6
☐ Mean±SD	3,256±2,838 ^a		5,400±5,635 ^{ab}		8,435±10,419 ^b	
☐ ANOVA	0.002					
Phone credit money						
- No phone credit money	24	33.3	12	17.1	1	1.4
- ≤ IDR 5,000	13	18.1	4	5.7	1	1.4
- > IDR 5,000-IDR 10,000	21	29.2	22	31.4	10	14.3
- > IDR 10,000-IDR 15,000	8	11.1	18	25.7	24	34.3
- > IDR 15,000	6	8.3	14	20	34	48.6
- Mean±SD	10,885±6,839 ^a		13,672±8,691 ^a		19,257±9,823 ^b	
- ANOVA	0.001					

6.3. Schoolchildren's Nutritional Status

Nutritional status assessment of the schoolchildren in the elementary school, junior high school, and senior high school was performed using anthropometric measurement method. Nutritional status indicator of children aged 5-18 years was based on

anthropometric measurements of body weight and body height presented as body mass index for age (BMI-for-age) (WHO 2007). Based on Table 6.8, the mean body weight of schoolchildren in elementary school, junior high school, and senior high school were 34.3 kg, 46.5 kg, and 55.6 kg, respectively. The age of the schoolchildren will increase with a higher education level. An increase in age is also followed by increased weight and height of the schoolchildren.

Table 6.8. Distribution of schoolchildren by body weight and body height

Nutritional status	Elementary School	Junior High School	Senior High School
	Mean±SD		
Body weight (kg)	34.3±9.3	46.5±10.7	55.6±13.1
Body height (cm)	137.3±7.3	155.2±7.3	161.9±7.2
BMI-for-age (Z-score)	0.19±1.43	-0.18±1.32	-0.19±1.39
ANOVA test (BMI/A)	0.172		

Schoolchildren's body weight and height will reflect their nutritional status (BMI-for-age) that can be classified into five categories, as presented in Table 6.9. Based on the distribution, most schoolchildren (>60%) in the elementary school, junior high school, and senior high school had normal nutritional status. The proportions of overweight and obese schoolchildren were higher than the proportion of thin or severely thin schoolchildren, especially in elementary schoolchildren. It was presumably caused by nutritionally imbalanced food consumed by schoolchildren. A study by Anggiruling (2019) showed that elementary schoolchildren tended to prefer snacks outside the home, which were high in calories and fat. The fat and energy intakes that continuously exceeded the schoolchildren's nutritional requirements would lead to obesity. This finding was consistent with a study by Rahmawati and Marfuah (2016), which indicated that the number of obese elementary schoolchildren was higher than thin schoolchildren. One of the factors causing childhood obesity is excessive intake, which is sourced from snacks.

Table 6.9. Distribution of schoolchildren by nutritional status

Nutritional status (BMI-for-age)	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Severely thin (Z-score < -3SD)	0	0.0	2	2.9	1	1.4
Thin (-3 SD ≤ Z-score ≤ -2 SD)	4	5.6	3	4.3	5	7.1
Normal (-2 SD < Z-score ≤ +1 SD)	44	61.1	51	72.9	53	75.7
Overweight (+1 SD < Z-score ≤ +2 SD)	14	19.4	11	15.7	6	8.6
Obese (Z-score > +2SD)	10	13.9	3	4.3	5	7.1

7. EXPOSURE TO INDONESIAN DIETARY GUIDELINES

7.1. Exposure to the Indonesian Dietary Guidelines (IDG) in Schoolchildren

IDG is expected to be applied by Indonesian people, including schoolchildren, to achieve a healthy life. The understanding of IDG becomes very important because the macronutrients, micronutrients, and overnutrition problems still occur in the community.

Table 7.1 shows the exposure to Indonesian Food Guide known as Four Healthy Five Perfect (FHFP). The Indonesian Food Guide was launched to Indonesian people in the late 1950s, and thereby the slogan became very well known by the people. The schoolchildren in the elementary school, junior high school, and senior high school who had heard the FHFP term were 94.4%, 98.6%, and 100.0%, respectively. The FHFP slogan contains a suggestion that our daily food must consist of four food elements (i.e., rice, protein-source foods, vegetables, and fruits), which are completed by the fifth element (milk). Thus, the principle of FHFP is that diversity in food consumption should be applicable in families.

The FHFP slogan was socialized to schoolchildren through Science or Physical and Health Education subjects. Both subjects are taught from elementary school to senior high school levels. It was not surprising that many schoolchildren answered that information about FHFP was acquired from their teachers. More than 70% of schoolchildren in elementary school, junior high school, and senior high school mentioned that the teacher was the source of information that made the Indonesian Food Guide known among the schoolchildren. Besides that, the second place after the teacher was the parents. A total of 17.6% of elementary schoolchildren, 20.3% of junior high schoolchildren, and 11.4% of senior high schoolchildren got information about FHFP from their parents. Meanwhile, the role of health workers in promoting FHFP among schoolchildren was very minimal. Only 0%-6% of schoolchildren mentioned health workers as a source of information for the FHFP slogan.

Although the FHFP slogan has been well-known among schoolchildren, only a few elementary schoolchildren (25%) could correctly mention that FHFP consisted of rice, protein-source foods, vegetables, fruits, and milk. The proportion of junior high schoolchildren that could mention the elements of FHFP was higher (49.3%) than the elementary schoolchildren, and the highest proportion (54.3%) was found in senior high schoolchildren. The statistical test showed that there were significant differences ($p < 0.01$) between the proportion of elementary schoolchildren and junior/senior high schoolchildren, and there were no significant differences ($p > 0.05$) between junior and senior high schoolchildren in terms of the ability to mention the details of FHFP.

IDG is a substitute of Indonesian Food Guide (FHFP). With the increasingly complex nutritional problems faced by Indonesia, the MoH RI launched IDG in 1996. There are ten

messages in IDG that are expected to be practiced by people so that the double burden of malnutrition can be prevented earlier.

Table 7.1. Exposure to Indonesian Food Guide (Four Healthy Five Perfect)

No	Exposure to Four Healthy Five Perfect	Elementary School		Junior High School		Senior High School		Kruskal-Wallis test
		n	%	n	%	n	%	
1	Have you ever heard the Four Healthy Five Perfect term?							
	- Yes	68	94.4	69	98.6	70	100.0	0.077
	- No	4	5.6	1	1.4	0	0.0	
2	Who is the source of information about Four Healthy Five Perfect?							
	- Teachers	52	76.5	53	76.8	52	74.3	0.914
	- Health workers	2	2.9	0	0.0	4	5.7	
	- Parents	12	17.6	14	20.3	8	11.4	
	- Media	2	2.9	2	2.9	6	8.6	
3	Can mention Four Healthy Five Perfect in detail							
	- Complete (5 food components)	17	25.0 ^a	34	49.3 ^b	38	54.3 ^b	0.001
	- Incomplete (0-4 food components)	51	75.0 ^a	35	50.7 ^b	32	45.8 ^b	

The 23-year-old IDG is apparently not quite known by schoolchildren until now as they know FHFP. Table 7.2 shows that the schoolchildren in elementary school, junior high school, and senior high school that have heard the IDG term are 51.4%, 61.4%, and 82.9%, respectively. There was no difference ($p > 0.05$) between the proportion of elementary and junior high schoolchildren, but the proportion of both schoolchildren groups was significantly lower ($p < 0.01$) than the proportion of senior high schoolchildren. In the elementary and junior high schoolchildren groups, the teacher was the main source of IDG information. It was stated by 70.3% of elementary schoolchildren and 74.4% of junior high schoolchildren. Meanwhile, only 41.4% of senior high schoolchildren that mentioned teacher as a source of IDG information, and this proportion was significantly lower ($p < 0.01$) than the elementary and junior high schoolchildren. Other sources of IDG information were parents, health workers, and the media.

There are four principles of basic nutrition, which are then explained in detail in 10 nutrition-related messages. The four principles of balanced nutrition are as follows: (1) eating a variety of foods, (2) getting used to clean living behavior, (3) performing physical activity (including sports), and (4) maintaining and monitoring normal body weight. There were 91.7% of elementary schoolchildren who answered correctly that the first principle of basic nutrition was to eat a variety of foods, and this proportion was higher ($p < 0.05$) than the proportions in junior high schoolchildren (74.3%) and senior high schoolchildren (78.6%).

The second principle of IDG is getting used to clean living behavior. The proportion of elementary schoolchildren who gave correct answers (88.9%) was relatively similar to and not significantly different from the proportion of junior high schoolchildren (85.7%) and the proportion of senior high schoolchildren (80.0%). There were no differences found in the proportion between elementary schoolchildren, junior high schoolchildren, and senior high schoolchildren regarding the third and fourth principles. Overall, it can be interpreted that the schoolchildren have a good understanding of the four principles of balanced nutrition inherent in the IDG.

Table 7.2. Exposure to Indonesian Dietary Guidelines

No	Exposure to Indonesian Dietary Guidelines	Elementary School		Junior High School		Senior High School		Kruskal-Wallis test
		n	%	n	%	n	%	
1	Have you ever heard the term "Indonesian Dietary Guidelines"?							
	- Yes	37	51.4 ^a	43	61.4 ^a	58	82.9 ^b	0.001
	- No	35	48.6 ^a	27	38.6 ^a	12	17.1 ^b	
2	Who is the source of information about the Indonesian Dietary Guidelines?							
	- Teacher	26	70.3 ^a	32	74.4 ^a	24	41.4 ^b	0.001
	- Others*	11	29.7 ^a	11	25.5 ^a	34	58.6 ^b	
3	The principles of balanced nutrition							
	- Eat a variety of foods	66	91.7 ^a	52	74.3 ^b	55	78.6 ^b	0.021
	- Get used to clean living behavior	64	88.9	60	85.7	56	80.0	0.328
	- Perform physical activity (including sports)	52	72.2	59	84.3	61	87.1	0.055
	- Maintain and monitor the normal body weight	60	83.3	64	91.4	60	85.7	0.346

Notes: *) Others: health workers, parents, and media

Figure 7.1 called Balanced Nutrition *Tumpang* (BNT) is included in the IDG book. *Tumpang* was originally known as a food dish at various ceremonies, such as marriage, *selamatan* (a ceremony which includes the custom of giving away foods that will provide security for the host and his family), and other ceremonies. *Tumpang* generally contains various types of food that are served together, which are then consumed by guests or invitees.

In IDG, BNT is a reflection of the consumption of a variety of foods consisting of staple foods, vegetables, fruits, protein sources (including milk), and the foods consumed in a small amount (i.e., oil, sugar, and salt). Besides that, various types of physical activities to support health are also featured in the BNT.



Figure 7.1. Balanced Nutrition *Tumpeng* (BNT)

Table 7.3 presents exposure to IDG visual. The proportion of elementary schoolchildren that had seen the picture of BNT was only 30.6%, which was significantly lower ($p < 0.01$) than the proportion of junior high schoolchildren (75.7%) and senior high schoolchildren (65.7%). Most of the schoolchildren (70.0%) in elementary school, junior high school, and senior high school knew that the picture was BNT.

There are several meanings related to BNT picture; i.e., (1) staple foods must be varied (rice, cassava, sweet potatoes, corn, etc.), (2) vegetables are consumed more than fruits, (3) the protein-source foods consumed consist of food sources of animal protein (fish, eggs, and meat) and plant protein (tofu and tempeh), (4) limit the consumption of sugar, salt, and oil, (5) perform various physical activities to be healthy and fit, (6) drink eight glasses of plain water a day, (7) get used to washing hands (before eating, after going to the bathroom, etc.), and (8) get used to monitoring body weight.

The BNT picture turned out to be very easy for schoolchildren to understand. It could be seen from the high proportion of schoolchildren ($> 90.0\%$) who could correctly answer the eight meanings of BNT picture. The good understanding becomes a strong foundation so that the schoolchildren can watch over their dietary patterns, personal hygiene, and physical activities to achieve optimal health.

Moreover, Figure 7.2 called "My Plate: One-Meal Portion" is also introduced in the IDG book. The picture shows the proportion of vegetables and fruits that occupy half of the plate, along with the staple food and protein-source foods that also occupy half of the plate.

Table 7.3. Exposure to Balanced Nutrition *Tumpeng* visual

No	Exposure to Balanced Nutrition <i>Tumpeng</i> visual	Elementary School		Junior High School		Senior High School		Kruskal-Wallis test
		n	%	n	%	n	%	
1	Have seen the BNT picture							
	- Yes	22	30.6 ^a	53	75.7 ^b	46	65.7 ^b	0.001
- No	50	69.4 ^a	17	24.3 ^b	24	34.3 ^b		
2	Know the name of the picture							
	- Yes	17	77.3	38	71.7	37	80.4	0.593
- No	5	22.7	15	28.3	9	19.6		
3	The meaning of BNT picture							
	- Staple foods must be varied (rice, cassava, sweet potatoes, corn, etc.)	67	93.1 ^a	67	95.7 ^a	58	82.9 ^b	0.023
	- Vegetables are consumed more than fruits	68	94.4	65	92.9	66	94.3	0.911
	- The protein-source foods consumed consist of food sources of animal protein (fish, eggs, and meat) and plant protein (tofu and tempeh)	67	93.1	66	94.3	69	98.6	0.270
	- Limit the consumption of sugar, salt, and oil	66	91.7	70	100	66	94.3	0.058
	- Perform various physical activities to be healthy and fit	70	97.2	70	100	69	98.6	0.376
	- Drink 8 glasses of plain water a day	70	97.2	69	98.6	70	100.0	0.376
	- Get used to washing hands (before eating, after going to the bathroom, etc.)	70	97.2	70	100	70	100.0	0.142
- Get used to monitoring body weight	70	97.2	66	94.3	66	94.3	0.635	

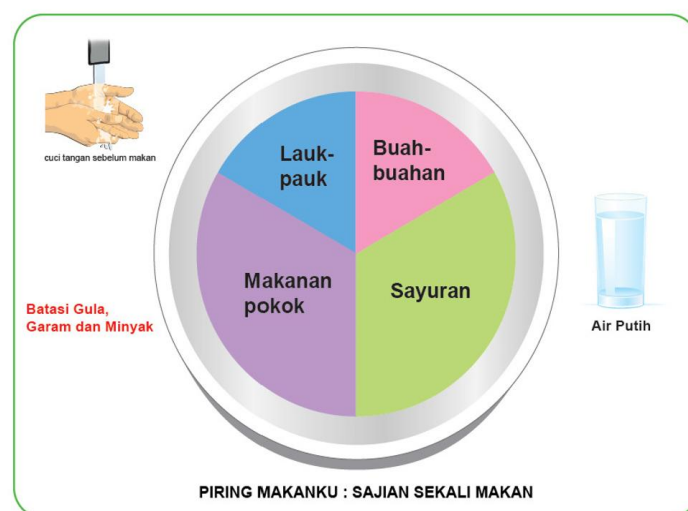


Figure 7.2. My Plate: One-Meal Portion

Table 7.4 shows the exposure to My Plate visual. It seems that My Plate has not yet quite popular among schoolchildren. The proportion of elementary schoolchildren, junior high schoolchildren, and senior high school children that had seen the picture of My Plate were 41.7%, 41.4%, and 51.4%, respectively. Many schoolchildren did not even know the name of the picture. Only 6.9%-16.7% of schoolchildren correctly stated that the picture was My Plate.

Table 7.4. Exposure to My Plate visual

No	Exposure to My Plate visual	Elementary School		Junior High School		Senior High School		Kruskal-Wallis test
		n	%	n	%	n	%	
1	Have seen My Plate picture							0.398
	- Yes	30	41.7	29	41.4	36	51.4	
	- No	42	58.3	41	58.6	34	48.6	
2	Know the name of the picture							0.452
	- Yes	3	10.0	2	6.9	6	16.7	
	- No	27	90.0	27	93.1	30	83.3	
3	The meaning of My Plate							0.198
	- A healthy eating recommendation in which half (50%) of the amount of food at each meal consists of staple food and protein-source foods	68	94.4	64	91.4	60	85.7	
	- A healthy eating recommendation in which half (50%) of the amount of food at each meal consists of vegetables and fruits	67	93.1	66	94.3	61	87.1	0.270

There are two important meanings contained in the picture of My Plate; i.e., (1) a healthy eating recommendation in which half (50%) of the amount of food at each meal consists of staple foods and protein-source foods, and (2) half (50%) of the amount of food at each meal consists of vegetables and fruits. Both of these meanings had been well-understood by the schoolchildren in which more than 85% of them had correctly answered the meanings of My Plate. This finding indicates that nutrition-related messages in the form of a picture will be easier to understand. Thus, the application of these messages in daily life to improve dietary patterns can be practiced.

7.2. Schoolchildren's Knowledge, Attitude, and Practice (KAP) on Indonesian Dietary Guidelines (IDG)

Schoolchildren's knowledge, attitudes, and practices on IDG in this study were assessed by several relevant questions or statements. The knowledge regarding IDG can be an

important foundation for the formation of positive attitudes and good behavior by referring to IDG.

7.2.1. Schoolchildren's Knowledge

Table 7.5 shows the distribution of schoolchildren based on the category of IDG knowledge. The poor knowledge category (score <60) was mostly found in elementary schoolchildren (15.3%), while the good knowledge category (score >80) was mostly found in junior high schoolchildren (35.7%) and senior high schoolchildren (35.7%). The mean score of elementary schoolchildren (72.6), junior high schoolchildren (77.5), and senior high schoolchildren (77) indicated that all of them belonged to moderate knowledge category. The comparison test showed that the mean knowledge score of elementary schoolchildren was significantly lower ($p < 0.05$) than junior or senior high schoolchildren.

Table 7.5. Distribution of schoolchildren based on IDG knowledge category

Category of IDG knowledge	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Poor (<60)	11	15.3	0	0.0	3	4.3
Moderate (60-80)	39	54.2	45	64.3	42	60.0
Good (>80)	22	30.6	25	35.7	25	35.7
Mean±SD	72.6±13.6 ^a		77.5±9.7 ^b		77±9.6 ^{ab}	
ANOVA	0.018					

Nutrition knowledge scores acquired by the schoolchildren can be a capital for the achievement of good nutrition behavior in their dietary patterns. According to Candra (2013), nutrition knowledge is strongly associated with the quality of nutrition and food consumed. With the right and proper knowledge about nutrition, a person will know and try to manage his diet so that he has a balanced and adequate diet.

The implementation of IDG can be affected by many things, including knowledge, food availability at the family level, household purchasing power, and other things. There are ten nutrition-related messages in the IDG; i.e., (1) eat a variety of foods, (2) consume vegetables and fruits, (3) consume high-protein foods, (4) consume a variety of staple foods, (5) limitation of sweet, salty, and fatty foods, (6) breakfast regularly, (7) drink enough water, (8) read food label, (9) wash hands with soap, and (10) regular physical activity. These ten messages were then translated into true-false questions. The questions correctly answered by 80% of schoolchildren were considered good and understood.

It can be seen in Table 7.6 that the first message (eat a variety of foods) has been understood by the majority of schoolchildren (78.6%-97.1%), either the ones in elementary school, junior high school or senior high school. The composition of diverse foods consists of food sources of carbohydrates, protein, fat, vitamin, and mineral. This composition was once

known as FHFP in Indonesia. Diversity in food consumption is very important so that complete nutrient intakes can be obtained.

The second message (consume vegetables and fruits) had also been understood by the majority of schoolchildren. However, the question “overeating and low consumption of vegetables and fruits can cause obesity” had not been quite understood by the schoolchildren because only 56.9% of them correctly answered the question.

The third message (consume high-protein foods) with a question “meat has a higher protein content than eggs” was correctly answered by 35%-65% of schoolchildren. This finding showed that the schoolchildren’s understanding of the nutrients in food sources of animal protein had not been good enough. The food sources of animal protein are essential as the source of protein and essential mineral (e.g., iron and zinc) intakes. Lack of consumption of food sources of animal protein can cause impaired growth, anemia, etc.

Table 7.6. Distribution of schoolchildren (%) based on IDG knowledge questions

Message	Knowledge questions	Elementary School		Junior High School		Senior High School	
		Correct	False	Correct	False	Correct	False
1. Eat a variety of foods	1. The more diverse the types of food consumed, the easier it is to meet the nutritional requirements.	88.9	11.1	82.9	17.1	78.6	21.4
	2. Food consists of five groups; i.e., staple food, protein-source foods, vegetables, fruits, and beverages.	87.5	12.5	88.6	11.4	97.1	2.9
2. Consume vegetables and fruits	3. Overeating and low consumption of vegetables and fruits can cause obesity.	56.9	43.1	78.6	21.4	88.6	11.4
	4. Vegetables and fruits are sources of various vitamins, minerals, and dietary fiber.	87.5	12.5	94.3	5.7	98.6	1.4
3. Consume high-protein foods	5. Meat has a higher protein content than eggs.	65.3	34.7	62.9	37.1	37.1	62.9
	6. Tempeh, tofu, and legumes are food sources of plant protein.	84.7	15.3	90.0	10.0	94.3	5.7
4. Consume a variety of staple foods	7. Corn, red rice, and black sticky rice do not contain much fiber.	61.1	38.9	61.4	38.6	55.7	44.3
	8. Staple foods contain carbohydrates and fiber.	83.3	16.7	94.3	5.7	98.6	1.4
5. Limitation of sweet, salty, & fatty foods	9. Consuming a lot of salty foods (high in salt content) can cause high blood pressure.	83.3	16.7	65.7	34.3	75.7	24.3
	10. Banana, nuts, and melon can help reduce blood pressure.	86.1	13.9	80.0	20.0	72.9	27.1
6. Breakfast regularly	11. Breakfast is an activity of eating and drinking performed from the time you get up in the morning to 9 o'clock.	91.7	8.3	92.9	7.1	94.3	5.7
	12. A good breakfast consists of staple foods, protein-source foods, vegetables or fruits, and beverages.	94.4	5.6	92.9	7.1	90.0	10.0

Table 7.6. Distribution of schoolchildren (%) based on IDG knowledge questions (*cont.*)

Message	Knowledge questions	Elementary School		Junior High School		Senior High School	
		Correct	False	Correct	False	Correct	False
7. Drink enough water	13. Water is needed by the body to live healthily.	98.6	1.4	98.6	1.4	100.0	0.0
	14. Constipation is a sign of dehydration.	72.2	27.8	77.1	22.9	70.0	30.0
8. Read food label	15. Before buying or consuming packaged foods, it is recommended to read the nutrition facts label.	95.8	4.2	97.1	2.9	91.4	8.6
	16. An expiration date on a packaged food indicates whether the food is still safe or not safe for consumption.	83.3	16.7	95.7	4.3	97.1	2.9
9. Wash hands with soap	17. Washing hands with soap and clean running water is a clean living behavior.	97.2	2.8	98.6	1.4	100.0	0.0
	18. It is enough to wash hands with clean water before eating	18.1	81.9	37.1	62.9	50.0	50.0
10. Regular physical activity	19. A good physical activity only needs to be performed once a week.	33.3	66.7	52.9	47.1	70.0	30.0
	20. Regular physical activity can keep the body healthy and fit.	93.1	6.9	100.0	0.0	100.0	0.0

The fourth message (consume a variety of staple foods) with the question “corn, red rice, and black sticky rice do not contain much fiber” had not been quite understood by the schoolchildren. Only 61.1% of elementary schoolchildren, 61.4% of junior high schoolchildren, and 55.7% of senior high schoolchildren correctly answered the question. The fiber intake of most Indonesian people has not met the requirement of 20-30 g/day. Besides rice that is commonly consumed by Indonesian people, other staple foods can be a source of fiber.

The fifth message (limitation of sweet, salty, and fatty foods) with the question “consuming a lot of salty foods (high in salt content) can cause high blood pressure” had not been understood by junior and senior high schoolchildren. The junior and senior high schoolchildren that correctly answered the question were 65.7% and 75.7%, respectively. The MoH RI has stated that the salt consumption limit is 5 g/capita/day to anticipate the spread of one of the degenerative diseases (i.e., hypertension).

The sixth message (breakfast regularly) had been well-understood by the schoolchildren. More than 90% of schoolchildren had correctly answered the breakfast-related questions. Various studies have proven the important role of breakfast to improve schoolchildren’s academic performance. Therefore, the recommendation of having breakfast before going to school must always be emphasized to schoolchildren so that their stamina in the class is always good.

The seventh message (drink enough water) with the question “constipation is a sign of dehydration” had not been understood by some schoolchildren. A total of 70.0%-77.1% of

schoolchildren had correctly answered the question. Dehydration is a condition in which the body lacks fluid, and it can cause various symptoms such as dizziness, constipation, and other symptoms. The recommendation to drink eight glasses of water a day is very important to note.

The eighth message (read food label) had been well-understood by the schoolchildren. The increasing number of packaged food products must be accompanied by consumer’s awareness to always read food labels. Thus, we can find out the calorie and nutrient contents of the packaged food we consume.

The ninth message (wash hands with soap) with the question “it is enough to wash hands with clean water before eating” has not been well-understood by the schoolchildren. Only 18.1%-50.0% of schoolchildren had correctly answered the question. The use of soap for handwashing needs to be emphasized because soap is a disinfectant that can kill bacteria. Various activities that must be accompanied by washing hands with soap, among others, are as follows: after using the toilet, before and after eating, after handling pets, etc.

The tenth message (regular physical activity) with the question “a good physical activity only needs to be performed once a week” had not been understood by many schoolchildren. Those who correctly answered the question ranged from 33.3% to 70.0%. Physical activity should be performed three to five times a week, depending on the types of sports chosen. Performing regular exercise with adequate duration is essential for improving body fitness.

7.2.2. Schoolchildren’s Attitude

Table 7.7 shows the distribution of schoolchildren based on the category of IDG attitude. Positive attitudes were more common in elementary schoolchildren (73.6%) than junior high schoolchildren (55.7%) or senior high schoolchildren (57.1%). The statistical test showed that the mean attitude score of the elementary schoolchildren (84.4) was significantly higher than junior high schoolchildren (81.6) and senior high schoolchildren (81.7). In this study, the attitude was defined as a tendency to act or behave according to the IDG messages.

Table 7.7. Distribution of schoolchildren based on IDG attitude category

Category of IDG attitude (score)	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Positive (>80)	53	73.6	39	55.7	40	57.1
Negative (≤80)	19	26.4	31	44.3	30	42.9
Mean±SD	84.4±5.8 ^a		81.6±5.6 ^b		81.7±6.2 ^b	
ANOVA	0.007					

The details of statements regarding the attitude on IDG can be seen in Table 7.8. There were 65.3% of elementary schoolchildren, 44.3% of junior high schoolchildren, and 54.3% of senior high schoolchildren who agreed with the statement “consuming a variety of foods

every day is important for nutrient intakes and health" (the first message of IDG). The rest expressed doubts or disagreement with the statement. These results indicate that the reinforcement of the message is required so that the recommendation of eating a variety of foods can be reflected in the schoolchildren's nutrition attitudes.

There were 48.6% of elementary schoolchildren, 25.7% of junior high schoolchildren, and 28.6% of schoolchildren who agreed with the statement "consumption of vegetables a day is more than the consumption of fruits" (the second message of IDG). The rest expressed doubt or disagreement with the statement. The good understanding when the schoolchildren paid careful attention to My Plate picture where the portion of vegetables was more than the portion of fruits was not reflected in the schoolchildren's nutrition attitudes. These results showed that the understanding (cognition) about nutrition-related messages had not been internalized into positive nutrition attitudes.

Only 30.0%-44.3% of schoolchildren agreed with the statement "I choose to consume fish/eggs/meat rather than tofu/tempeh" (the third message of IDG). Animal source foods have advantages compared to plant-based protein sources. The consumption of animal source foods is very important to note because they have higher protein and mineral quality than plant-based protein sources. The schoolchildren still need to be given an understanding regarding this information; thereby, doubtful nutrition attitudes can be changed to positive nutrition attitudes.

Only a few students (24.3%-28.6%) agreed with the statement "I should consume more than one type of staple food (rice/noodles/potatoes/cassava) every day" (the fourth message of IDG). The staple food consumed daily by Indonesian people is rice. Other staple foods are mostly consumed only in the form of snacks. It can be understood from the schoolchildren's nutrition attitudes that shifting the mindset to change the staple food from rice to non-rice needs continuous nutrition socialization efforts.

Regarding the fifth message of IDG (limitation of sweet, salty, and fatty foods), many elementary schoolchildren disagreed with the selection of sweets or soft drinks. On the contrary, the proportion of junior and senior high schoolchildren who expressed disagreement was lower than the elementary schoolchildren. It meant that the nutrition attitudes of the elementary schoolchildren were better than the junior/senior high schoolchildren, especially for the fifth message.

Most schoolchildren (78.6%-90.3%) agreed with the statement "I choose to have breakfast before going to school" (the sixth message of IDG). This statement might be one of the messages that got the most agreement. This result indicates that the understanding of breakfast is far better than other nutrition-related messages; thereby, breakfast habits will become part of the schoolchildren's eating habits.

Table 7.8. Distribution of schoolchildren (%) based on IDG attitude statements

IDG messages	Statements	Elementary School			Junior High School			Senior High School		
		Agree	Doubt-ful	Dis-agree	Agree	Doubt-ful	Dis-agree	Agree	Doubt-ful	Dis-agree
1. Eat a variety of foods	1. Consuming a variety of foods every day is important for nutrient intakes and health.	65.3	23.6	11.1	44.3	37.1	18.6	54.3	41.4	4.3
2. Consume vegetables and fruits	2. Consumption of vegetables a day is more than the consumption of fruits.	48.6	36.1	15.3	25.7	55.7	18.6	28.6	52.9	18.6
	3. I choose to consume stir-fried vegetables rather than clear vegetable soup	34.7	38.9	26.4	27.1	54.3	18.6	45.7	25.7	28.6
3. Consume high-protein foods	4. I choose to consume fish/eggs/meat rather than tofu/tempeh.	31.9	38.9	29.2	30	52.9	17.1	44.3	42.9	12.9
	5. I should drink milk to support health.	93.1	4.2	2.8	82.9	10.0	7.1	92.9	4.3	2.9
4. Consume a variety of staple foods	6. I should consume more than one type of staple food (rice/noodles/potatoes/cassava) every day.	27.8	50.0	22.2	28.6	38.6	32.9	24.3	45.7	30.0
5. Limitation of sweet, salty, and fatty foods	7. I choose sweet snacks (cakes, chocolates, and candies).	20.8	36.1	43.1	21.4	45.7	32.9	38.6	34.3	27.1
	8. I choose ice syrup or soft drinks.	9.7	19.4	70.8	15.7	28.6	55.7	17.1	28.6	54.3
	9. I choose savory and salty snacks.	29.2	48.6	22.2	40.0	45.7	14.3	50.0	40.0	10.0
6. Breakfast regularly	10. I choose to have breakfast before going to school	90.3	4.2	5.6	88.6	11.4	0.0	78.6	12.9	8.6

Table 7.8. Distribution of schoolchildren (%) based on IDG attitude statements (*cont.*)

IDG messages	Statements	Elementary School			Junior High School			Senior High School		
		Agree	Doubt- ful	Dis- agree	Agree	Doubt- ful	Dis- agree	Agree	Doubt- ful	Dis- agree
7. Drink enough water	11. I should drink eight glasses of water a day.	80.6	13.9	5.6	84.3	14.3	1.4	84.3	8.6	7.1
8. Read food label	12. I should read the expiration date before buying or consuming packaged food products.	87.5	9.7	2.8	100.0	0.0	0.0	95.7	1.4	2.9
	13. I need to read nutrition facts label on packaged foods	87.5	8.3	4.2	75.7	22.9	1.4	58.6	32.9	8.6
9. Wash hands with soap	14. I should wash my hands with soap and tap water.	95.8	0.0	4.2	98.6	1.4	0.0	91.4	5.7	2.9
10. Regular physical activity	15. I should exercise diligently since a young age.	93.1	4.2	2.8	91.4	7.1	1.4	94.3	2.9	2.9

The statement related to the seventh message of IDG was “I should drink eight glasses of water a day”. Many schoolchildren (>80.0%) responded positively to this statement. Schoolchildren’s awareness of the importance of drinking enough water was good. This attitude can support schoolchildren’s health if it is practiced in their daily lives.

The statement “read food label” (the eighth message of IDG), especially regarding the expiration date, received a positive response. It was indicated by the number of schoolchildren who agreed with the statement (87.5%-100.0%). However, it turned out that the number of schoolchildren who agreed with the statement “I need to read nutrition facts label on packaged foods” was lower (only 58.6%-87.5%). However, the awareness about reading food label could be considered quite good, and it could be an indicator that the schoolchildren were nutritionally conscious consumers.

The statement “I should wash my hands with soap and tap water” (the ninth message of IDG) received a positive response from the schoolchildren (91.4%-98.6%). The awareness seems to have become part of their daily lives. Access to clean water and soap is easier to obtain, especially for schoolchildren who live in cities. The positive attitude shown by schoolchildren indicates that personal hygiene will be easier to practice by them.

Many students (91.4%-94.3%) also responded positively to the tenth nutrition-related message of IDG reflected by the statement "I should exercise diligently since a young age". Awareness to exercise is important, and thereby the schoolchildren's positive attitudes should be realized through the practice of exercise as an effort to maintain health and fitness.

7.2.3. Schoolchildren's Practice

Table 7.9 shows the distribution of schoolchildren based on IDG practice category. Most elementary schoolchildren (65.3%) had good IDG practices. Meanwhile, the junior and senior high schoolchildren that had good practices were only 45.7% and 18.6%, respectively. The ANOVA showed that the mean score of IDG practice in elementary schoolchildren (81.6) was not different from the score of junior high schoolchildren (79.4), but their scores were different from the IDG practice score of senior high schoolchildren (75.8). A balanced-nutrition diet in young age groups (elementary school and junior high school) is very likely to be very dependent on the foods provided by their parents at home, which are relatively more diverse. Besides that, they still want to follow their parents' suggestions related to good dietary patterns.

Table 7.9. Distribution of schoolchildren based on IDG practice category

Category of IDG practice	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Poor (<60)	1	1.4	0	0	0	0
Moderate (60-80)	24	33.3	38	54.3	57	81.4
Good (>80)	47	65.3	32	45.7	13	18.6
Mean±SD	81.6±8 ^a		79.4±6.4 ^a		75.8±6.2 ^b	
ANOVA	0.001					

Notes: the mean scores of elementary schoolchildren and senior high schoolchildren were significantly different, and the mean scores of junior and senior high schoolchildren were significantly different.

Table 7.10 describes the details of balanced nutrition practices among the schoolchildren in elementary school, junior high school, and senior high school. The diversity of daily food consumption that consisted of staple foods, protein-source foods, vegetables, fruits, and beverages in the elementary schoolchildren was better than junior and senior high schoolchildren. A total of 34.7% of elementary schoolchildren answered "always" for the questions regarding the diversity of daily food consumption. Meanwhile, the junior and senior high schoolchildren who answered "always" were 21.4% and 12.9%, respectively.

The number of schoolchildren in the elementary school, junior high school, and senior high school who answered that they always ate vegetables three times a day were relatively similar; i.e., 43.1%, 41.4%, and 47.1%, respectively. The habit of eating vegetables that are generally rich in fiber, vitamins, and minerals will support the schoolchildren's health. Some schoolchildren might not be able to consume vegetables three times a day because the breakfast menu was generally lacking in vegetables. Popular types of breakfast among Indonesian schoolchildren are fried rice, *nasi uduk* (rice cooked with coconut milk), or chicken

porridge served without vegetables. Meanwhile, 79.2% of elementary schoolchildren, 64.3% of junior high schoolchildren, and 54.3% of senior high schoolchildren answered “always” regarding the habit of eating fruit twice a day. Access to fruits in schools is very limited, and thereby the availability of fruits at home will greatly determine the fruit consumption habits.

The number of elementary schoolchildren that always consumed animal source foods alternately (27.8%) was higher than the junior high schoolchildren (20.0%) and senior high schoolchildren (10.0%). Popular animal source food with the relatively lowest price is egg, and the most expensive one is beef. Consumption of animal source foods is essential to support the physical growth of schoolchildren. The main constraint of the provision of animal source foods at home is family income. The highest proportion of schoolchildren stating that they always drank milk were found in senior high school (27.1%), followed by the schoolchildren in elementary school (19.4%) and junior high school (14.3%). Milk is more expensive than other drinks. Besides that, Indonesian people in general rarely drink milk. Given the importance of milk as a source of calcium, milk-drinking habits should continue to be practiced among schoolchildren.

The diversity of food consumption of carbohydrate sources was also more prominent in elementary schoolchildren. Those who answered that they always ate tubers as staple foods or snacks were 84.7%, 77.1%, and 71.4% in the elementary school, junior high school, and senior high schools, respectively. The efforts related to the diversification of staple food consumption are currently promoted by the government in the hope of reducing rice consumption. However, these efforts are not easy because people have been accustomed to eating rice as a staple food for a long time.

The number of senior high schoolchildren who stated that they always consumed sweet foods/beverages (32.9%) was relatively higher than junior high schoolchildren (17.1%) and elementary schoolchildren (15.3%). Meanwhile, the number of schoolchildren in the elementary school, junior high school, and senior high schools who always consumed fried foods were almost the same (around 70.0%). Limitation of sugar, salt, and fat consumption currently becomes a concern of the MOH RI due to the increasingly high degenerative diseases and obesity problems faced by the people.

Breakfast habits practiced by elementary schoolchildren were better than junior and senior high schoolchildren. It could be seen from the number of elementary schoolchildren (62.5%) who stated that they always had breakfast before going to school while the junior and senior high schoolchildren who always had breakfast were 50.0% and 22.9%, respectively. Breakfast is very important to maintain the stamina in the morning so that schoolchildren can do many activities properly at school. A large number of schoolchildren not eating breakfast before going to school showed a lack of understanding of nutrition among schoolchildren.

Table 7.10. Distribution of schoolchildren (%) based on IDG practice questions

Messages	Questions	Elementary School			Junior High School			Senior High School		
		Always	Some times	Never	Always	Some times	Never	Always	Some times	Never
1. Eat a variety of foods	1. The foods I consume every day are the staple food, protein-source foods, vegetables, fruits, and beverages.	34.7	63.9	1.4	21.4	77.1	1.4	12.9	75.7	11.4
2. Consume vegetables and fruits	2. I eat vegetables 3x /day	43.1	55.6	1.4	41.4	55.7	2.9	47.1	51.4	1.4
	3. I eat fruits twice a day.	79.2	20.8	0.0	64.3	31.4	4.3	54.3	44.3	1.4
3. Consume high-protein foods	4. I always eat animal source foods (eggs/fish/chicken/beef) alternately every day.	27.8	61.1	11.1	20.0	72.9	7.1	10.0	72.9	17.1
	5. I drink milk to support health	19.4	70.8	9.7	14.3	77.1	8.6	27.1	71.4	1.4
4. Consume a variety of staple foods	6. I eat sweet potatoes, cassava, or potatoes as staple foods or snacks.	84.7	13.9	1.4	77.1	21.4	1.4	71.4	24.3	4.3
5. Limitation of sweet, salty, and fatty foods	7. I eat sweet snacks (cakes, chocolates, candies) and drink various ice syrup or soft drinks.	15.3	73.6	11.1	17.1	62.9	20.0	32.9	57.1	10.0
	8. I consumed fried foods (vegetable fritters, fried tofu, fried tempeh, etc.)	72.2	23.6	4.2	71.4	27.1	1.4	70.0	30.0	0.0
6. Breakfast regularly	9. I have breakfast before going to school.	62.5	33.3	4.2	50.0	41.4	8.6	22.9	67.1	10.0
	10. I bring home-packed meal to school.	90.3	9.7	0.0	88.6	10.0	1.4	77.1	22.9	0.0

Table 7.10. Distribution of schoolchildren (%) based on IDG practice questions (*cont.*)

Messages	Questions	Elementary School			Junior High School			Senior High School		
		Always	Some times	Never	Always	Some times	Never	Always	Some times	Never
7. Drink enough water	11.I drink eight glasses of water a day.	81.9	18.1	0.0	90.0	8.6	1.4	90.0	10.0	0.0
8. Read food label	12.I read the expiration date before buying or consuming packaged food products.	70.8	26.4	2.8	48.6	50.0	1.4	27.1	67.1	5.7
	13.I read nutrition facts label on packaged foods.	61.1	38.9	0.0	54.3	44.3	1.4	38.6	55.7	5.7
9. Wash hands with soap	14.I wash my hands with soap and tap water (clean running water).	27.8	63.9	8.3	14.3	77.1	8.6	4.3	70.0	25.7
	15.I wash my hands before eating.	6.9	77.8	15.3	11.4	77.1	11.4	11.4	82.9	5.7
10. Regular physical activity	16.I exercise regularly.	15.3	73.6	11.1	22.9	74.3	2.9	35.7	62.9	1.4
	17. I help clean the house yard.	48.6	45.8	5.6	34.3	61.4	4.3	17.1	78.6	4.3

Drinking eight glasses of water a day is essential to keep the body not dehydrated. Water is useful for maintaining body temperature, and it is an important component in one's body. The practices of drinking water had been relatively good among schoolchildren. A total of 81.9% of elementary schoolchildren, 90.0% of junior high schoolchildren, and 90.0% senior high schoolchildren stated that they always drank eight glasses of water a day.

Reading food labels is important so that we know the information about nutrient contents on packaged foods. Besides that, reading the expiration date is also important because it is related to the food safety aspect. It turned out that the awareness about food labels among elementary schoolchildren was higher than junior and senior high schoolchildren. The number of schoolchildren in the elementary school, junior high school, and senior high schools that always paid attention to the expiration date on packaged foods were 70.8%, 48.6%, and 27.1%, respectively. Meanwhile, the number of schoolchildren in the elementary school, junior high school, and senior high school that paid attention to nutrition facts were 61.1%, 54.3%, and 38.6%, respectively.

Only a small proportion of schoolchildren (i.e., 28% of elementary schoolchildren, 14.3% of junior high schoolchildren, and 4.3% of senior high schoolchildren) practiced the habit of always washing hands with soap, likewise the habit of washing hands before eating. Personal hygiene practices that were still poor showed a low awareness of schoolchildren about the importance of clean living. The use of soap for washing hands should always be socialized among schoolchildren. Soap is known to have disinfectant properties, and it can kill germs.

Regarding physical activity, regular exercise practices were mostly performed by senior high schoolchildren (35.7%) compared to junior high schoolchildren (22.9%) and elementary schoolchildren (15.3%). Exercise must be part of a healthy lifestyle. A higher awareness of exercise among senior high schoolchildren might be due to their better understanding that exercise was strongly related to the physical shape of the body. Lack of exercise can cause overweight.

7.3. Mothers' Knowledge, Attitude, and Practice (KAP) on Indonesian Dietary Guidelines (IDG)

7.3.1. Mother's Knowledge

Mothers' knowledge, attitude, and practice (KAP) on Indonesian Dietary Guidelines (IDG) had been assessed to identify the possible relationship between mothers' KAP and schoolchildren's KAP and the relationship between mothers' KAP and nutritional status of schoolchildren. Mothers' KAP towards balanced nutrition and healthy lifestyles are important to support children's nutritional and health status. Mother with good knowledge is expected to have a good practice as well. Food and nutrition-related behaviors are embedded in many other aspects of their lives; thereby, making a change in one aspect may involve drastic changes in other aspects. Educators and psychologists (Rogers 1969; Freire & Shor 1987; Knowles 1990; Vella 2002) note that learning environments must be challenging enough to stimulate growth but also safe enough to allow people to grow and change perspectives, knowledge, attitude, motivation, and action.

Table 7.11. Distribution of mothers based on IDG knowledge category

Category	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Poor (<60)	0	0.0	0	0.0	0	0.0
Moderate (60-80)	2	2.8	0	0.0	2	2.9
Good (>80)	70	97.2	70	100.0	68	97.1
Mean±SD	92.5±5.5		90.8±5.3		92±5.9	
ANOVA	0.201					

Table 7.11 shows the distribution of mothers based on their IDG knowledge category. The majority of mothers of schoolchildren in elementary school (97.2%), junior high school (100%), and senior high school (97.1%) had good scores, and only a few mothers in

elementary school (2.8%) and senior high school (2.9%) had moderate scores. The distribution among them was not different significantly with the mean score of >90.

Table 7.12 presents the distribution of mothers that have answered the IDG knowledge questions. From the questions regarding the knowledge of ten messages in IDG, 80%-100% of mothers correctly answered the questions. One question could not be correctly answered by the mothers (67%-87%); i.e., good physical activity only needs to be performed once a week. The correct answer to that question should be "false". The mothers' knowledge in balanced-nutrition aspects is essential for the formation of healthy family, which may affect nutritional status and wellness. Even though most mothers had known the benefit of vegetable and fruit consumption, the total consumption of vegetables and fruits was still low. The total consumption of fruits and vegetables in Indonesia were still low; i.e., 173 g/person/day for fruits (BPS 2018c) and 108.8 g/person/day for vegetables (Hermina and Prihatini 2016). These figures were far below the recommendation (300-400 g/person/day) (MoH RI 2014).

Table 7.12. Distribution of mothers (%) based on IDG knowledge questions

Messages	Knowledge questions	Elementary School		Junior High School		Senior High School	
		Correct	False	Correct	False	Correct	False
1. Eat a variety of foods	1. The more diverse the types of food consumed, the easier it is to meet the nutritional requirements.	88.9	11.1	88.6	11.4	90.0	10.0
	2. Food consists of five groups; i.e., staple foods, protein-source foods, vegetables, fruits, and beverages.	97.2	2.8	98.6	1.4	97.1	2.9
	3. Diverse food and beverages are certainly safe.	91.7	8.3	78.6	21.4	88.6	11.4
2. Consume vegetables and fruits	4. Vegetables and fruits are sources of various vitamins, minerals, and dietary fiber.	100.0	0.0	100.0	0.0	100.0	0.0
	5. Adequate consumption of vegetables and fruits can facilitate defecation.	100.0	0.0	100.0	0.0	100.0	0.0
	6. Overeating and low consumption of vegetables and fruits can cause obesity.	83.3	16.7	95.7	4.3	92.9	7.1
	7. Eating one portion of fruit (one apple or one banana) a day is enough.	40.3	59.7	31.4	68.6	47.1	52.9

Table 7.12. Distribution of mothers (%) based on IDG knowledge questions (*cont.*)

Messages	Knowledge questions	Elementary School		Junior High School		Senior High School	
		Correct	False	Correct	False	Correct	False
3. Consume high-protein foods	8. Meat has a higher protein content than eggs.	72.2	27.8	62.9	37.1	60.0	40.0
	9. Tempeh, tofu, and legumes are food sources of plant protein.	100.0	0.0	100.0	0.0	100.0	0.0
	10. Milk contains protein, fat, and calcium.	100.0	0.0	98.6	1.4	98.6	1.4
4. Consume a variety of staple foods	11. Rice, corn, cassava, sweet potatoes, and taro are examples of Indonesia's staple foods.	100.0	0.0	98.6	1.4	98.6	1.4
	12. Staple foods contain carbohydrates and fiber.	97.2	2.8	95.7	4.3	98.6	1.4
5. Limitation of sweet, salty, and fatty foods	13. Consuming a lot of salty foods (high in salt content) can cause high blood pressure.	97.2	2.8	95.7	4.3	94.3	5.7
	14. Consuming a lot of oily and fatty foods is bad for heart health.	100.0	0.0	100.0	0.0	95.7	4.3
6. Breakfast regularly	15. Breakfast is an activity of eating and drinking performed from the time you get up in the morning to 9 o'clock.	98.6	1.4	100.0	0.0	97.1	2.9
	16. Adequate breakfast can increase learning concentration and stamina and prevent obesity.	95.8	4.2	97.1	2.9	98.6	1.4
7. Drink enough water	17. Water is needed by the body to live healthily.	100.0	0.0	97.1	2.9	100.0	0.0
	18. Constipation is a sign of dehydration.	72.2	27.8	74.3	25.7	77.1	22.9
8. Read food label	19. Before buying or consuming packaged foods, it is recommended to read the nutrition facts label.	100.0	0.0	98.6	1.4	98.6	1.4
	20. An expiration date on a packaged food indicates whether the food is still safe/not for consumption.	98.6	1.4	97.1	2.9	97.1	2.9
9. Wash hands with soap	21. Washing hands with soap and clean running water is a clean living behavior.	100.0	0.0	98.6	1.4	100.0	0.0
	22. It is enough to wash your hands with clean water before eating.	33.3	66.7	41.4	58.6	52.9	47.1

Table 7.12. Distribution of mothers (%) based on IDG knowledge questions (*cont.*)

Messages	Knowledge questions	Elementary School		Junior High School		Senior High School	
		Correct	False	Correct	False	Correct	False
10. Regular physical activity	23. Sweeping, washing, gardening, and exercising are examples of physical activity.	100.0	0.0	100.0	0.0	97.1	2.9
	24. A good physical activity only needs to be performed once a week.	73.6	26.4	67.1	32.9	78.6	21.4
	25. Regular physical activity can keep the body healthy and fit.	100.0	0.0	100.0	0.0	100.0	0.0

7.3.2. Mother's Attitude

Table 7.13 shows the distribution of mothers based on their IDG attitudes. There were 90.3%, 95.7%, and 84.3% of mothers of schoolchildren in elementary school, junior high school, and senior high school that had positive attitudes towards IDG messages. The distribution of the mothers was not significantly different, with a mean score of >80.

Table 7.13. Distribution of mothers based on IDG attitude category

Category of IDG attitude	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Positive (>80)	65	90.3	67	95.7	59	84.3
Negative (≤80)	7	9.7	3	4.3	11	15.7
Mean±SD	88.1±5.6		88.1±5.2		86.9±5.6	
ANOVA	0.307					

Table 7.14 shows the distribution of mothers who give their responses to the IDG attitude statements. The majority of the mothers had positive responses to IDG messages as follows: 1) eat a variety of foods, 2) consume vegetable and fruits, 3) breakfast habits, 4) limitation of sweet, salty, and fatty foods, 5) drinking enough water, 6) read food label, 7) wash hands with soaps, and 8) regular physical activity. From three schools, there were 41%-55% of mothers who disagreed with the statement "I choose to consume fish/eggs/meat rather than tofu/tempeh". It indicated that the majority of mothers had chosen to eat plant-based foods as sources of protein. However, the majority of mothers (87-94%) agreed to consume milk for health. Indonesian people in rural and urban areas, especially in Java, prefer to consume tempeh or soy chips as delicious and affordable foods. Tempeh is widely available in the market, small stall, and door to door greengrocer, making it highly accessible. Besides that, the proportion of mothers who chose to consume more than one type of staple food was still low. The proportion of mothers who agreed, doubted, and disagreed with the statement were 25%-38%, 25%-34%, and 34%-45%, respectively.

Table 7.14. Distribution of mothers (%) based on IDG attitude statements

Messages	Attitude statements	Elementary School			Junior High School			Senior High School		
		Agree	Doubtful	Disagree	Agree	Doubtful	Disagree	Agree	Doubtful	Disagree
1. Eat a variety of foods	1. Consuming a variety of foods every day is important for nutrient intakes and health.	83.3	12.5	4.2	87.1	10.0	2.9	82.9	10.0	7.1
2. Consume vegetables and fruits	2. Consumption of vegetables a day is more than the consumption of fruits.	68.1	15.3	16.7	61.4	25.7	12.9	78.6	15.7	5.7
	3. I choose to consume stir-fried vegetables rather than clear vegetable soup.	15.3	30.6	54.2	20.0	27.1	52.9	28.6	32.9	38.6
3. Consume high-protein foods	4. I choose to consume fish/eggs/meat rather than tofu/tempeh.	25.0	19.4	55.6	25.7	27.1	47.1	32.9	25.7	41.4
	5. I should consume milk to support health.	87.5	8.3	4.2	94.3	1.4	4.3	90.0	7.1	2.9
4. Consume a variety of staple foods	6. I should consume more than one type of staple food (rice/noodles/potatoes/cassava) every day.	38.9	25.0	36.1	25.7	28.6	45.7	31.4	34.3	34.3
5. Limitation of sweet, salty, and fatty foods	7. I choose sweet snacks (cakes, chocolates, and candies).	11.1	26.4	62.5	15.7	20.0	64.3	10.0	32.9	57.1
	8. I choose ice syrup or soft drinks.	1.4	2.8	95.8	1.4	7.1	91.4	2.9	12.9	84.3
	9. I choose savory and salty snacks.	13.9	36.1	50.0	8.6	40.0	51.4	27.1	41.4	31.4

Table 7.14. Distribution of mothers (%) based on IDG attitude statements (*cont.*)

Messages	Attitude statements	Elementary School			Junior High School			Senior High School		
		Agree	Doubtful	Disagree	Agree	Doubtful	Disagree	Agree	Doubtful	Disagree
6. Breakfast regularly	10. I choose to have breakfast before going to school.	98.6	1.4	0.0	98.6	1.4	0.0	95.7	4.3	0.0
7. Drink enough water	11. I should drink eight glasses of water a day.	97.2	1.4	1.4	95.7	4.3	0.0	98.6	0.0	1.4
8. Read food label	12. I should read the expiration date before buying or consuming packaged food products.	100.0	0.0	0.0	98.6	1.4	0.0	100.0	0.0	0.0
	13. I need to read nutrition facts label on packaged foods.	93.1	6.9	0.0	95.7	4.3	0.0	94.3	4.3	1.4
9. Wash hands with soap	14. I should wash my hands with soap and tap water (clean running water).	100	0.0	0.0	98.6	1.4	0.0	100.0	0.0	0.0
10. Regular physical activity	15. I should exercise diligently since a young age.	87.5	9.7	2.8	78.6	12.9	8.6	80.0	15.7	4.3

7.3.3. Mother's Practice

Table 7.15 shows the distribution of mothers based on their practices on IDG messages. There were 72.2%, 75.7%, and 61.4% of mothers of schoolchildren in elementary school, junior high school, and senior high school that had good practices on IDG messages. The rest (24.3%-38.6%) had moderate IDG practices. The distribution of the mothers was not significantly different, with a mean score of >80. The practices of consuming vegetables three times a day, consuming fruits twice a day, and regular exercise still need to be improved among mothers in all school levels.

Table 7.15. Distribution of mothers based on IDG practice category

Category	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Poor (<60)	0	0.0	0	0.0	0	0.0
Moderate (60-80)	20	27.8	17	24.3	27	38.6
Good (>80)	52	72.2	53	75.7	43	61.4
Mean±SD	83.5±6.1		84.2±6.2		83±6.5	
ANOVA	0.546					

Table 7.16 shows the distribution of mothers based on their answers to IDG practice questions. Most mothers (52%-100%) had practiced eight IDG messages as follows: 1) eat a variety of foods, 2) consume high-protein foods, 3) milk consumption, 4) breakfast habits, 5) drinking enough water, 6) read food label, 7) wash hands with soap, and 8) regular physical activity. Besides that, four IDG messages were sometimes practiced by the mothers (53%-87%), which consisted of 1) consume vegetables and fruits, 2) staple food consumption aside of rice, 3) consumption of sweet, salty, and fatty foods, and 4) exercise habits.

Table 7.16. Distribution of mothers (%) based on IDG practice questions

Messages	Questions	Elementary School			Junior High School			Senior High School		
		Always	Some times	Never	Always	Some times	Never	Always	Some times	Never
1. Eat a variety of foods	1. The foods I consume every day are the staple food, protein-source foods, fruits, and vegetables.	69.4	30.6	0.0	64.3	34.3	1.4	72.9	27.1	0.0
2. Consume vegetables and fruits	2. I eat vegetables 3 times a day.	23.6	73.6	2.8	27.1	67.1	5.7	25.7	74.3	0.0
	3. I eat fruits twice a day.	30.6	66.7	2.8	37.1	61.4	1.4	37.1	61.4	1.4
	4. I eat fruits as a snack.	30.6	68.1	1.4	40.0	60.0	0.0	44.3	52.9	2.9
3. Consume high-protein foods	5. I always eat animal source foods (eggs/ fish/chicken/ beef) alternately every day.	68.1	30.6	1.4	70.0	28.6	1.4	67.1	31.4	1.4
	6. I drink milk to support health.	58.3	41.7	0.0	52.9	45.7	1.4	47.1	50.0	2.9
4. Consume a variety of staple foods	7. I eat sweet potatoes, cassava, or potatoes as staple foods or snacks.	18.1	77.8	4.2	14.3	78.6	7.1	24.3	70.0	5.7
5. Limitation of sweet, salty, and fatty foods	8. I eat sweet snacks (cakes, chocolates, and candies) and drink various ice syrup or soft drinks.	1.4	86.1	12.5	2.9	84.3	12.9	4.3	80.0	15.7
	9. I consume savory/salty snacks.	11.1	84.7	4.2	4.3	87.1	8.6	17.1	81.4	1.4

Table 7.16. Distribution of mothers (%) based on IDG practice questions (*cont.*)

Messages	Questions	Elementary School			Junior High School			Senior High School		
		Always	Some times	Never	Always	Some times	Never	Always	Some times	Never
	10. I consumed fried foods (vegetable fritters, fried tofu, fried tempeh, etc.)	13.9	83.3	2.8	12.9	84.3	2.9	28.6	70.0	1.4
6. Breakfast regularly	11. I have breakfast before going school.	84.7	15.3	0.0	92.9	7.1	0.0	84.3	15.7	0.0
7. Drink enough water	12. I drink eight glasses of water a day.	79.2	19.4	1.4	85.7	14.3	0.0	81.4	18.6	0.0
8. Read food label	13. I read the expiration date before buying or consuming packaged food products.	98.6	1.4	0.0	94.3	5.7	0.0	95.7	4.3	0.0
	14. I read nutrition facts label on packaged foods.	76.4	23.6	0.0	67.1	30.0	2.9	67.1	31.4	1.4
9. Wash hands with soap	15. I wash my hands with soap and tap water (clean running water).	87.5	12.5	0.0	94.3	5.7	0.0	92.9	7.1	0.0
	16. I wash my hands before eating.	100.0	0.0	0.0	98.6	1.4	0.0	97.1	2.9	0.0
10. Regular physical activity	17. I exercise regularly.	37.5	54.2	8.3	50.0	48.6	1.4	24.3	67.1	8.6
	18. I clean the house yard.	73.6	26.4	0.0	72.9	27.1	0.0	77.1	22.9	0.0

7.4. Relationship between KAP of the Schoolchildren and KAP of Mothers on Indonesian Dietary Guidelines (IDG)

Table 7.17 shows the relationship between knowledge, attitude, and practice of schoolchildren on IDG messages. Schoolchildren's attitudes were correlated significantly with their practices on IDG messages ($p < 0.01$) at all school levels. This result means that the more positive the schoolchildren's attitudes, the better their practices. The similar result was also found among the mothers of junior and senior high schoolchildren. Their attitudes were significantly correlated ($p < 0.01$) with their IDG practices. Meanwhile, no correlation was found between attitudes and practices of the mothers of elementary schoolchildren (Table 7.18).

Table 7.17. Relationship between knowledge, attitude, and practice of schoolchildren on IDG¹⁾

Variables	Total		Elementary School		Junior High School		Senior High School	
	r	p-value	r	p-value	r	p-value	r	p-value
Knowledge, attitude	-0.041	0.557	-0.146	0.221	0.138	0.256	0.077	0.529
Knowledge, practice	0.055	0.425	0.119	0.319	0.171	0.157	0.028	0.816
Attitude, practice	0.402	0.001	0.275*	0.019	0.498**	0.001	0.399**	0.001

¹⁾Pearson's correlation

The understanding of the KAP of mothers regarding healthy lifestyles (especially IDG) is required to promote better schoolchildren's KAP. Aside from mothers' affection and care, potential influence from school environment also contribute to improving better KAP among schoolchildren, which was not determined in this study.

Table 7.18. Relationship between knowledge, attitude, and practice of mothers on IDG¹⁾

Variable	Total		Elementary School		Junior High School		Senior High School	
	r	p-value	r	p-value	r	p-value	r	p-value
Knowledge, attitude	-0.041	0.554	-0.133	0.266	-0.074	0.540	0.083	0.493
Knowledge, practice	-0.013	0.853	-0.055	0.648	0.038	0.757	0.002	0.990
Attitude, practice	0.336	0.001	0.217	0.067	0.357**	0.002	0.422**	0.001

¹⁾Pearson's correlation

8. FOOD HABITS

8.1. Breakfast Habits

Food habits (eating habits) are divided into three parts; i.e., breakfast, lunch, and dinner. In general, the eating frequency of a person is three times a day (i.e., breakfast, lunch, and dinner). The consumption frequency of the main course also affects the total daily energy and nutrient intakes in schoolchildren. The food consumption frequency of three times a day is associated with normal nutritional status, while the consumption frequency less than three times a day is associated with the high body mass index that is in the value range of overweight. Based on Table 8.1, the eating frequency of most schoolchildren (>58%) was three times a day. The breakfast habit is an activity carried out before performing morning physical activities, or it can be said as an activity of consuming food and drinks in the morning that contributes 15% to 30% of energy to daily energy requirement (Hardinsyah 2013). Based on Table 8.1, most schoolchildren always had breakfast, either those in elementary school, junior high school, or senior high school. This result showed that most schoolchildren had already realized that breakfast was important to do.

Table 8.1. Distribution of schoolchildren by food habits and breakfast habits

Food habits	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Daily eating frequency						
<input type="checkbox"/> Once	0	0.0	0	0.0	2	2.9
<input type="checkbox"/> Twice	22	30.6	23	32.9	26	37.1
<input type="checkbox"/> 3 times	46	63.9	44	62.9	41	58.6
<input type="checkbox"/> ≥ 4 times	4	5.6	3	4.3	1	1.4
Breakfast habits						
<input type="checkbox"/> Always (every day)	45	62.5	49	70.0	45	64.3
<input type="checkbox"/> Sometimes (2-3 times/week)/Never	27	37.5	21	30.0	25	35.7
The amount of water consumed (mean \pm SD)	6.3 \pm 2.3		7.3 \pm 2.4		7.4 \pm 2.5	

According to Khomsan (2002), breakfast menus should be diverse (e.g., consisting of rice, protein-source foods, fruits, vegetables, and milk) to meet the nutritional requirement. Based on Table 8.2 that shows the quality of breakfast on the first day of recall, the breakfast quality of most schoolchildren is still less diverse. Most elementary schoolchildren, junior high schoolchildren, or senior high schoolchildren only consumed sources of carbohydrates (carbs) and protein-source foods. Only three elementary schoolchildren, two junior high schoolchildren, and two senior high schoolchildren consumed breakfast with a complete menu (carbs+protein-source foods+vegetables+fruits). The lack of diversity in schoolchildren's breakfast menus might be due to the short time the parents had in the

morning, which made them serve easy-to-make breakfast (e.g., only one staple food and one type of protein-source food or vegetable). The studies by Anggiruling (2019) and Janah (2017) showed that some students consumed easy-to-make breakfast, such as fried rice, instant noodles, or only rice with one type of protein-source food.

Table 8.2. Distribution of the quality of breakfast based on recall day 1

Quality of breakfast	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Carbs or protein-source food only	4	5.6	5	7.1	6	8.5
Carbs + protein-source foods	55	76.4	44	62.9	52	74.3
Carbs + vegetables	1	1.4	0	0.0	0	0.0
Carbs + protein-source foods + vegetables	9	12.5	18	25.8	9	12.8
Carbs + protein-source foods + fruits	0	0.0	1	1.4	1	1.4
Carbs + protein-source foods+ vegetables + fruits	3	4.2	2	2.9	2	2.9

Note: protein-source foods (sources of protein, including milk)

The quality of schoolchildren's breakfast on the second day was not much different from the first day of recall. It can be seen in Table 8.3, which shows that 66.7% of elementary schoolchildren, 67.1% of junior high schoolchildren, and 74.3% of senior high schoolchildren only have breakfast with carbs and protein-source foods. Only 1.4% of elementary schoolchildren, junior high schoolchildren, or senior high schoolchildren had breakfast with a complete menu. According to a study by Anggiruling (2019), students who consumed a staple food with food sources of animal protein or plant protein were more than those consuming a staple food with vegetables because the preparation of vegetables was more complicated than food sources of animal protein or plant protein.

Table 8.3. Distribution of the quality of breakfast based on recall day 2

Quality of breakfast	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Carbs or side-dishes only	9	12.5	9	12.9	4	5.7
Carbs + protein-source foods	48	66.7	47	67.1	52	74.3
Carbs + vegetables	3	4.2	4	5.7	1	1.4
Carb + protein-source foods + vegetables	8	11.1	9	12.8	10	14.3
Carb + proteins-source foods + fruits	3	4.2	0	0.0	2	2.9
Carb + protein-source foods + vegetables + fruits	1	1.4	1	1.4	1	1.4

8.2. Breakfast Contribution

According to Khomsan (2002), breakfast is one of the most important mealtimes. The carbohydrate intake from breakfast will increase blood glucose levels, which have a positive impact on productivity and learning concentration of schoolchildren. Breakfast ideally contribute 15-25% of energy. Based on the adequacy levels in Table 8.4, each schoolchild had met the recommended breakfast energy contribution of >15%. The highest mean energy intake was found in elementary schoolchildren (479 kcal), followed by junior high schoolchildren (421 kcal) and senior high schoolchildren (416 kcal). The protein contribution of breakfast had also met the recommendation. Although the schoolchildren's breakfast menus did not vary based on the quality of breakfast, the contribution of nutrients from the breakfast had met the recommendations. It might be due to the large portion of carbohydrates and protein-source foods that gave high energy and protein contribution.

Table 8.4. Energy and protein contribution of breakfast

Intake and contribution	Elementary School	Junior High School	Senior High School
Energy			
- Intake (kcal)	479±178	421±123	416±133
- %RDA	23.3±8.7 ^a	18.6±5.3 ^b	17.4±6.4 ^b
ANOVA	0.001		
Protein			
- Intake (g)	14.6±5.6	13.4±4.5	14.6±6.1
- %RDA	25.4±9.8 ^a	19.1±6.5 ^b	23.1±10.6 ^a
ANOVA	0.001		

Notes:

- % energy contribution: elementary schoolchildren were significantly different from junior and senior high schoolchildren, while junior high schoolchildren were not significantly different from senior high schoolchildren
- % protein contribution: junior high schoolchildren was significantly different from elementary and senior high schoolchildren

Based on the socio-economic status in Table 8.5, schoolchildren with poor socio-economic status had a higher mean energy intake (443.9 kcal) than those with non-poor socio-economic status (438.5 kcal) because the energy contribution of carbohydrates in schoolchildren with poor socio-economic status might be higher than the energy contribution of protein. Carbohydrate-source foods (e.g., rice, noodles, and rice vermicelli) are cheaper than protein-source foods (e.g., beef and chicken).

Table 8.5. Breakfast energy intake based on household socio-economic status

Socio-economic status	Energy from Breakfast (Mean Intake in kcal; %RDA)			
	Total	Elementary School	Junior High School	Senior High School
Poor	443.9; 19.8	437.8; 20.9	460.5; 19.8	410.4; 16.6
Not Poor	438.5; 19.9	484.2; 23.6	415.3; 18.4	416.0; 17.7

The protein contribution of breakfast in schoolchildren with poor socio-economic status was lower than non-poor schoolchildren. The protein intake contribution in poor schoolchildren was 13.8% while the one in non-poor children was 14.3% (Table 8.6). The low

protein contribution might be due to the high price of protein-source foods; thereby, the poor schoolchildren consumed less protein-source foods.

Table 8.6. Breakfast protein intake based on household socio-economic status

Socio-economic status	Protein from Breakfast (Mean Intake in g; %RDA)			
	Total	Elementary School	Junior High School	Senior High School
Poor	13.8; 21.6	12.6; 22.4	15.3; 21.7	12.4; 19.3
Not Poor	14.3; 22.8	14.9; 25.8	13.1; 18.8	14.7; 23.7

8.3. Frequency of Food Consumption

Consumption frequency is how many times a person eats in a day. Table 8.7 shows the consumption frequency of carbohydrate-source foods in the last one month. The current study showed that rice was the most frequently consumed carbohydrate-source food. The mean consumption frequency of rice in elementary schoolchildren was the highest compared to junior and senior high schoolchildren. Other carbohydrate-source foods are important for consumption so that the children’s dietary intake varies. However, in Table 8.7, the schoolchildren’s consumption frequencies of bread, noodles, corn, potatoes, sweet potatoes, and cassava were still low. Children need to be introduced to carbohydrate-source foods. The balanced nutrition *tumpeng* recommends consuming 3-4 portions of staple foods or carbohydrate-source foods. It also shows examples of staple foods besides rice, such as corn, sweet potatoes, and cassava (MoH RI 2014). Education is required for children’s knowledge in understanding carbohydrate-source foods so that the foods consumed are diverse and nutritious.

Table 8.7. Consumption frequency of carbohydrate-source foods (times/month)

Food habits	Elementary School	Junior High School	Senior High School
Rice	83.8	79.7	75.0
Bread	10.9	10.9	8.0
Noodles	4.7	5.6	5.6
Corn	4.6	1.8	1.9
Potatoes	4.1	4.2	3.5
Sweet potatoes	0.9	0.6	0.6
Cassava	0.6	0.8	2.1

The food sources of animal protein consumed by schoolchildren, among others, were cow’s milk, eggs, chicken meat, sausage/nuggets, beef, freshwater fish, *pindang* fish (fish boiled in salt, tamarind juice, and other spices), and salted fish. Based on My Plate in IDG, the portion of animal protein in one meal is one-third of half plate. Table 8.8 shows that animal protein is not consumed every day by the schoolchildren. The most frequently consumed protein-source foods or beverages were cow’s milk, eggs, and chicken meat. The highest frequency (16.3 times/month) was the consumption frequency of cow’s milk among junior high schoolchildren. The highest egg consumption (15.8 times/month) was found in

elementary schoolchildren. In contrast to egg consumption, the highest consumption frequency of chicken meat (14.1 times/month) was found in senior high schoolchildren. The most frequently consumed protein-source foods are presumably easy-to-get and easy-to-cook foods and preferred by children. Our results were similar to a study by Lily *et al.* (2015), which showed that the most frequently consumed protein-source foods were eggs and chicken meat because these foods were affordable and the most widely available.

Table 8.8. Consumption frequency of animal protein-source foods (times/month)

Food habits	Elementary School	Junior High School	Senior High School
Cow's milk	16.1	16.3	15.5
Eggs	15.8	12.1	15.6
Chicken meat	13.8	12.7	14.1
Sausage/nuggets	7.5	6.8	5.9
Beef	4.5	4.9	5.9
Freshwater fish	2.9	2.5	2.1
<i>Pindang</i> fish	2.3	2.2	1.3
Salted fish	2.3	0.8	0.9

The food sources of plant protein consumed by schoolchildren were tofu, tempeh, and legumes. Table 8.9 shows that tofu and tempeh are foods that are often consumed. It was far different from the consumption frequency of legumes. The consumption frequency of legumes in elementary schoolchildren and senior high schoolchildren was only 2.2 times/month, while the one in junior high schoolchildren was 17 times/month. The high consumption frequency of tofu and tempeh was due to the affordable price, and these foods were easily available and preferred by schoolchildren.

Table 8.9. Consumption frequency of plant protein-source foods (times/month)

Food habits	Elementary School	Junior High School	Senior High School
Tofu	12.9	11.7	11.6
Tempeh	11.5	12.4	9.3
Legumes	2.2	1.7	2.2

Vegetables and fruits are the main food ingredients in daily life besides fish, meat, legumes, and other carbohydrate sources. Vegetables and fruits are sources of vitamins, minerals, and non-nutrients, which are ideal for maintaining fitness and disease control. The great benefits of fresh fruits and vegetables as sources of vitamins and minerals have been well-known. The nutrient contents that are quite prominent in fruits and vegetables are vitamins and minerals (Dave *et al.* 2010). Table 8.10 shows that the vegetables commonly consumed by schoolchildren are spinach, carrots, water spinach, chayote, bean sprouts, and cabbage. The most frequently consumed vegetable was spinach; i.e., 8.8 times/month in elementary schoolchildren, 6.8 times/month in junior high schoolchildren, and 4.1 times/month in senior high schoolchildren. Other vegetables that were also often consumed were carrots and water spinach. These results were similar with a study by Anggiruling (2019),

which showed that the vegetables commonly consumed by elementary schoolchildren and provided by their parents were spinach, water spinach, and carrots because these vegetables were easily available and preferred by children.

Table 8.10. Consumption frequency of vegetables (times/month)

Food habits	Elementary School	Junior High School	Senior High School
Spinach	8.8	6.8	4.1
Carrots	7.3	7.5	6.8
Water spinach	6.7	5.5	3.9
Chayote	2.7	0.3	0.7
Bean sprouts	2.5	3.1	4.8
Cabbage	2.0	2.9	3.7

Table 8.11 shows that the most frequently consumed fruit among elementary schoolchildren is mango with a frequency of 8.8 times/month. It was different from the finding in junior and senior high schoolchildren in which banana was the most frequently consumed fruit with a frequency of 9.0 times/month. The least consumed fruits were watermelon in elementary schoolchildren and rambutan in junior and senior high schoolchildren. The consumption frequency of fruits in elementary schoolchildren, junior high schoolchildren, and senior high schoolchildren was still low. IDG recommends consuming three portions of fruit a day (MoH RI 2014). However, the schoolchildren in our study had not consumed fruits every day, which might be caused by the lack of availability of vegetables and fruits at home or school. Canteens in elementary school, junior high school, and senior high school that became our study sites only provided a few fruits. Only the senior high school canteen provided sliced fruits. The canteens in elementary school and junior high school did not provide sliced fruits, but they only provided fruits in the form of *rujak* (fruit salad with spicy palm sugar dressing).

Table 8.11. Consumption frequency of fruits (times/month)

Food habits	Elementary School	Junior High School	Senior High School
Mango	8.8	6.0	5.9
Banana	8.8	9.0	9.0
Rose apple	6.9	3.7	2.9
Grapes	6.2	2.4	1.1
Orange	6.0	5.9	6.7
Apple	4.6	3.0	2.9
Papaya	3.6	4.0	4.7
Rambutan	3.2	1.0	.4
Avocado	3.1	2.0	1.7
Melon	2.7	1.6	2.2
Watermelon	2.5	1.7	2.8

The beverages consumed by schoolchildren at school or home were divided into two types; beverages made by vendors or those made by factories. The most frequently

consumed beverage was the powdered drink with a frequency of 9.1 times/month in elementary schoolchildren and junior high schoolchildren. The most frequently consumed beverage in senior high schoolchildren was tea (e.g., bottled tea and box-packaged tea drink) with a frequency of 10.2 times/month (Table 8.12). The powdered drink was the most commonly consumed beverage, probably because it was cheap and affordable for elementary schoolchildren and junior high schoolchildren. Besides that, the powdered drink was sold by more than one vendors. This finding was similar to a study by Anggiruling (2019) on elementary schoolchildren. The elementary schoolchildren in the study considered the price when buying beverages. The most frequently consumed beverage in schoolchildren was flavored drink, and the most rarely consumed beverage was soft drink.

Table 8.12. Consumption frequency of beverages (times/month)

Food habits	Elementary School	Junior High School	Senior High School
Powdered drinks (pop ice, etc.)	9.1	9.1	3.2
Tea (bottled tea, box-packaged tea drink)	8.2	7.0	10.2
Fruit juice	7.1	5.2	5.8
Fruit-flavored sweet drinks	4.9	4.8	3.9
Coffee	1.5	0.9	3.0
Soft drinks	1.2	0.9	1.3

According to Brown *et al.* (2011), snacks have a quite significant contribution to children's daily intakes. Children cannot consume a large amount of food at one time, and thereby snacks are needed to be able to meet their nutritional requirements. Table 8.3 shows the frequently consumed snacks among schoolchildren in elementary school, junior high school, and senior high school. The most frequently consumed snack among schoolchildren, especially in elementary schoolchildren, was puff snack (12.1 times/month). The most commonly consumed snacks among senior high schoolchildren were fried foods such as tofu, tempeh, banana, sweet potatoes, and vegetable fritters. The differences in the types of snacks consumed by elementary schoolchildren, junior high schoolchildren, and senior high schoolchildren might be due to the availability of snacks at school or around the house. The schoolchildren spent most of their time at school, and thereby they bought more snacks at school. A study by Syafitri (2009) showed that high snack-purchasing habit among schoolchildren was supported by the availability of abundant snacks. The snack that was rather often consumed by elementary schoolchildren, junior high schoolchildren, or senior high schoolchildren was chicken porridge. The children usually chose to buy chicken porridge at school because they did not have breakfast. According to BPOM/NADFC (2013), chicken porridge is a heavy snack or one-dish meal.

Table 8.13. Consumption frequency of snacks (times/month)

Food habits	Elementary School	Junior High School	Senior High School
Puff snacks/chips	12.1	11.1	10.0
Biscuits	10.1	10.0	9.0
Wafers	6.1	4.9	7.3
Fried foods (tofu/tempeh/ banana/sweet potatoes/ vegetable fritters)	6.0	8.5	10.6
Shumai/meatball-stuffed fried tofu	5.7	4.6	4.2
Chicken porridge	5.3	3.3	2.6
Ice cream	5.0	4.9	3.6
Meatballs	4.1	3.5	2.9
Noodles topped with diced chicken	3.6	2.3	1.9

Based on household socio-economic status in Table 8.14, chicken meat is most often consumed by schoolchildren with poor socio-economic status. However, if it was differentiated based on the schoolchildren groups, the chicken meat was consumed more often by non-poor elementary and senior high schoolchildren. Chicken meat is a food source of protein with moderate price because it is cheaper than beef but more expensive than eggs. Almost all socio-economic groups consume chicken meat.

Table 8.14. Chicken meat consumption frequency (times/month) based on household socio-economic status

Socio-economic status	Chicken meat consumption frequency			
	Total	Elementary School	Junior High School	Senior High School
Poor	13.7	11.5	18.6	5
Not Poor	13.5	14.1	11.9	14.5

Milk is a beverage that contains protein and calcium. It is quite expensive, and it is usually consumed in the morning during breakfast time or as a snack. Based on the socio-economic status category in Table 8.15, milk was most often consumed by schoolchildren in the non-poor socio-economic group. If it was differentiated by schoolchildren's education level, the milk consumption frequency was higher in poor schoolchildren, either in the elementary school, junior high school, or senior high school. A study by Handarsari and Astuti (2010) showed that the schoolchildren living in the outskirts of a city had a lower milk consumption frequency than those living in the city center, and it was affected by the socio-economic conditions of the schoolchildren's families.

Table 8.15. Milk consumption frequency (times/month) based on household socio-economic status

Socio-economic status	Milk consumption frequency			
	Total	Elementary School	Junior High School	Senior High School
Poor	12.5	15.6	9.2	14
Not Poor	16.4	16.2	17.4	15.6

Based on table 8.16, the schoolchildren in the non-poor group consumed freshwater fish more often (2.5 times/month) than the poor group. In the elementary schoolchildren and senior high schoolchildren groups, the fish consumption frequency in the non-poor group was higher than the poor group. However, in contrast to junior high schoolchildren, the fish consumption frequency was higher in the poor group. It is possible that the fish consumption frequency in children is not only affected by economic factors but also food availability.

Table 8.16. Fish consumption frequency (times/month) based on household socio-economic status

Socio-economic status	Fish consumption frequency*			
	Total	Elementary School	Junior High School	Senior High School
Poor	2.1	1.5	3.1	0.3
Not Poor	2.5	3.1	2.4	2.2

Note: *consumption of freshwater fish

Table 8.17 shows that eggs are most often consumed by schoolchildren in the poor category, and it may be due to the lower price of eggs compared to other food sources of animal protein. Besides the low price, eggs are easily available and easy to prepare. However, if it was differentiated based on the schoolchildren's education levels, non-poor senior high schoolchildren consumed eggs more often than the poor schoolchildren. The difference might be due to the influence of preference level or food availability.

Table 8.17. Egg consumption frequency (times/month) based on household socio-economic status

Socio-economic status	Egg consumption frequency			
	Total	Elementary School	Junior High School	Senior High School
Poor	20.1	28.9	14.4	13.3
Not Poor	13.9	14.2	11.8	15.7

9. PHYSICAL ACTIVITY

9.1. Sports Activity

Physical activity is a term that covers sports activities, dancing, recreation, and other activities, while exercise is an activity performed to improve health and physical fitness (Corbin *et al.* 2000). Weight-bearing exercises are of paramount importance for skeletal growth during childhood and adolescence and peak bone mass at early adulthood (Gibney *et al.* 2008).

In this study, we observed the physical activity of schoolchildren, including sports activities, sitting time, sleeping time, and physical activity level (PAL). The majority of schoolchildren in elementary school (80%), junior and senior high schools (90%) were used to exercising. In the last one month, more than 70% of schoolchildren were accustomed to exercising ≥ 5 times with a duration of ≤ 1 hour each time they exercised (Table 9.1). The reasons for not exercising were laziness, no companion, and tiredness (Table 9.2).

Table 9.1. Distribution of schoolchildren based on exercise habits

Sports activity	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Exercise habits						
<input type="checkbox"/> Yes	65	90.3	64	91.4	56	80.0
<input type="checkbox"/> No	7	9.7	6	8.6	14	20.0
Frequency of exercise in the last month						
<input type="checkbox"/> Less than twice	0	0.0	0	0.0	1	1.8
<input type="checkbox"/> Twice	2	3.1	0	0.0	3	5.4
<input type="checkbox"/> 3 times	2	3.1	4	6.3	1	1.8
<input type="checkbox"/> 4 times	9	13.8	9	14.1	10	17.9
<input type="checkbox"/> ≥ 5 times	52	80	51	79.7	41	73.2
Duration of each exercise						
<input type="checkbox"/> ≤ 1 hour	46	70.8	32	50.0	23	41.1
<input type="checkbox"/> >1-2 hours	16	24.6	24	37.5	27	48.2
<input type="checkbox"/> >2-3 hours	1	1.5	5	7.8	5	8.9
<input type="checkbox"/> >3 hours	2	3.1	3	4.7	1	1.8

Regular physical activity will maintain one's fitness. Physical activity can also maintain a normal weight. Healthy dietary patterns accompanied by physical activity will help control weight so that the body will become healthier. Schoolchildren are advised to perform regular physical activities that are beneficial for them, such as tidying up their bedrooms, gardening, walking a bit far from home, sweeping, or mopping the floor. These activities keep them sweating even though they are not exercising. There are some exercises suitable for them, such as soccer, basketball, volleyball, badminton, cycling, jogging, and rope skipping.

Table 9.2. Distribution of schoolchildren based on the reasons for not exercising

Reasons for not exercising	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Tired	1	1.4	2	2.9	5	7.1
Lazy	4	5.6	0	0.0	1	1.4
Have no time/busy	0	0.0	2	2.8	5	7.1
Do not like to exercise	0	0.0	0	0.0	3	4.3
No companion	2	2.8	2	2.9	0	0.0

Physical activity is one of the forms of energy use in the body besides basal metabolism. Physical activity is the main component of energy expenditure; i.e., 20-50% of the total energy expenditure (Almatsier 2003). Studies in developed countries have shown a correlation between low physical activity and the prevalence of obesity. Individuals with low physical activities have a risk of gaining five kilograms. A study on American children with similar socio-economic levels showed that those watching TV for five hours a day had a greater risk of obesity; i.e., 5.3 times greater than those who watched TV for two hours a day (Hidayati *et al.* 2009).

9.2. Sitting Time and Sleeping Time

Table 9.3 and Table 9.4 show the sitting time and sleeping time of schoolchildren in a day. Within one day, schoolchildren spent their time sitting for about 11-13 hours, while 7-8 hours were spent for nighttime sleeping. Thus, in one day, the time spent on other activities besides sitting and sleeping was around 3-4 hours.

Table 9.3. Mean sitting time in a day

Sitting time	Elementary School	Junior High School	Senior High School	ANOVA
Studying at school (hours)	5.0±0.0	6.5±0.0	7.0±0.0	-
Tutoring (hours)	1.0±0.4 ^a	2.3±0.9 ^b	2.1±0.7 ^b	0.001
Reading Qur'an and praying (minutes)	91.6±43.7 ^a	77.4±35.2 ^{ab}	65.1±48.3 ^b	0.001
Watching TV/playing games (minutes)	104.7±74 ^{ab}	124.9±69.9 ^a	88.3±55.4 ^b	0.006
Studying at home (minutes)	46.7±35 ^a	72.4±45.9 ^b	72.3±45.4 ^c	0.000
Eating (minutes)	28.5±19.5	25.6±11.4	26.4±13	0.468
Traveling by vehicles (minute)	36.0±25.6 ^{ab}	28.3±22.4 ^a	41.1±26.8 ^b	0.011
Total (hours)	11.1±1.9 ^a	12.8±2.2 ^b	12.4±1.8 ^c	0.000

Note: abc= different letter shows statistically significant differences between school levels

The sitting time was recorded according to the activities performed by schoolchildren during their sitting time, including studying at school, tutoring, reading the Qur'an and praying, watching TV/playing games, studying at home, eating, and traveling. The results were as follows:

- a) Sitting time for tutoring between elementary schoolchildren, junior high schoolchildren, and senior high schoolchildren were significantly different.
- b) Sitting time for reading Qur'an and praying between elementary schoolchildren and senior high schoolchildren was significantly different.
- c) Sitting time for watching TV/playing games between junior and senior high schoolchildren was significantly different.
- d) Sitting time for studying at home at all school levels was significantly different.
- e) Sitting time for traveling between junior and senior high schoolchildren was significantly different.
- f) Total sitting time at all school levels was significantly different.

The sleeping time was categorized into napping time and nighttime sleeping. Elementary schoolchildren had a longer sleeping time (8.2 hours) than schoolchildren in junior high school (7.7 hours) and senior high school (7.0 hours), and it was significantly different ($p=0.001$).

Table 9.4. Sleeping time during the day and night

Sleeping time (hours)	Elementary School	Junior High School	Senior High School	ANOVA
Napping time	2.1±0.7	2.1±0.8	2.0±0.5	0.822
Nighttime sleeping	8.2±1.0 ^a	7.7±0.7 ^b	7.0±1.1 ^c	0.001
Total	9.6±1.5 ^a	8.8±1.3 ^b	7.8±1.4 ^c	0.000

9.3. Physical Activity Level (PAL)

Physical activity is one of the fourth principles in IDG (MoH RI 2014). Maintaining adequate daily physical activity is important to preserve health and fitness. At the national level, 33.5% of children aged ≥ 10 years have inadequate physical activities (MoH RI 2019). Table 9.5 shows schoolchildren's PAL. The schoolchildren's PAL was categorized into light, moderate, and vigorous. The physical activity of most schoolchildren (65-95%) was in the light category, and it was different significantly at each school level ($p<0.01$). Social cognitive theory is the foundation of efforts to help children understand how eating and physical activity affect the way they grow, learn, play, and feel now, as well as the relationship between their choices and lifelong health (FNS/USDA 2009). Children's willingness and ability to take recommended action are greatly affected by parental or family actions. Therefore, the parent-related or family-related components can be planned to assist them become more supportive of their children's attempts to eat healthy and being physically active (Contento 2011).

Table 9.5. Distribution of schoolchildren based on physical activity level

Physical Activity Level	Elementary School		Junior High School		Senior High School	
	n	%	n	%	n	%
Light (1.40-1.69)	49	68.1	59	84.3	67	95.7
Moderate (1.70-1.99)	21	29.2	8	11.4	2	2.9
Vigorous (2.00-2.40)	2	2.8	3	4.3	1	1.4
Mean±SD	1.5±0.2 ^a		1.4±0.2 ^b		1.3±0.2 ^c	
ANOVA test	0.001					

10. FACTORS AFFECTING NUTRITIONAL STATUS

Nutritional status is a state of body health in individual or group that affected by the ingestion, absorption, and utilization of nutrient from foods. Adolescence is a period of growth and maturity of human, and very unique changes occur continuously in this period. Physical changes may influence health and nutritional status. An imbalance between nutrient intake and requirement may lead to nutritional problems (i.e., overnutrition and undernutrition). Nutritional status is calculated based on the body mass index for age (BMI-for-age) according to the reference from WHO (2007) for children aged 10-19 years. The nutritional status will hence be classified into five categories, namely severely thin, thin, normal, overweight, and obese. The results showed that 60%-75% of schoolchildren had normal nutritional status. There were still 8%-19% of overweight schoolchildren, 4%-14% of obese schoolchildren, and 4%-7% of thin schoolchildren.

Adolescents' eating behaviors are influenced by factors at many levels in the social-ecological model as follows: individual factors (psychological and biological factors), interpersonal factors (e.g., family and peers), community settings (e.g., schools or fast food outlets), and society factors (e.g., mass media, marketing, and sociocultural norms) (Story *et al.* 2002). Factors influencing food choices are hunger, food cravings, mood, body image, and habit. The focus group research has found that adolescents have a significant amount of knowledge about healthy foods and believe that healthy eating involves balance, moderation, and variety. However, they find it difficult to eat healthily due to their perceived lack of time, the limited availability of healthy food options in school, and a general lack of concern about following recommendations (Neumark-Sztainer *et al.* 1997; Croll *et al.* 2001). In another study, adolescents were willing to balance less nutritious items with more nutritious items within a meal and to balance less healthy lunch with healthier dinner (Contento *et al.* 2006).

The nutritional status of schoolchildren is affected by certain factors. In this study, the relationship between nutritional status and the factors affecting nutritional status had been assessed. Those factors were breakfast habits, food consumption frequency, mothers' KAP, schoolchildren's KAP, and household socio-economic status. Based on breakfast habits, nutritional status of schoolchildren who were used to having breakfast every day were not different significantly at each school level (Table 10.1). As a matter of fact, schoolchildren had the habitual meal frequency less than three times a day, and 20% of them did not have breakfast before going to school (MoH RI 2013). At the current study, there were still 30%-37% of schoolchildren had no daily breakfast.

Table 10.2 shows the relation of schoolchildren's KAP, mothers' KAP, physical activity, and household socio-economic status (fathers' education, mothers' education, monthly income, and family size) to schoolchildren's nutritional status. Schoolchildren's IDG knowledge was significantly correlated with the nutritional status of elementary schoolchildren ($r=0.316$, $p=0.007$). Nutritional status of senior high schoolchildren had significant correlations with their IDG practices ($r=0.283$, $p=0.018$) and mothers' IDG practices

($r=0.279$, $p=0.020$). Despite these factors, physical activity and household socio-economic status had no relationship with schoolchildren's nutritional status.

Table 10.1. Schoolchildren's nutritional status based on breakfast habits

Breakfast habits	Nutritional Status (mean Z-score BMI-for-age)			
	Total	Elementary School	Junior High School	Senior High School
Always	-0.07±1.42	-0.01±1.47	-0.06±1.42	-0.13±1.39
Sometimes/Never	-0.04±1.34	0.52±1.34	-0.46±1.04	-0.3±1.41
t-test	0.910	0.133	0.255	0.626

According to the literature, the pressure to eat has been associated with lower levels of children's intake and weight and higher levels of pickiness. The parents of picky eaters and thin children may put pressure on their children to eat (Ventura & Birch 2008). Highly restrictive parental controls limit children's opportunities to practice self-regulation and maintain a healthy weight (Birch, Fisher, Davison 2003; Faith *et al.* 2004). This condition can also result in overeating in the absence of hunger when the children are given free access to an array of tasty snacks (Birch, Fisher, and Davison 2003). In some populations, mothers' own flexible restraint can result in more healthy food choices for themselves and their children (Robinson *et al.* 2001; Contento, Zybert, Williams 2005), and this control is interpreted as expressing parental responsibility and caring (Lin & Liang 2005). At the same time, parents' practices in terms of eating more fruits and vegetables greatly influence what their daughters eat (Fisher *et al.* 2002).

Tabel 10.2. Relation of mothers' KAP, schoolchildren's KAP, schoolchildren's physical activity, and household socio-economic status to schoolchildren's nutritional status

Variable	Nutritional Status of Schoolchildren							
	Total		Elementary School		Junior High School		Senior High School	
	r	p	r	p	r	p	r	p
Mothers' IDG knowledge	0.125	0.069	0.316	0.007	0.122	0.315	-0.086	0.477
Mothers' IDG attitudes	-0.013	0.851	-0.051	0.669	-0.071	0.559	0.058	0.633
Mothers' IDG practices	0.117	0.089	-0.005	0.968	0.079	0.514	0.279	0.020
Schoolchildren's IDG knowledge	0.028	0.680	0.185	0.120	-0.129	0.288	0.039	0.748
Schoolchildren's IDG attitudes	-0.089	0.197	-0.096	0.421	-0.212	0.079	-0.066	0.585
Schoolchildren's IDG practices	0.101	0.141	-0.028	0.816	-0.003	0.981	0.283	0.018
Physical activity level (PAL)	0.065	0.344	-0.046	0.700	0.009	0.944	0.152	0.209
Sitting time	0.066	0.342	-0.064	0.592	0.196	0.104	0.231	0.055
Sleeping time	0.064	0.354	0.043	0.718	0.088	0.466	-0.083	0.495
Fathers' education*	-0.078	0.269	-0.152	0.209	-0.028	0.826	-0.083	0.506
Mothers' education*	0.002	0.971	-0.062	0.606	-0.012	0.921	0.038	0.755
Total monthly income	0.027	0.694	0.035	0.769	0.131	0.279	-0.080	0.513
Family size	-0.044	0.528	0.020	0.870	-0.080	0.511	-0.077	0.528

Pearson's correlation test, *) except for fathers and mothers' education (Spearman's correlation test)

11. CONCLUSIONS AND RECOMMENDATIONS

11.1. Conclusions

1. A total of 60%-75% of schoolchildren had normal nutritional status, and the number of thin schoolchildren was only 4%-7%. The number of overweight/obese schoolchildren in elementary school (33%) was higher than the ones in junior high school (20%) and senior high school (15%).
2. Only 30%-35% of schoolchildren had good IDG knowledge. Thus, the schoolchildren's understanding of IDG must be improved.
3. Some nutrition-related information that has not been quite known by schoolchildren, among others, are as follows:
 - Overeating and its effect on obesity
 - Nutrient contents of food (protein and fiber sources)
 - Effect of dehydration on health
 - Personal hygiene related to a habit of washing hands with soap
 - Adequate frequency of physical activity to support fitness
4. Schoolchildren's nutrition behavior related to balanced nutrition was still not optimal. It can be seen from the lack of diversity in daily food consumption, the low consumption frequency of vegetables, the low consumption of food sources of animal protein, the lack of milk-drinking habits, and frequent consumption of sweet foods.
5. There were still many schoolchildren (30%) who ate twice a day, which could be seen from the low breakfast habits of the schoolchildren (i.e., 30%-40% of schoolchildren did not have breakfast regularly). The quality of breakfast consumed by schoolchildren did not reflect the diversity according to balanced nutrition.
6. The majority of mothers of schoolchildren in elementary school (97.2%), junior high school (100%), and senior high school (97.1%) had good scores regarding IDG knowledge and only a few schoolchildren's mothers in elementary school (2.8%) and senior high school (2.9%) had moderate scores. The distribution among them was not significantly different, with a mean score of >90. A total of 80%-100% of mothers correctly answered the knowledge questions regarding ten IDG messages. One question could not be correctly answered by 67%-87% of mothers. The question was "physical activity only needs to be performed once a week, and the correct answer for the question was "false".
7. There were 90.3%, 95.7%, and 84.3% of mothers of schoolchildren in elementary school, junior high school, and senior high school had positive attitudes towards IDG messages. The distribution of mothers was not significantly different, with a mean score of >80.
8. The consumption frequency of food sources of animal protein (i.e., chicken meat, milk, and eggs) was relatively good, but the fish consumption that was only twice a month

needs to be a concern. The schoolchildren from poor families consumed eggs more often than those from non-poor families, and the schoolchildren from non-poor families consumed milk more often than those from poor families.

9. The majority of schoolchildren had been accustomed to exercising (4-5 times/month). The elementary schoolchildren had a longer sleeping time (8.2 hours) than junior high schoolchildren (7.7 hours) and senior high schoolchildren (7.0 hours). Besides that, schoolchildren spent most of their time sitting (11-13 hours), and thereby the time they spent on other activities besides sitting and sleeping was only 3-4 hours.
10. The nutritional status of schoolchildren may be affected by certain factors. In this study, the relationship between nutritional status and the factors affecting nutritional status had been assessed. Those factors were breakfast habits, food consumption frequency, mothers' KAP, schoolchildren's KAP, and household socio-economic status as follows:
 - Based on breakfast habits, nutritional status of the schoolchildren who were used to having breakfast every day was not significantly different at each school level.
 - Schoolchildren's IDG knowledge was significantly correlated with nutritional status of elementary schoolchildren ($r=0.316$, $p=0.007$). Nutritional status of senior high schoolchildren had significant correlations with their IDG practices ($r=0.283$, $p=0.018$) and mothers' IDG practices ($r=0.279$, $p=0.020$). Despite these factors, physical activity and household socio-economic status had no association with schoolchildren's nutritional status.

11.2. Recommendations

1. IDG socialization must always be improved among schoolchildren so that these guidelines can be applied in daily life. Besides teachers, the role of health workers (Puskesmas' staffs) is expected to promote IDG that has been around for 23 years.
2. In order to apply the guidelines in daily life via school program, we emphasize the improvement of *Usaha Kesehatan Sekolah (UKS) or School Health Effort*. In Senior High School, there is a non-academic program called *Palang Merah Remaja (Students Red Cross Activity)* in which together with the teachers the IDGs would be possible to be socialized among the students. Another way is to elaborate the activity of school canteen (for those schools who have managed their own canteen).
3. Practically, it would be quite difficult to maintain and improve mothers/parents attitudes and practices towards IDGs via school in a direct way. However, it would be possible to gain the access of mothers/parents to be exposed by IDGs in school via parents meeting in each semester. Teachers would be able to provide such information and socialization of IDGs in continuity.

4. The breakfast habits among schoolchildren must be emphasized by teachers/parents because breakfast is closely related to academic performance, learning concentration, and learning achievement.
5. The high number of overweight/obese schoolchildren must be watched out for from an early age. Thus, the parents/teachers should always remind the schoolchildren about a healthy and nutritionally balanced diet so that the schoolchildren have normal weight.
6. Regarding the consumption of sweet, salty, and fatty foods, those are included in the IDGs message and the recommendation may be achieved by applying the others messages accordingly. For example, to reduce the sweet food consumption, people may need to consume more fiber foods (complex carbohydrate) to provide sufficient and efficient energy to be used by the body. It means that people need to consume a variety of foods (IDGs message no.1). However, it also would be possible to focus in obesity among school children in another study by using the nutrition intervention program in the implementation of IDGs.
7. Regarding fish consumption among schoolchildren, to date, Indonesian government (Ministry of Health) has a program to promote fish consumption. It is called 'GEMARIKAN' (*A Campaign for Fish Consumption*). Our study results may give an input both for Public Health Services and schools to gain the promotion of fish consumption among students.
8. Suggestion/persuasion to bring a home-packed meal to school once a week needs to be carried out so that teachers can evaluate the types and diversity of home-packed meal consumed by schoolchildren.

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