RESEARCH REPORT IN304

CHILDREN'S FOOD CONSUMPTION, SNACKING HABITS AND FOOD SAFETY OF POPULAR SNACKS IN SCHOOL ENVIRONMENT

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SUMMARY

School-age is a children period of growth and development into adolescence. Therefore, adequate intake of nutrients and food that is safe to consume is very important. According to Bondika (2011), only about 5% of school-aged children bring foods from home, so school-age children tend to buy snacks at school. However, there are potential problems on the safety of snack food sold at the school, namely the hazardous food contamination (microbiological & chemical), the hygiene and sanitation problem during its preparation, as well as the contribution of snack foods as unhealthy source of calories. Ensuring food safety of snack sold at school is very important in order to create quality human resources (MoH 2001). Food safety level of school snacks is still poor and has become a serious problem. One of the ways that can be done is to provide rules or conditions for sellers who will sell their foods in canteen or around the school environment. According to Notoatmodjo (2003a), with the rules that must be obeyed, then it may help the changes of one's behavior.

The overall objective of this research was to assess food safety of snacks sold in school environment consumed by school children in urban and rural areas. This research used a cross-sectional study design and conducted in six purposively selected public elementary schools (SDN). This study collected data from four types of respondents, namely 1) elementary school children (grade 5), 2) mothers of elementary school children (grade 5), 3) elementary school teachers, and 4) school food vendors or owners of canteen in the selected schools. The research started in November 2017 till April 2019. The study involved selecting sample using purposive sampling method. Three elementary schools in urban area (Tangerang Selatan City) and three elementary schools in rural area (Tangerang District). The total samples from six schools were 214 students. Food profiling was done for all vendors. Snack sold in school environment were categorized into dry food, wet food, and drink.

Data consisted of primary and secondary data. On school children respondents, the primary data included: 1) children characteristics, 2) health status and history of childhood disease, 3) food consumption, 4) eating habits and snacking frequency, 5) knowledge, attitude, practice (KAP) of nutrition and food safety, 6) individual sanitation and hygiene. For mothers, the data consisted of: 1) knowledge, attitude, practice of nutrition and food safety, 2) food caring behavior, and 3) hygiene and sanitation in the living environment. The primary data that was collected from the teachers include: 1) teachers characteristics, 2) KAP of nutrition and food safety aspects, and 3) school policies on food sold in school. From school food vendor/canteen owner respondents, the primary data that was collected include: 1) data of vendor characteristics, 2) knowledge, attitude, practice of nutrition and food safety, 3) snack profiles (manufactured and traditional), and 4) hygiene, food safety and environmental sanitation. The most popular snacks based on food profiling were collected for laboratory analysis . The data was collected through interviews to the respondents, filling out the questionnaire and laboratory analysis. Data analyses were include: data entry, data cleaning, statistical analysis, and creating dummy tables. SPSS Statistics software was used to carry out the analysis of comparison on variables between urban and rural and correlation analysis.

Current study found that mobidity rate of school children in city area (56%) is lower than in rural area (70%), especially on the occurrence of Upper Respiratory Tract Infection. Personal hygiene and sanitation of children in the city is better than in the rural area.

There was a significant difference between eating frequency school children in city and rural area ($p < 0.05$), where in rural area there are more students who eat 3 times. There are still quite a lot of students who didn't have breakfast before going to school. In regards of snacking habits, most of the students in the city (61.0%) and rural (76.2%) had snack for 4-6 times / week. The contribution of macro nutrients to daily energy and protein intake from street food in the city is 21.7% for energy and 18.1% for protein, while in the rural is 31.6% for energy and 24.1% for protein.

Evaluation on food vendors personal hygiene shown that there are 30% vendors in the city and 43.8% vendors in rural area that still pay no attention on hand, hair, nail and clothing hygiene. However, the food sold are considerately safe from food hazards and contaminants since all snack foods sampled from school in Tangerang Selatan City (urban) and Tangerang District (rural) were found to be safed from microbial contamination and forbidden food additives. Only one food (noodle) was considered not safe because it was contaminated by formalin.

Based on those findings, the schools should conntinously supervise the practice of selling snacks around the school. Although almost all snacks sold in schools are classified as safe, the presence of formalin in noodles found in one of the school indicates the potential for food hazard. The Department of Education and Culture and the Health Office need to conduct training or training for food vendors and teachers about healthy snacks and sanitation and hygiene management in schools. Thus the school can make policies for food vendors in the school environment related to aspects of personal hygiene and food safety. Parents need to pay more attention to children's food consumption, especially regarding breakfast habits that many students leave behind and the quality of breakfast that does not meet food diversity.

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CHAPTER 1
INTRODUCTION

1.1. Background

School-age is a children period of growth and development into adolescence. Therefore, adequate intake of nutrients and food that is safety to consume is very important. School-age children often buy snacks while at school. According to Bondika (2011), only about 5% of school-aged children bring foods from home, so school-age children tend to buy snacks at school. Based on survey conducted by Alfid *et al*. (2012) almost all (91.1%) of school-aged children like to buy snacks.

However, there are potential problems on the safety of snack food sold at the school, namely the hazardous food contamination (microbiological & chemical), the hygiene and sanitation problem during its preparation, as well as the contribution of snack foods as unhealthy source of calories. All the problems occur due to food handling procedures that ignore the aspects of food safety, and also consumer ignorance (school children and teachers) of safe and quality snacks (Artista 2009).

According to Kusumaningrum *et al*. (2012), the harm caused by bacteria is usually caused by the presence of E. coli bacteria that become sanitary parameter and Salmonella (pathogen bacteria). Other contaminant that needs to be concerned is metal contamination, such as plumbum (Pb). In addition, harmful additives in the food will have a negative effect on health. The additives that often found in snack food of school children are formalin, borax, rhodamine B, and methanil yellow. While the permitted food additives by the Minister of Health also being used (the Minister of Health Regulation No. 033 of 2012 on Food Added Substances (MoH 2012), the dose is often above the allowed threshold.

Ensuring food safety of snack sold at school is very important in order to create quality human resources (MoH 2001). Snack that neglect food safety aspect, such as microbial contamination, the use of food additives above the threshold, and the content of hazardous materials will be a threat that can interfere with the health and intelligence of children. Decree of the Minister of Health of the Republic of Indonesia Number 942 of 2003 states that public needs to be protected from foods and drinks that do not meet the requirements and endanger public health (MoH 2003).

According to BPOM (2016), the types of food causing Food Poisoning Incidence in 2015 are household food (40.98%), food snack (22.95%), culinary food (21.31%), and processed food (14.75%). Extraordinary Occurrence of Food Poisoning in primary school is generally caused by food snacks that are contaminated with pathogenic bacteria. Therefore, the empowerment of the school community that includes the principal, teachers, students, parents, and food vendors on supervising foods sold at school need to be increased.

Throughout January to March 2017, the National Poison Information Center (SIKerNas) has collected news of poisoning incidents from online mass media listed on the press council that occurred in North Sumatra, Jambi, Lampung, Banten, West Java, Central Java, East Java, Bali, West Kalimantan, Central Kalimantan, South Kalimantan and South Sulawesi (BPOM 2017[a]). There are 6 incidents of food poisoning are caused by street food

with the number of victims 231 people; 7 incidents caused by manufactured foods with the number of victims 403 people; 4 incidents caused by homefood industry with the number of victims 183 people; and 2 incidents due to beverages (especially milk) with the number of victims 27 people.

There are five major sources and types of hazard and the microbial risk involved in street food: 1) vendor location, 2) raw materials, 3) utensils and equipment, 4) storage and reheating, and 5) personal hygiene of vendors (Rane 2011). We propose hypothesis based on those points that schools in urban areas tend to have better condition compared to the ones in rural areas, therefore it is important to compare between two areas.

The existence of a school canteen holds a relatively significant contribution as it provides approximately ¼ family food consumption. Children spend time in school long enough, thus the availability of safe and healthy food snacks in the school canteen is very important. School canteens that meet health standards have been established as one indicator of healthy school. Regulation of Minister of National Education Number 19 Year 2005 on National Education Standards in Article 42 paragraph 2 states that every educational unit must have facilities and infrastructure such as canteen space. It is also regulated in the Decree of the Minister of Health No. 1429 of 2006 on Guidelines on the Implementation of School Environmental Health (MoH 2006).

The results of a Healthy School study conducted by the Center for Physical Quality Development of the Ministry of National Education in 2007 at 640 primary schools in 20 provinces found that as many as 40% of schools have not yet had a canteen. Meanwhile, from those who have owned canteen (60%) as many as 84.3% of the canteen has not fulfilled the health requirements. In addition, there are found that many food snacks do not meet the requirements of quality cleanliness, health and safety, so it can cause adverse effects for nutrition and health of children. BPOM monitoring results in 2011 showed there were 35.5% of school canteen's snack food did not meet the food safety requirements (MoH 2011[a]).

The result on snack food sampling from 2010-2012 shows that every year the number of non-qualified snacks decreased from 44% (n = 3372 samples) in 2010 to 35.46% (n = 4808 samples) in year 2011 and to 23.89% (n = 7200 samples) in 2012. Nevertheless, the number remains large because it involves negative impacts on the health of school children. The results of school food snack testing on the parameter of the use of food additives that exceeds the maximum limit show a tendency to increase each year. Based on the results, it is known that there are fluctuation of test result that is in 2009 (21%), 2010 (23%), 2011 (20.45%) and 2012 (24%) (BPOM 2012[a]).

The results of a study by Adhisty (2014) on healthy canteen assessment in Depok City showed that the evaluated canteens were unhealthy because there were still many bacteria contaminants, hazardous substances, and food additives above the maximum limit stated in SNI (Indonesian National Standard). Similar results were also shown in a study by Jayasiddayatra (2014) on the characteristics of snack food at primary school in Indonesia; i.e. that there were still no eligible snacks due to excessive and unacceptable food additives and the presence of microorganism contamination. The main cause of snacks (ice, jelly and soft drinks) became not eligible was the cyclamate content. The presence of high bacterial

contamination was indicated in meatballs and snacks based on the parameter of Total Plate Count (TPC) test. Noodles were known to contain preservatives in form of formalin.

In 2006, a study conducted by Firlieyanti on ice-cube sanitation in Bogor showed that 100% of the samples tested contained non-fecal coliform, 45% contained fecal coliform, and 10% contained E. coli. Based on the study results, it is known that ice cubes circulating in Bogor still do not meet microbiological criteria determined in Indonesian National Standard for ice cubes; i.e. 0/100 ml for the amount of fecal coliform and total coliform. Therefore, ice cubes have potential microbiological hazards when not treated with good sanitation and hygiene (Firlieyanti 2006).

The analysis results on the data concerning food and beverage monitoring activities conducted by Health Office of Tangerang District to snack food vendors in primary schools in 2006 showed that nearly half of the food samples examined were positively contaminated by bacteria (37.1%). As for the knowledge variable, it was seen that more than more than half of the snack food vendors had poor knowledge (62.9%). Most of the snack food vendors had poor behaviors (76.7%), and more than half of business locations had unqualified building conditions (53.5%). More than half of the snack food vendors in the primary schools used equipment that did not meet the requirements (57.2%). The condition of garbage disposal facilities from almost all food vendors was not eligible. Most of the existing clean water facilities (75.5%) and the disposal of visible waste (86.2%) were not eligible (Wibawa 2008).

The type of snacks mostly consumed by primary school students who became the study subjects of Monalisa (2013) in Tangerang Selatan City area were noodles (56.8%), rice (68.2%), processed meat (27.3%), extrusion/manufacturer products (40.9%), processed flour products (43.2%) and packaged liquid beverages (58.0%). The results of the study also showed that most food vendors had low food-safety knowledge (78.6%). A study by Rumanta, Iryani, and Ratnaningsih (2016) showed that 54% of the food samples obtained from the primary schools in Subdistrict of Pamulang positively contained borax; while all samples acquired from supermarkets were not detected to contain borax.

The low food safety level of school children's snacks requires special attention because it can indirectly become one of the most important obstacles in Indonesia's human resource development in the future. In general, school-aged children often buy snack foods sold in the canteens or around the schools without realizing that some of the snack foods consumed can endanger their health. The condition is aggravated by improper way of sale that is on the side of road which is relatively open, thereby prone to be contaminated by microorganism harmful to human health. Therefore, monitoring and supervision on school canteen and/or vendors around the school should be continuously improved since most of the snacks are made in inappropriate conditions and ways.

Food safety level of school snacks is still poor and has become a serius problem. One of the ways that can be done is to provide rules or conditions for sellers who will sell their foods in canteen or around the school environment. According to Notoatmodjo (2003[a]), with the rules that must be obeyed, then it may help the changes of one's behavior.

1.2. Objectives

The overall objective of this research is to assess food safety of snacks sold in school environment consumed by school children in urban and rural areas. The specific objectives are:

1. To assess the relationship between (a) the children's morbidity and snacking habits; (b) the relationship morbidity of the children and food hygiene of the children and the vendors.
2. To assess whether there are differences between rural and urban regarding children's morbidity, snacking habits, and food hygiene of the children and the vendors.
3. To analyze the knowledge, attitude and practice of school children, mothers, teachers and food vendors about nutrition and food safety.

CHAPTER 2
LITERATURE REVIEW

School Snack Food Safety

According to MoH (2011), food safety is a condition and effort needed to prevent food from the possibility of biological and chemical polution as well as other objects that can disturb, harm and endanger human health. Food snacks according to MoH (2011) are food and/or drinks that can be consumed directly from food vendors, either those produced by the sellers or those produced by other people, without being processed again. BPOM (2013) adds that school children's snacks (SCS) are foods that are found in the school environment and routinely consumed by most school children.

Wholesome food includes nutritious and safe food. To obtain nutritious and safe food, the government through Government Regulation (GR) No. 19 of 2005 concerning the National Education Standards (NES) states that each education unit must have facilities and infrastructure including a canteen room or school canteen (MoH 2011).

Unsafe food sources are 1) disease-causing microbes (pathogens); 2) hazardous chemicals, such as pesticides and heavy metals (mercury, arsenic and lead); 3) physical contamination, such as nails, staplers, hair, rubber and others; 4) use of prohibited materials, such as borax and formalin and textile dyes; and 5) use of safe materials that exceed the maximum limits of use, such as sweeteners and preservatives. The cause of unsafe food is behavior that is not in accordance with the principles of food safety, unsafe materials and unclean equipment, and an unclean environment (MoH 2011).

Two hazardous chemicals which are often misused for food preservatives and food processing are formalin and borax. The signs of wet noodles containing formalin and borax are that they appear more shiny, not sticky, not easily stale. Signs of meatballs containing borax are that they appear whiter and very springy. Two textile dyes that are often misused in food are Rhodamin B and Methanyl Yellow. Signs of food containing dyes are not conspicuously colored, the food tastes a little bitter, and the throat is itchy after one tastes the food. Packaged drinks and fruits that have been damaged or "dented" (change shape); moldy breads and cakes as well as foods and drinks that have changed their color, aroma and taste are at risk of being unsafe (MoH 2011).

Studies have shown that about 2.5 billion people consume street food around the world. Although consumption keeps on spreading, the difficulty of sanitary quality control and the low nutritional quality of street foods can be a threat to consumer’s health in terms of nutritional security. Street foods could be associated with the emergence of foodborne diseases, due to the ease of contamination by several agents, including pathogenic microorganisms. In addition, street foods could also be associated with the development of chronic non-communicable diseases, since street foods usually have high quantities of carbohydrates and fats. These issues indicate that pertinent health authorities should regulate the marketing of street foods and initiate appropriate training programs for schoolbased street food vendors, for example in foodborne diseases, food safety, and food security. Simultaneously, incorporation of food safety and food security messages into textbooks and school curriculum would provide opportunities for increasing awareness of

people regarding food security and nutrition. Studies have also shown that in most countries' policies there is no legal arrangement for food safety and application or the sale of street food (Sezgin & Şanlıer 2016; Nonato et al. 2016).

Snacking Habits of School Children

Food likes and dislikes play an important role in food choices, especially in children. Preferences are shaped by a combination of genetic and environmental factors. A mixture of innate preferences and the ability to develop new preferences (i.e. to learn what is nutritious and safe to eat) appeared to be fundamental in the past. There is substantial similarity in children's preferences of food, which to some degree transcends cultural variations. High-fat and sweet foods are usually preferred by children of many countries, whereas vegetables are almost universally unwelcomed (Scaglioni *et al*. 2011).

Children consumed 72% fewer calories when eating a combination snack of vegetables and cheese compared with when they were served potato chips. Children who ate the combination snack of vegetables and cheese needed significantly fewer calories to achieve satiety than those who ate potato chips. The effects of the snack conditions on caloric intake were more pronounced among overweight or obese children and those from low-involvement families (Wansink, Shimizu, & Brumberg 2013).

Children and adolescents who had a higher number of eating episodes per day had 22% lower probabilities of being overweight or obese compared with those who had fewer episodes. Interestingly, the inverse association was evident only in boys and not in girls. Schools may play an important role in improving children's eating preferences and patterns, and in this perspective, integrating smaller, more frequent meals in the school environment may be an effective way to battle childhood obesity (Kaisari, Yannakoulia, & Panagiotakos 2013).

BPOM (2013) states that eating snacks while at school is important so that blood sugar levels remain well controlled in order that children are still able to concentrate on learning and can carry out other activities. However, breakfast must remain a priority in nutrition for school children. The results of a study conducted by Wiraningrum, Pudjirahaju, and Setyobudi (2015) showed that only 10% of the total PJAS studied in the study fulfilled values of energy, nutrients, and protein quality.

Hygiene, Sanitation, and Morbidity of School Children

Hygiene is any effort to maintain and enhance health status. Sanitation is an effort to prevent the possibility of growth and proliferation of decomposing microorganisms and pathogens in equipment and buildings that are destructive and harmful (BPOM 2013).

In a study conducted by Das *et al*. (2012), the total number of primary school children in ten selected schools in North Kolkata of West Bengal, India was 530 and among them 502 (94.7%) were interviewed and examined. Poor hygiene (presence of dirt under nails, pediculosis scalp, and unclean skin) was found at the rate of 40.2% of children.

Most common causes of morbidity in the study were nutritional deficiency diseases, anemia, worms infestation, vitamin deficiency, tonsils enlarged, dental caries, fever, upper respiratory tract infections, defective vision, pain abdomen, skin infections (pyoderma, scabies, and fungal infections), conjunctivitis, congenital malformation, pediculosis, refractive error, infective and parasitic diseases, eye, ear and skin problems (Das *et al*. 2012; Sehgal *et al*. 2015; Shinde, Trivedi, & Joshi 2015; Kalyani, Felix, & Arulmani 2016; Kausar, Sambutwad, & Shafee 2016)

Shinde, Trivedi, and Joshi (2015) declared that 404 (58.72%) children were found to be suffering with one or more morbidity and of them 62.13% were male and 54.83% were female. Another study found out that the prevalence of anemia, dental caries, and pediculosis was more among girls compared to boys (Kalyani, Felix, & Arulmani 2016). A study that was conducted by Kausar, Sambutwad, and Shafee (2016) also found that prevalence of morbidities among girls was more than boys but it was not found to be statistically significant ($X2= 1.14$; $d.f=1$, $p>0.05$).

Knowledge, Attitude and Practice

Winkel (1984) states that a person's level of knowledge can be influenced by his intellectual abilities. The level of knowledge will affect a person's attitudes and behavior because it relates to the power of reasoning, experience, and clarity of concepts regarding certain objects. A person can obtain nutritional knowledge through various sources such as library books, magazines, television, radio, newspapers and other people (husband, friends, neighbours, nutritionists, doctors, etc.).

Sediaoetama (1996) also argues that the better the nutritional knowledge, then someone will increasingly pay attention to the quantity and quality of food to be consumed. People who do not have enough knowledge of nutrition, will choose foods that are most attractive to the five senses, and do not make choices based on the nutritional value of food. Conversely people who are getting better nutritional knowledge, use more rational considerations and knowledge as a basis before consuming certain foods.

Lack of nutritional knowledge results in reduced ability to apply information in everyday life and is one of the causes of nutritional disorders (Suhardjo 2013). Sharif, Obaidat, and Al-Dalalah (2013) state that educating, training and promoting positive attitudes of food handlers would improve the status of food hygiene knowledge, attitudes and practices.Mendagudali et al. (2015) added that there were positive relationships between both knowledge and attitude and knowledge and practice, and also attitude and practice. It can be anticipated that as knowledge will increase, attitude and practice will improve accordingly.

Study that were conducted by Lee *et al*. (2017) found that the education level, working experience, and safe food handling course had different degrees of impact on food safety knowledge and attitudes of food handlers. It is interesting to note that those who had not received any formal education performed better than those who had received primary education. Nonetheless, it was found that those who had secondary education and above scored significantly higher on food safety items related to food handling ($p<0.05$) and only

food handlers with tertiary education knew more about foodborne pathogens than the rest ($p<0.05$). On the other hand, food handlers who had more working experience in the food service industry had a better overall food safety knowledge (more than 6 years > 5–6 years > 2–4 years ≥ 2 years, $p < 0.05$) than food handlers with lesser experience. From the questionnaire, even though the safe food handling course did not significantly improve the food safety knowledge, those who had attended the course performed slightly better than those who had not attended the course. Most importantly, the safe food handling course had a significant positive impact on the attitudes toward food safety.

It is important for food handlers to equip themselves with knowledge on good food handling practices. Beside knowledge and law enforcement, the attitude of the food handlers also is another important factor that may influence the occurrence of foodborne disease. Basically, all three traits; knowledge, attitude and education, are compulsory to achieve safe food handling practice (Mustaffa *et al*. 2017).

CHAPTER 3
CONCEPTUAL FRAMEWORK

National Agency of Drug and Food Control (BPOM) and Ministry of Health (MoH) state that the biggest sources of food poisoning that occurs in Indonesia are homemade food, catering services and school children's snack food. Provision of healthy, safe and nutritious food in school is important to support nutritional needs and health of the schoolchildren (BPOM 2012[b]).

Healthy snack foods include foods that are nutritious and safe to consume. Without avoiding unsafe food, it is unlikely that the nutritional benefits are realized in one's growth, development and health. Thus, food safety is one the aspects that needs to be considered in the fulfillment of healthy food for consumption. In Law Number 7 Year 1996, it is mandated that food is a basic human need in which the fulfillment of it becomes the right of each people in Indonesia in order to bring about qualified human resources to carry out national development. Therefore, safe, good-quality, nutritious, diverse and sufficiently available food is the major prerequisite in the implementation of a food system that gives protection for consumers' health, prosperity and people's welfare (MoH 2011[a]).

Some snacks of the school children is called "heavy snack", for example chicken noodles, meatballs, chicken porridge, fried rice, gado-gado, soto, vegetable- or meat-stuffed lontong etc. Snack is a food usually consumed outside the main course. Other snacks can be categorized as wet snacks and dry snacks. The examples of wet snacks are deep-fried foods, lemper, layer cake, donuts, and jelly. Meanwhile, the examples of dry snacks are popcorn, chips, biscuits, pastries, and candy. Beverages are divided into two groups i.e. beverages served in glasses and the ones served in packs. Examples of beverages served in the glass are plain water, sweet iced tea, orange ice drink, and a variety of mixed beverages (cendol ice, ice mixed with fruits and syrup, tutti-frutti, doger ice, fruit juice and ice cream). Meanwhile, the examples of beverages served in packages are bottled beverages and canned beverages (Kusumaningrum *et al*. 2009).

Based on the Final Report of Monitoring and Verification Results on National Food Safety Profile of School children's Snacks in 2009, it showed that 98.9% of children bought snacks in school. Further data showed that school children's snack foods contributed 31.06% energy and 27.44% protein of daily food consumption. Thus, the position of school children's snack food become strategic and its existence is expected. The study results indicate that school children's nutrition knowledge levels belong to high category. However, in practice, this does not underlie the selection of appropriate school children's snack foods. One of the reasons is the limited availability of snack foods for children in school environment and pocket money (MoH 2011[a]).

School children's snacks have an important role in providing energy and nutrition for students. Snacks or street foods have a very important role because these foods can overcome hunger between "hungry times", prevent overeating at meals, and improve concentration. Unfortunately, there are still many unhealthy children snacks that even endanger their health, especially the snacks sold in school environment. Some study results

indicate that there are still about 40-44% of school children's snacks that do not meet health requirements (Nuraida *et al*. 2009).

Sources of the unsafety snacks of school children can come from various contaminants, either from biological contamination, chemical contamination, or physical contamination. Besides these various contaminants, school children's snack foods can also be unsafe because of the condition of raw ingredients, additives, and the equipment used in the food processing. Meanwhile, the environment and the handlers involved in food management process may also participate in determining the food safety conditions (BPOM 2012[b]).

Biological contamination is generally caused by low hygiene condition and sanitation. It can contaminate school children's snack foods at various stages of food management, starting from food selection stage, food storage, preparation and cooking, packing of cooked food, storage of cooked food and its distribution, as well as when the food is consumed. Contamination on school children's food snacks may happen through biological contaminants such as contamination by Salmonella, E. coli, virus, parasite and mycotoxin-producing molds (BPOM 2012[b]).

Chemical contamination may come of waste-polluted environment and the abuse of hazardous materials prohibited for foodstuffs that are added to the food. Examples of materials categorized as hazardous substances are formalin, rhodamine B, borax, and methanil yellow. Besides these causes, chemical contamination can also stem from natural toxins contained in the food. This chemical contamination may come from foodstuff, food additives, equipment, environment, chemicals, pesticides and packaging materials. As is the case with biological contaminants, chemical contaminants may contaminate food during selection of raw ingredient, ingredient storage, preparation and cooking, packing, storage of the cooked food, the distribution, and when the food is consumed. Physical contaminants can be in the form of hairs from handlers who do not cover their heads while working, pieces of wood, pieces of insect body parts, sand, stones, shards, metal staple of the stapler etc. (BPOM 2012[b]).

Consuming unsafe food will cause health problems. These health problems can be mild symptoms such as dizziness and nausea, or serious ones such as nausea with vomiting, stomach cramps, muscle cramps, muscle paralysis, diarrhea, disability and death. Permanent disability of fetal growth and development may occur due to food poisoning experienced by pregnant mothers. Food poisoning incidence caused by unsafe food not only adversely affects consumers or the victims, but also adversely affects socially and economically for families, producers or food industries, and government (Kusumaningrum *et al*. 2009).

Most of the snack foods in schools need to get serious attention because there are enough cases of food poisoning in schools due to hazardous substances contained in the food. The hazardous substances such as formalin, borax, rhodamine B, food additives (e.g. cyclamate and benzoate) are often used over the safe limits, and poor microbiological qualities. These substances can be accumulated in the human body and some are carcinogenic which may lead to serious health problems in the long term.

The high use of hazardous substances in snack foods can be caused by the low education level of the vendors and supportive environments. Vendors with low education tend not to pay attention to health and safety factors of food. The economic factor of the vendors also influences this matter. Snack food vendors with low economic level tend to use harmful preservatives due to cheaper prices. Meanwhile, school children with limited pocket money tend to buy cheaper food.

To overcome this problem, the awareness, commitment and synergic steps among various stakeholders are needed; such as the local governments who have an important role to implement snack food safety improvement program for children in school in consistent and sustainable ways. Meanwhile, the school also has an important role in establishing policies and regulations regarding food safety of the school children's snack foods in school environment and providing facilities and infrastructure that adequately support food safety in school (Nuraida 2011).

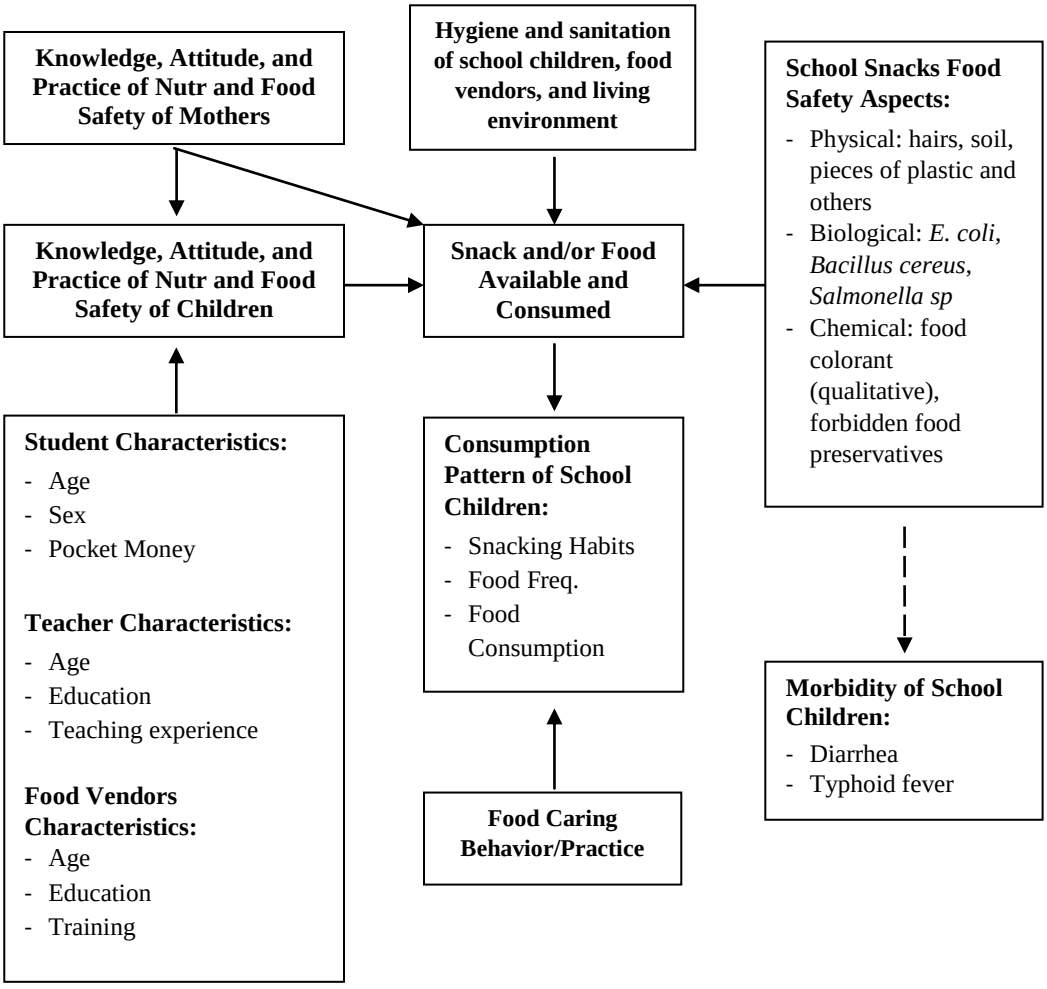


Figure 3.1. Conceptual Framework

CHAPTER 4
METHODS

4.1. Research Design, Location and Time

This research used a cross-sectional study design and conducted in six purposively selected public elementary schools (SDN). This study collected data from four types of respondents, namely 1) elementary school children (grade 5), 2) mothers of elementary school children (grade 5), 3) elementary school teachers, and 4) school food vendors or owners of canteen in the selected schools. The research started in November 2017 till April 2019 which includes site survey, research permission, data collection, data processing, data analysis, report writing, and seminar.

4.2. Sampling

The study involved selecting sample using purposive sampling method. Three out of 140 public elementary schools in urban area (Tangerang Selatan City) and three out of 757 public elementary schools in rural area (Tangerang District) were selected based on local education authority's recommendation (Educational Office).

For school in urban area (Tangerang Selatan City), a minimum 35 purposive samples were drawn among 5th grade class and six teachers in the sampled school. In rural area (Tangerang District), since the number of students at SDN Cibogo were less than 35 students, then the researchers withdrawn additional samples from SDN Kedokan (Table 4.1). The total samples from six schools were 214 students.

Food profiling was done for all vendors. Snack sold in school environment were categorized into dry food, wet food, and drink. To ensure adequate representation of vendor, five dry food vendors and five wet food and drink vendors were chosen in each school for interview. The number of food vendor for interview in SDN Cibogo and SDN Pajajaran are less than ten vendors, thus more vendors from SDN Kedokan was taken to round out the sample number.

Table 4.1. School characteristic

Area	**Urban (Tangerang Selatan City)**			**Rural (Tangerang District)**		
School name	**SDN Pamulang 2**	**SDN Pamulang Tengah**	**SDN Pamulang Timur 1**	**SDN Cibogo**	**SDN Kedokan**	**SDN Pajajaran**
Total number of student	830	461	356	260	453	259
Total number of 5th grade class	3	2	2	1	2	1
5th grade student						
- Total	125	72	76	36	66	38
- Sample	35	35	35	31	39	35
Teacher						
- Total	35	21	20	7	15	12
- Sample	6	6	6	6	6	6
Food vendor						
- Total	12	10	10	10	13	9
- Sample	10	10	10	10	13	9

4.3. Data Collecting

Once a school agreed to participate in the study, researchers identified a local contact to carry out the following tasks: 1) construct list of students in 5th grade, 2) serve as a liaison between sampled student, teacher and researcher, and 3) help researcher to plan interview schedule.

Data consisted of primary and secondary data. On school children respondents, the primary data included: 1) children characteristics, 2) health status and history of childhood disease, 3) food consumption, 4) eating habits and snacking frequency, 5) knowledge, attitude, practice of nutrition and food safety, 6) individual sanitation and hygiene (see Table 4.2). For mothers, the data consisted of: 1) knowledge, attitude, practice of nutrition and food safety, 2) food caring behavior, and 3) hygiene and sanitation in the living environment (see Table 4.3).

Table 4.2. Methods of measurement and collection of school children's data

Aspects	Variables	Methods of Collection
Children characteristics	- Name - Sex - Date of birth - Father and Mother names	Interview using questionnaire
Morbidity	History of: - Diarrhea - Typhoid fever	Interview using questionnaire
Food consumption	Type and quantity of food consumed	Interview using questionnaire (food frequency questionnaire and 2x24 hour food recall)
Snacking Habits	- Snacking habit - Pocket money and money spend for snack - Preference of snacks - Portion intake of snack in a week	Interview using questionnaire
Nutrition and food safety aspects	- Knowledge (K) - Attitude (A) - Practice (P)	Interview using questionnaire
Individual sanitation and hygiene	- Sanitation - Hygiene	Interview using questionnaire

Table 4.3. Methods of measurement and collection of mother's data

Aspects	Variables	Methods of Collection
Nutrition and food safety aspects	- Knowledge (K) - Attitude (A) - Practice (P)	Self administered questionnaire
Food caring behavior	Food caring practice	Self administered questionnaire
Hygiene and sanitation	Hygiene and sanitation in the living environment	Self administered questionnaire

The primary data that was collected from the teachers include: 1) teachers characteristics, 2) KAP of nutrition and food safety aspects, and 3) school policies on food sold in school (Table 4.4).

Table 4.4. Methods of measurement and collection of teacher's data

Aspects	Variables	Methods of Collection
Teachers characteristics	- Name - Sex - Age - Education - Job experience	Interview using questionnaire
Nutrition and food safety aspects	- Knowledge (K) - Attitude (A) - Practice (P)	Interview using questionnaire
School policies on food sold at school	- Kind of foods - Price	Indepth interview

From school food vendor/canteen owner respondents, the primary data that was collected include: 1) data of vendor characteristics, 2) knowledge, attitude, practice of nutrition and food safety, 3) snack profiles (manufactured and traditional), and 4) hygiene, food safety and environmental sanitation (Table 4.5).

The data was collected through interviews to the respondents, filling out the questionnaire and laboratory analysis. For this purpose, a questionnaire was designed and tried out first before being administered. The regulation of Indonesian Health Minister on Snack food (*Kepmenkes Nomor 942/MENKES/SK/VII/2003*) and Food Vendors (*Permenkes Nomor 1096/MENKES/PER/VI/2011*) were used as guidelines to design the related questionnaire. The feedback from the try-out was used to improve the questionnaire as to make it more operational (MoH 2003; MoH 2011[b]).

The most popular snacks based on food profiling were collected for laboratory analysis (Table 4.6). Interviewers were asked to take detailed field notes during food profiling, describing what the vendors were doing throughout selling their food. They were asked to pay attention to certain aspect of hygiene and sanitation of the vendors.

The number of foods profiled were 19 snacks from SDN Pamulang Timur 1, 22 snacks from SDN Pamulang Tengah, 26 snacks from SDN Pamulang 2, 41 snacks from SDN Kedokan, 12 snacks from SDN Cibogo, and 17 snacks from SDN Pajajaran. Rank of most popular snack was based on number of portions sold per day. During food profiling, some foods were observed for containing food hazard. Thus, eventhough the foods are not popular, laboratory analysis was performed to check for food hazard.

Table 4.5. Methods of measurement and collection of food vendor's data

Aspects	Variables	Methods of Collection
Food vendor/ canteen owner characteristics	- Name - Sex - Age - Education level - Training/seminar related to nutrition and food safety that have been participated	Interview using questionnaire
Nutrition and food safety	- Knowledge (K) - Attitude (A) - Practice (P)	Interview using questionnaire
Snack profiles	- Name of snack - Source of snack - Type of snack - Unit price - Conditions of storage temperature - Expose to sunlight - Raw and auxiliary materials - Packaging/wrapping - Potential for unsafety - Sanitary of equipment and place - Source of water - Expire date, labeling and code registration for manufactured snacks - Best selling snacks	Interview using questionnaire
Food Safety	- Characteristics: ▪ Physical ▪ Biological ▪ Chemical - Environmental sanitation	- Collecting food and water samples and analyzed in laboratory examinations - Interview and observation using questionnaire

Table 4.6. Food profile of popular snacks for laboratory analysis

No	Food Name	Category	Main ingredient	Packaging	Unit price (IDR)	Portion sold/day
SDN Pamulang Timur 1						
1	Sosis Goreng* (Fried sausage chips)	Dry Food	Meat saussage	plastic	1,000	30 pcs
2	Basreng* (Meatball chips)	Dry Food	Meatball, Flour	plastic	500	10 pcs
3	Cireng Isi (Stuffed Frittes)	Wet Food	Cassava Flour, Chicken	Used paper	1,000	100 pcs
4	Cilung (Rolled Frittes)	Wet Food	Sagoo Flour	Plastic	1,000	100 pcs
5	Sosis Panggang (grilled sausage)	Wet Food	Meat saussage	plastic	1,000	90 pcs
SDN Pamulang Tengah						
1	Gulali* (Hard candy)	Dry Food	Sugar	plastic	1,000	10 pcs
2	Roti bakar (baked bread)	Wet food	Bread, jam	Bread paper	2,000	140 pcs
3	Seblak (spicy wet cracker)	Wet food	Fish cracker, egg	styrofoam	2,000	125 pcs

Note: *) additional snacks to be tested for food safety

Table 4.6. Food profile of popular snacks for laboratory analysis [continued]

No	Food Name	Category	Main ingredient	Packaging	Unit price (IDR)	Portion sold/day
4	Otak-otak cryspy (fishcake chips)	Wet food	fishcake	Used paper	1,000	80 pcs
5	Mie Bakso* (Meatball noodle)	Wet food	Meat ball, noodle	bowl	1,0000	50 pcs
SDN Pamulag 2						
1	Spagetty	Wet food	Pasta, meat sauce	styrofoam	2,000	55 pcs
2	Telur gulung (egg satay)	Wet food	Egg, glassnoodle	plastic	1,000	50 pcs
3	Soto Mie* (Noodle Soup)	Wet Food	Noodle	bowl	5,000	20 pcs
4	Pisang Coklat (Chocolate Banana)	Dry Food	Banana, Chocolate jam	plastic	1,000	30 pcs
SDN Pajajaran						
1	Bakso Ikan (Fish meatball)	Dry food	Fish, flour	plastic	1,000	100 pcs
2	Mie jablay* (Noodle)	Wet Food	Noodle	Plastic cup	1,000	13 pcs
3	Makaroni (Macaroni)	Wet Food	Macaroni	plastic	3,000	66 pcs
4	Martabak Telur (stuffed egg pancake)	Wet food	Egg, Flour	paper	1,000	25 pcs
SDN Kedokan						
1	Sosis goreng (Fried sausage)	Wet Food	Meat saussage	plastic	2,000	60 pcs
2	Bakso ikan (Fish meatball)	Dry food	Fish, flour	plastic	2,000	125 pcs
3	Sarang laba-laba (spider web cake)	Wet food	Flour, sugar	Used paper	1,000	100 pcs
SDN Cibogo						
1	Batagor (Fried tofu and meatball with peanut sauce)	Wet food	Fried tofu, meatball	plastic	2,000	15 pcs
2	Papeda telur puyuh (Steamed sago with quail egg)	Wet food	Sago flour, egg	plastic	2,000	25 pcs
3	Ketupat pecel (ketupat rice with peanut sauce)	Wet food	Ketupat rice	paper	4,000	20 pcs

Note: *) additional snacks to be tested for food safety

4.4. Laboratory Analysis for Food Safety

Three most popular snacks among students at each school were tested for food safety analysis in laboratory. Samples were tested for presence of borax, formalin, textile dyes, *E. coli*, *Salmonella* and *Bacillus.* Snack sample collection were performed by a qualified lab researcher. Methods on sample collection were based on *Permenkes Nomor 1096/MENKES/PER/VI/2011*. Samples were stored in sterile plastic container and were stored below 10°C until reaching the laboratory.

Sample snacks then were tested in the BBIA laboratory (Centre for Agro Industry) to analyze the presence or absence of chemical and biochemical contamination in the

suspected snacks. The list of food safety assay in this study limited to only aspects presented in Table 4.7 below.

Table 4.7. List of food safety assay

Category	Method
Food colorant (qualitative)	SNI 01 – 2895 – 1992, UDC 664
Forbidden food preservatives	SNI 01 – 2894 – 1992, UDC 663/664
E. Coli	Bacteriological Analytical Manual
Bacillus cereus	AOAC Official Method 980.31
Salmonella sp	International standard (ISO 6579, fourth edition 2002-07-15) Ref number ISO 6579:2002(E)

4.5. The Control of Data Quality

To ensure data quality, all of the interviewers had a complete understanding of the purposes and procedures of the study, each interviewer participated in a training session conducted by the researchers. Therefore, by the end of the training there was substantial agreement on how to conduct observation and interviews. During the interview on site, the researchers supervised throughout the whole process. After the interview was done, all of the questionnaire sets were checked immediately to ensure they had been filled correctly. To test realibility of knowledge on nutrition and food safety aspects, a statistical analysis had been performed and the results were Cronbach's Alpha coefficients of the students and the mothers' knowledge are 0.644 and 0.702, respectively.

Food sampling was conducted by the researchers together with research assistants. The food sampling protocol used in this study was adapted from Ministry of Health (MoH) protocol and suggestion from laboratory of State Department Agricultural Department, and in most cases, the researchers had training and experience using that protocol in collecting food sample. Once the sample was collected, it was weighed on the spot and stored inside cooled ice box to prevent contamination and bacterial growth.

4.6. Data Analysis

Data analyses included: data entry, data cleaning, statistical analysis, and creating dummy tables. The data entry was done in Microsoft Excel, and data editing and cleaning was then performed. Data on the samples characteristics were analyzed descriptively, and comparisons of variables between urban and rural were tested using t-test for numerical data and Mann Whitney test for the categorical ones. Correlation analysis was used to answer the objectives if there was a correlation between (a) the children's morbidity and snacking habits; (b) a correlation between morbidity of the children and food hygiene of the children and the vendors. Pearson and Rank-Spearman correlation tests were used and SPSS Statistics software was used to carry out the analysis.

CHAPTER 5
DESCRIPTION OF THE STUDY SITES

5.1. Geographic Condition

South Tangerang City is the youngest city, that has been officially separated from Tangerang Regency since 2008, located in the eastern part of Banten Province, which is geographically located between 6º39 '- 6º47' South Latitude and 106º14 '- 106º22' East Longitude with an area of 147.19 square kilometers (km²) or equal to 1.63% of the total area of Banten Province. While administratively, South Tangerang City consists of 7 sub-districts, and 54 *kalurahan* (village). The city of South Tangerang had an average rainfall of 252.3 mm2 with an average number of rainy days which is 19.5 days / month. The average air temperature in the City of South Tangerang was 27.80C with the lowest and highest temperatures in 24.90C and 33.20C respectively. Meanwhile, the average air humidity in the area was 83.1% (BPS-South Tangerang City 2017).

Tangerang Regency is a lowland with an altitude of 0-85 meters above sea level, located at 6 ° 00'-6 ° 20 'South Latitude and between 106 ° 20'-106 ° 43 ’East Longitude. The total area of Tangerang Regency is a land area of 959.60 km2. In 2016, the administrative area of Tangerang Regency consisted of 29 sub-districts. Tangerang Regency had an average rainfall of 237.7 mm2 with an average number of rainy days which was 16 days/month. The average air temperature in Tangerang Regency was 27.90C with the lowest temperature and the highest 24.8 0C and 32.30C respectively. Meanwhile, for the average air humidity of the region was 81.3% (BPS-Tangerang Regency 2017).

5.2. Population

The population of the City of South Tangerang in 2016 was 1,593,812 people consisting of 802.908 male residents and 790.904 female ones with a male sex ratio of female population of 101.52 The numbers of population according to the age group 5-9 years and 10-14 years were 138,509 and 114,336 respectively. The population density in South Tangerang City in 2016 reached 10.828 people per km2. The number of households in South Tangerang City was 406,291 with an average number of household members of 4 people (BPS-South Tangerang City 2017).

The population of Tangerang Regency based on the 2015 population projection was 3.37 million, consisting of 1.72 million male residents and 1.65 million female ones. Meanwhile the number of male sex ratio in 2015 for the female population was 104.81. Most of the population of Tangerang Regency was 0-4 years old,that is, 353.0 thousand people. The second most was residents aged 30-34 years, that is, 325.48 thousand people. The population density in Tangerang Regency in 2015 reached 3,512 people per km2 with an average population per household of 4.08 people. Population density in 29 sub-districts was quite diverse with the highest population density located in Pasar Kemis Subdistrict with a density of 12,112 people per km2 and the lowest in Kemiri Subdistrict, 1,301 people per km2 (BPS-Tangerang Regency 2017).

5.3. Education

The school enrollment rate in South Tangerang City for the 7-12 year category was 100 in 2016. Whereas the Net Participation Rate and Gross Participation Rate at the elementary/MI education level were 95.80 and 107.72, respectively. Based on data from the South Tangerang City Education Office, it was found that in South Tangerang City there were 413 TKs (kindergartens) in 2014 with 16,815 students. In 2015 there were 302 elementary schools with 129,831 students, 166 junior high schools with 51,801 students and 70 senior high school students with 20,876 students and 1,937 teachers (BPS-South Tangerang City 2017).

The Tangerang District Education Office noted that there were 488 Kindergartens, 967 Elementary Schools, 340 Junior High Schools, 132 Senior High Schools and 156 Vocational Schools in Tangerang Regency in 2015. The highest number of kindergartens was in Pasar Kemis Subdistrict, 73 schools. The highest number of elementary schools (SD) was in Cikupa sub-district with 59 schools and the least was in Jambe sub-district, 16 schools. At the junior secondary level (SLTP), Pasar Kemis District had the highest number of junior secondary schools, 27 schools but Jambe District was the region with the lowest number of junior secondary schools, 5 schools. In Senior High Schools (SMA), Kelapa Dua Subdistrict had the highest number of high schools, 13 schools, while there were no high schools in Sukamulya Subdistrict. For the vocational School (SMK) Tigaraksa Subdistrict had the highest number of Vocational Schools,12 schools, while the Pagedangan and Kronjo Subdistricts had the smallest number of Vocational Schools, 1 school (BPS-Tangerang Regency 2017).

5.4. Health

In South Tangerang City the prevalence of height for age nutritional status for children aged 5-12 years was 6.8% very short, 8.5% short, and 84.7% normal in 2013, while in Tangerang Regency 10.8% very short, 14.3% short, and 74.8% normal. In urban areas, the prevalence of height for age nutritional status of children aged 5-12 years was 9.0% very short, 14.8% short, and 76.1% normal, while children living in rural areas had a prevalence of nutritional status 10.8 % very short, 14.3% short, and 74.8% normal (MoH 2014a).

The prevalence of BMI/A nutritional status of children aged 5-12 years in Tangerang Regency in 2013 was 5.4% very thin, 7.8% thin, 64.2% normal, 13.2% fat, and 9.4% obese, while in South Tangerang City the prevalence was 4.7% very thin, 4.8% thin, 64.1% normal, 14.5% fat, and 11.9% obese. In urban areas, the prevalence of BMI/A nutritional status of children aged 5-12 years was 4.0% very thin, 7.0% thin, 65.4% normal, 13.6% fat, and 10.0% obese, while the prevalence of BMI/A nutritional status of children living in rural areas was 5.2% very thin, 7.6% thin, 73.0% normal, 8.7% fat, and 5.4% obese (MoH 2014a).

CHAPTER 6
SCHOOL POLICIES AND ASSESSMENT OF FOOD SAFETY

6.1. School Policies

School policies on regulating the food sold at school environment (cafetarias, canteens, and street stalls in school area) are aimed at achieving good academic performance by regularly creating healthy school environments and supporting healthy lifestyle of school children (Story, Nanney, & Schwartz 2009). The school board together with the local education authority and the public health office monitors the application of school nutrition policies that help to ensure the nutrition quality and food safety of food sold or served to students within the school areas.

Among six schools observed, only SDN Pamulang Tengah that had no policy on food sold at school because there was no canteen or cafeteria inside the school. Street vendors that were selling food near SDN Pamulang Tengah were regulated by the sub-distric authorities. Other than SDN Pamulang Tengah, SDN Kedokan and SDN Pamulang 2 also have no canteen nor cafetaria, but both schools oblige all street vendors to report their identity to prevent any criminal act rather than control on food quality. A brief summary of the policy from each school is described below:

SDN Kedokan

SDN Kedokan focused their policy on the variety of food sold by the street food vendors. Regarding food safety, the school only gave an appeal to each vendor the importance of providing safe and healthy snacks even though the school had no such guidelines or criteria. The school relied on the public health office to carry out food safety education for the vendors. The food safety education for the students were also given by public health office through the School Health Unit.

Picture 6.1. Students were buying snack at street food vendors at SDN Kedokan

SDN Cibogo

The school had their own canteen which consisted of five vendors and did not allow the street vendors to sell their food within the school area. The variety of foods are limited to encourage the students to pack their snack or lunch from home.

SDN Pajajaran

The school policy on canteen is mandated to the School Health Unit coordinator teacher whose duity is to monitor the vendors, control the types of food being sold, giving food safety education to the students (e.g. checking expired date, how to select healthy food), and build cooperation with the public health office regarding nutrition and food program. There was no requirement for th food sold at the school canteen. The Public health office gave food safety education irregularly therefore both school and food vendors were rarely exposed to current issues of food safety.

Picture 6.2. Street food vendors at SDN Pajajaran

SDN Pamulang 2

The school appointed a teacher to coordinate the food vendors and regulate the variety of food sold at school. Ensuring food safety was a duty which was attached to the School Health Unit coordinator teacher, who also served as a liaison for the public health office. Inspection by the School Health Unit coordinator teacher was only carried out when there was a food safety issue widely reported by media, such as formalin in noodle or drugs in candy. Policy implemented by the school such as: 1) the school only allows food that is cooked on site as a safeguard for any food contamination or hazard, 2) only manufactured drink registered in BPOM (The National Food and Drug Control) is allowed (not a home-industry product), 3) cooked water is suggested for food processing. Socialization on food safety by the public health office was held irregularly; the recent one was about one year ago.

SDN Pamulang Timur 1

SDN Pamulang Timur 1 had a school canteen which consisted of three sellers. The school hopes the sellers sell nutritious foods but at that time there was no specific requirement regarding criteria of food that is eligible to be sold in the canteen. The canteen was supervised by an appointed teacher that mainly focused on canteen cleanliness. However, the school did not control the food sold by the street food sellers in open area near the school because it was regulated by the space owner.

Table 6.1. School food policy

No	Question	Urban			Rural		
		SDN Pamulang Timur 1	SDN Pamulang Tengah	SDN Pamulang 2	SDN Kedokan	SDN Cibogo	SDN Padjadjaran
1	Supervising snack sellers around the school	Yes	No	Yes	Yes	Yes	Yes
2	Reinforcing quality requirements for snacks to food sellers who want to sell snacks around the school	No	No	No	No	No	No
3	Having routine food safety socialization activities for the school community	No	No	No	No	No	Yes
4	Ever carrying out food safety socialization activities for the school community	No	No	Yes	No	No	Yes
5	Providing school canteen facilities	Yes	No	No	No	Yes	Yes
6	Monitoring the cleanliness of facilities and place for selling and the way of processing food in the canteen	Yes	No	Yes	No	Yes	Yes
7	Monitoring the feasibility of food sold in the school canteen	No	No	Yes	No	No	Yes
8	There are efforts to improve the quality of the school canteen.	No	No	No	No	No	No
9	Providing facilities for snack sellers around the school	Yes	No	No	No	Yes	Yes
10	There is a person in charge of controlling snack sellers around the school	Yes	No	Yes	No	No	Yes
Score of school policy		50 ± 0.5	0	50 ± 0.5	10 ± 0.3	40±0.5	80 ± 0.4
School policy category		**Poor**	**Poor**	**Poor**	**Poor**	**Poor**	**Good**

Based on an indepth interview, generally the policy that was set by school were related to contribution fee that had to be paid by the street vendors and the types of food to be sold there to prevent competition among the vendors. The school had a list of street vendors that were already granted a permission to sell their food inside or near school area. The list containing the names of the food vendors, the food types, and the vendor addresses. Contribution fees (range from IDR 150,000 – IDR 200,000/month) were paid in exchange of certain facilities such as water, electricity, waste management or space. None of the schools had a specific policy on food safety or nutrition quality of the food as this aspect was handled by the public health office.

All of the schools claimed there had never been any food poisoning event at the schools. This was probably due to the fact that most of the snacks that were sold were fried or baked during preparation which are considered to be safe foods since they are usually consumed without delay (Winarno & Allain 1991). Food safety education was carried out irregularly by the public health office hence the lack of proper knowledge on food safety for the students, teachers, and food vendors. The finding is in line with previous study which point out the lack of action by the local education office and the public health office in socializing healthy snack to the food vendors and schools (Manalu & Su'udi 2016). It is recommended for school to take an action on improving their own and vendor's knowledge without waiting the authorities to act, just like what SDN Padjajaran did.

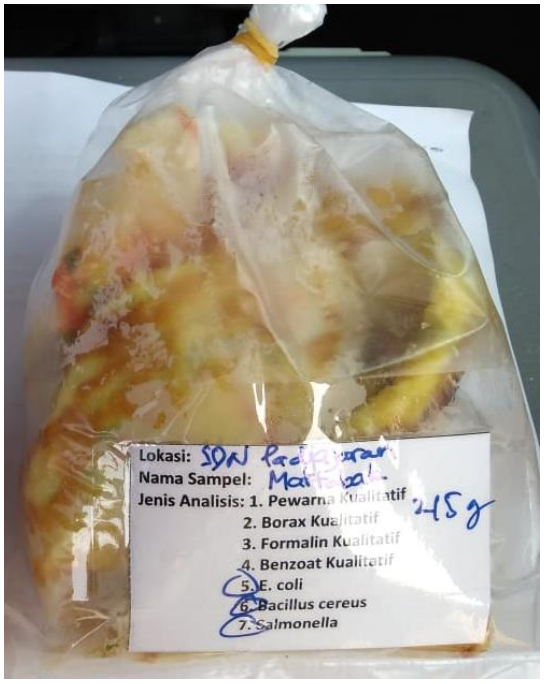
6.2. Assessment of Food Safety

A study performed in 2008 found that the incident of food poisoning on school children was 21,4% in which 75,5% of them were elementary school children (Andarwulan, Madanijah, & Zulaikhah 2009). Other studies by BPOM also reported an increase on food poisoning from 2003 to 2005, from 34 to 184 cases though a year afterward, the number decreased into 160 cases (Rahayu 2006). The main sources for poisoning known are due to microbiological and chemical contamination, and a lack of hygiene in the school canteen (Rahayu *et al*. 2005). This calls for an act by BPOM to reduce the distribution of hazardous snack foods.

According to BPOM, the number of non-qualified snacks decreased from 44% (n = 3,372 samples) in 2010 to 35.46% (n = 4,808 samples), in 2011 to 23.89% (n = 7,200 samples), in 2012 and to 23.82% (n = 10,429), and in 2013 (BPOM 2012[a]; BPOM 2013). However, the percentage of snacks contaminated by microbiological hazard increased in 2014 compared to the previous year (BPOM 2017[b]). Moreover, BPOM monitoring results in 2011 showed there were 35.5% of the snacks sold in the school canteen did not meet the food safety requirements (BPOM 2011). Follow up to these findings, a national program has been established to conduct an intervention on school food safety through the Healthy Canteen Program since 2015. Each year there are 5000 schools to be targeted to this program to ensure the safety of food sold at the school canteens.

Microbial Contamination Analysis. The result of microbiological contamination analysis of popular snacks from all of the schools came out negative. According to Rane (2011), there were several major sources that contributed to microbial risk in street food, namely: raw materials, vendor location, utensil and equipment, strorage and reheating, and personal hygiene of vendors. It was known through BPOM finding that the source of microbial

contamination on snack food was from *Salmonella sp*. in fried chicken (BPOM 2017[b]). Moreover, a previous study in Bogor found that *Salmonella sp* mostly came from contaminated ice cube in drinks (Judarwanto 2006). We observed that the main ingredients mostly used by food vendors were egg, hence the results were negative (Table 6.2). Unlike fried chicken, egg-based snacks were mostly cooked once the order was placed thus the microbial contamination was minimal.



Picture 6.3. Popular snack (*Martabak)* that would be analysed for microbiological contamination

Table 6.2. Result of the microbiological analysis of some popular snacks

Rank	Foods and Beverages	*E. Coli* (APM/g)	*Salmonella sp.* (/25 g)	*Bacillus cereus* (coloni/g)
SDN Pamulang Timur 1				
1	*Otak-otak cryspy* (fishcake chips)	< 3	Negative	0
2	*Cireng isi* (stuffed frittes)	< 3	Negative	0
3	*Cilung* (rolled frittes)	< 3	Negative	0
4	*Sosis panggang* (grilled sausage)	< 3	Negative	0
SDN Pamulang tengah				
1	*Telur gulung* (rolled egg)	< 3	Negative	0
2	*Seblak* (spicy wet cracker)	< 3	Negative	0
3	*Otak-otak cryspy* (fishcake chips)	< 3	Negative	0
SDN Pamulang 2				
1	*Telur gulung* (rolled egg)	< 3	Negative	0
2	Spaghetty	< 3	Negative	0
3	*Pisang coklat* (chocolate banana)	< 3	Negative	0
SDN Kedokan				
1	*Sarang laba-laba* (spider web cake)	< 3	Negative	0
2	*Bakso Ikan* (fish meatball)	< 3	Negative	0
3	*Sosis goreng* (fried sausage)	< 3	Negative	0
SDN Cibogo				
1	*Papeda telur puyuh* (steamed sago with quail egg)	< 3	Negative	0
2	*Ketupat ulek* (ketupat rice with peanut sauce)	< 3	Negative	0

Table 6.2. Result of the microbiological analysis of some popular snacks [continued]

Rank	Foods and Beverages	*E. Coli* (APM/g)	*Salmonella sp.* (/25 g)	*Bacillus cereus* (coloni/g)
3	*Batagor* (fried tofu and meatball with peanut sauce)	< 3	Negative	0
SDN Pajajaran				
1	*Bakso ikan* (fish meatball)	< 3	Negative	0
2	Makaroni	< 3	Negative	0
3	Martabak (stuffed egg pancake)	< 3	Negative	0

Flour-based snacks such as *cireng isi* (stuffed fritters), *cilung* (Rolled fritters), and *sarang laba-laba* (spider web cake) are also processed on the spot. This result is different from the previous studies which found that meatballs and fried food scored high on total plate count testing among elementary school children's food in Papua (Jayasiddayatra 2014).

Picture 6.4. Spider web cake (*Sarang Laba-Laba*) a popular snack at SDN Kedokan

Based on the result of the questionnaire on food vendors' behavior, questions related to utensil and equipment, storage and reheating, and personal hygiene of the vendors scored relatively low (40 – 60 point). Therefore, food processing using high temperature a moment before served is thought to be the main reason why there is no microbial contamination.

Hazardous Chemical Analysis. Findings on food preservatives use, such as borax and formalin comes out negative for all snacks tested (Table 6.3). This result is incorcondance with the previous study which found 54% of the food samples obtained from the primary schools in Subdistrict of Pamulang positively contained borax (Rumanta, Iryani, & Ratnaningsih 2016). Study by Judarwanto (2006) also found the use of borax, formalin, Rhodamin B, and Methalyn Yellow in snack food sold in Bogor. Only *mie bakso* (meatball noodle) sold at SDN Pamulang Tengah which showed a positive result for formalin. Noodles were known containing preservatives such as formalin (Jayasiddayatra 2014). However, study by Sajiman, Nurhamidi, and Mahpolah (2015) also found no formalin and borax among 53 samples of snack foods sold in elementary school in Banjarbaru.

Picture 6.5. Street food (*Martabak)* that would be analysed for hazardous chemical substance

Table 6.3. Results of the chemical analysis of some popular snacks

Rank	Foods and Beverages	Food preservatives		Colourant	Benzoate
		Borax	Formalin		
SDN Pamulang Timur 1					
1	*Otak-otak cryspy* (fishcake chips)	negative	negative	negative	Negative
2	*Cireng isi* (stuffed fritters)	negative	negative	negative	Negative
3	*Cilung* (fried fritters)	negative	negative	Yellow FCF (CI. 15985)	Negative
4	*Sosis panggang* (baked sausage)	negative	negative	negative	Negative
5	*Basreng** (fried meatballs)	negative	Not tested	Karmoisin (Cl.14720) Yellow FCF (Cl. 15985) Ponceau 4R (Cl. 16255)	Not tested
6	*Seblak**	negative	Not tested	Not tested	Not tested
SDN Pamulang tengah					
1	*Telur gulung* (rolled egg)	negative	negative	negative	Negative
2	*Seblak* (spicy wet cracker)	negative	negative	negative	Negative
3	*Otak-otak cryspy* (fishcake chips)	negative	negative	negative	Negative
4	*Gulali** (made of palm sugar)	Not tested	Not tested	Diamond blue (Cl. 42090) Yellow FCF (Cl. 15985) Ponceau 4R (Cl. 16255) Tartrazine (Cl. 19140)	Not tested
5	*Mie bakso* meatball and noodle*	negative	positive	negative	Not tested
SDN Pamulang 2					
1	*Telur gulung*	negative	negative	negative	negative
2	*Spagetty*	negative	negative	negative	negative
3	*Pisang coklat*	negative	negative	negative	negative
4	*Cilor**	Not tested	Not tested	Yellow FCF (CI. 15985)	Not tested
5	*Soto mie**	Not tested	negative	negative	Not tested
SDN Kedokan					
1	*Sarang laba-laba*	negative	negative	Diamond blue (Cl. 42090), Ponceau 4R (Cl. 16255), Tartrazine (Cl. 19140)	negative
2	*Bakso ikan*	negative	negative	negative	negative
3	*Sosis goreng*	negative	negative	Yellow FCF (CI. 15985)	negative

*****Snacks which were not popular but they were suspected to be potential containing bacteria and other dangerous chemical substances

Table 6.3. Results of the chemical analysis of some popular snacks [continued]

Rank	Foods and Beverages	Food preservatives		Colourant	Benzoate
		Borax	Formalin		
SDN Cibogo					
1	*Papeda telur puyuh*	negative	negative	Yellow FCF (CI. 15985)	negative
2	*Ketupat ulek*	negative	negative	negative	negative
3	*Batagor*	negative	negative	Yellow FCF (CI. 15985)	negative
SDN Pajajaran					
1	*Bakso ikan*	negative	negative	negative	negative
2	*Makaroni*	negative	negative	Yellow FCF (Cl. 15985) Alura red (Red 40) (cr. 16035) Tartrazine (Cl 19140)	negative
3	*Martabak*	negative	negative	Yellow FCF (CI. 15985)	negative
4	*Mie jablay**		negative		

*****Snacks which were not popular but they were suspected to be potential containing bacteria and other dangerous chemical substances

Picture 6.6. *Mie Jablay* a snack sold at school

Food colourants that were tested positive included in the list of the permitted food additives by the Minister of Health (the Minister of Health Regulation No. 033 of 2012 on Food-Added Substances (MoH 2012). This finding is in line with previous study conducted in Makassar that snacks sold around SDN Kompleks Mangkura Makassar was tested negative for forbidden colorants such as Rhodamine B and Methalyn Yellow (Pertiwi, Sirajuddin, & Najamuddin 2014). While the other food additive (benzoate) was tested negative.

Similar results also found from condiments (sauces) (Table 6.4). Both Yellow FCF (CI 159895) and Ponceau 4R (CI 16255) are included in the list of permitted food additives by the Minister of Health (MoH 2012). As for total plate count results for all tested items are still below permitted number, which is below 1 x 10^4 coloni/g (SNI 2006). Previous studies stated that chili sauce become the source of microbial contamination and contain forbidden colorant (Agustina 2002; Sajiman, Nurhamidi, and Mahpolah 2015). These results suggest that BPOM's Healthy Canteen Program is success on improving food safety on snacks sold at school.

Table 6.4. Results of the chemical and microbiological analyses of condiments

Item	**Colourant**	**Natrium benzoate**	**Total plate count 30^{o}C 72h (coloni/g)**
Saos botolan (bottled chilli sauce)	Yellow FCF (Cl. 15985) Ponceau 4R (Cl. 16255)	Not tested	$1,2 \times 10^{2}$
Sambal (chilli sauce)	Not tested	Not tested	$2,4 \times 10^{2}$
Saos (chilli and tomato sauce)	Yellow FCF (Cl. 15985), Ponceau 4R (Cl. 16255)	Negative	Not tested

CHAPTER 7
GENERAL CHARACTERISTICS

7.1. Household's Characteristics

Family condition that supports the growth and development of children will greatly help children to grow and develop normally. The family condition is in the form of socio-economic characteristics of the family consisting of parents' age, parental education, family size, and family income. Distribution of the samples based on family characteristics can be seen in Table 7.1.

Ages of the fathers and mothers were categorized into four, namely <30 years, 30-39 years, 40-49 years, and ≥50 years. Table 7.1 shows most of the fathers in urban area were 40-49 years old (47.0%) with an average age of 42.1 ± 6.9 years, while in rural area were 30-39 years (43.0%) with an average age of 42.4 ± 7.6 year. Overall the average age of fathers was 42.3 ± 7.3 years, and was dominated by fathers aged 30-39 years (40.0%) and 40-49 years (43.5%). The test results showed no significant difference between the age of the father in urban and rural area ($p > 0.05$). For category of 30-39 years, in urban area amounted to 57.1% and 55.2% in rural with an average age of 39.0 ± 6.0 years (urban) and 38.0 ± 6.0 years (rural). As for mother's age, when viewed in total, most (56.2%) mothers were in the 30-39 year age category with an average age of 38.0 ± 6.0 years. The test results showed no significant differences between maternal age in urban and in rural area ($p > 0.05$). The total age of the father in this study if categorized according to Papalia and Olds (2001) included in the middle adult category (41-65 years), and the age of the mother included in the category of early adults (20-40 years).

Parents' education consists of father and mothers' education and categorized into six, namely no formal education, elementary/its equivalent, junior high/its equivalent, high school /its equivalent, Diploma and Bachelor. As many as 46.0% of the fathers were educated at high school level/its equivalent. The highest number of fathers' education in urban area was high school/its equivalent (56.0%) and elementary school/its equivalent (36.0%); while in rural area was high school/its equivalent (21.0%) and elementary school/its equivalent (28.0%). The average length of education taken by the fathers in urban area was longer than in rural area, which is 10.0 ± 3.0 years and 9.0 ± 4.0 years. The results of mean difference tests showed that there was a significant difference between the education level of the fathers in urban and rural area ($p < 0.05$), where the fathers in urban area had higher education level than in rural area.

Overall the education level of the mothers was high school graduates/its equivalent (40.5%). The majority of the mothers' education in urban area (50.5%) was high school/its equivalent, while in rural area was elementary school/its equivalent (40.0%). The average length of education taken by the mothers in urban area was higher than in rural area, which were 10.0 ± 3.0 years and 8.0 ± 3.0 years respectively. Based on the results of mean different tests there was a significant difference ($p < 0.05$) between the education level of the mothers in the city and that in the village.

The household size is the total number of household members consisting of husband, wife, children and other household members who live together (BKKBN 1998).

Based on the research, a household is categorized as a small- sized household if the household members are ≤4 people, the household is medium if the household members are 5-6 people, and belongs to a large household if their household members are > 6 people. Based on Table 7.1, the household size in most urban (50.5%) and rural area (58.1%) belonged to small household size category (≤4 people) with an average number of family members was 5.0 ± 1.0 people. No significant differences between the size of the households in urban and rural area (p>0.05). According to Suhardjo (1989), large households determine the fulfillment of food needs. Fulfilling food needs will be easier for households with fewer members.

Tabel 7.1. Distribution of households social characteristics [n (%)]

Characteristics	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Category of fathers' age				
<30 year	1 (0.5)	1 (1.0)	0 (0.0)	
30-39 year	80 (40.0)	37 (37.0)	43 (43.0)	
40-49 year	87 (43.5)	47 (47.0)	40 (40.0)	
≥ 50 year	32 (16.0)	15 (15.0)	17 (17.0)	
Mean±SD (year)	42.3±7.3	42.1±6.9	42.4±7.6	0.786
Category of mothers' age				
<30 year	13 (6.2)	1 (1.0)	12 (11.4)	
30-39 year	118 (56.2)	60 (57.1)	58 (55.2)	
40-49 year	71 (33.8)	40 (38.1)	31 (29.5)	
≥ 50 year	8 (3.8)	4 (3.8)	4 (3.8)	
Mean±SD (year)	38.0±6.0	39.0±6.0	38.0±6.0	0.177
Fathers'education				
No formal education	6 (3.0)	1 (1.0)	5 (5.0)	
SD/its equivalent	49 (24.5)	21 (21.0)	28 (28.0)	
SMP/ its equivalent	38 (19.0)	15 (15.0)	23 (23.0)	
SMA/ its equivalent	92 (46.0)	56 (56.0)	36 (36.0)	
Diploma	4 (2.0)	2 (2.0)	2 (2.0)	
Sarjana(Undergraduate)	11 (5.5)	5 (5.0)	6 (6.0)	
Mean±SD (year)	10.0±3.0	10.0±3.0	9.0±4.0	0.021
Mothers'education				
No formal education	8 (3.8)	2 (1.9)	6 (5.7)	
SD/its equivalent	59 (28.1)	17 (16.2)	42 (40.0)	
SMP/ its equivalent	50 (23.8)	27 (25.7)	23 (21.9)	
SMA/ its equivalent	85 (40.5)	53 (50.5)	32 (30.5)	
Diploma	2 (1.0)	2 (1.9)	0 (0.0)	
Sarjana	6 (2.9)	4 (3.8)	2 (1.9)	
Mean±SD (year)	9.0±3.0	10.0±3.0	8.0±3.0	0.000
Household size				
Small (≤4 people)	114 (54.3)	53 (50.5)	61 (58.1)	
Medium (5-6 people)	79 (37.6)	44 (41.9)	35 (33.3)	
Big(>6 people)	17 (8.1)	8 (7.6)	9 (8.6)	
Mean±SD (people)	5.0±1.0	5.0±1.0	5.0±1.0	0.867

Household income is the amount of income obtained from all household members every month. The size of household income depends on the type of work of the husband and other household members. Household income was relatively greater when the husband and wife worked outside the home (Susanti 1999).

The average household income can be seen in Table 7.2. The average monthly income of the fathers in urban area was significantly higher than in rural area ($p<0.01$) with IDR 2,991,497 ± 2,152,067 and IDR 2,184,115 ± 1,177,539, respectively. Overall the total average monthly income the father was IDR 2,587,806 ± 1,777,173. Even though it was not as big as the fathers' income, the mothers also had their own income of IDR 647,007 ± 1,238,294 per month (urban) and IDR 636,016 ± 1,108,072 per month (rural). Overall, the total average income per month of the mother was IDR 641,511 ± 1,172,187. The statistical test results showed no significant difference ($p> 0.05$) between mother's income in urban and that in rural. Overall, the average family income per month in urban area was higher with IDR 3,638.503 ± 2,444,725, which is significantly different ($p<0.01$) than in rural area with IDR 2,820,131 ± 1,670,417.

Table 7.2. Distribution of economic characteristics of households

Household income	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Average income per month (IDR/month)				
Father	2,587,806±1,777,173	2,991,497±2,152,067	2,184,115±1,177,539	0.001
Mother	641,511±1,172,187	647,007±1,238,294	636,016±1,108,072	0.946
Household	3,229,317±2,128,555	3,638,503±2,444,725	2,820,131±1,670,417	0.005
Average income per capita per month (IDR/cap/month)				
Father	568,012±382,856	645,616±447,495	490,408±286,627	0.003
Mother	144,848±277,538	141,916±285,842	147,779±270,319	0.879
Household	712,859±486,239	787,532±529,169	638,187±428,780	0.026

If the total household income is divided by the number of household members, then per capita income will be obtained. The average per capita income per month in urban area was higher than in rural area, there's also a statistically significant different ($p <0.05$) between per urban and rural area. However, opposite results shown for the mother's monthly income after converted into average income per capita per month, where the amount in rural (IDR 147,779 ± 270,319) was higher than in urban area (141,916 ± 285,842), although not statistically different ($p>0.05$). The amount of income/capita/month of the household will usually determine the size of the allowance received by the child. According to Mudjianto et al. (1994) with the increasing purchasing power and income of the people, the opportunity to increase the allowance received by their children from their parents is expected to increase.

7.2. Characteristics of Children

Characteristics of school-age children included gender, age, order of children in the family and pocket money. Graph 7.1 shows the distribution of sex of children who

were as respondents in the study. In general, the total percentage of boys (54.3%) was more than that of the girls (45.7%). In urban area, the percentage of boys (57.1%) was higher than girls (42.9%). Likewise in rural area, the percentage of boys (51.4%) was higher than that of the girls (48.6%).

Hurlock (1999) calls school-age children as late childhood. School age starts at age 6 and ends when individuals show sexual maturity between the ages of 13 and 14 years. School age is the beginning of a child's learning to be responsible for their attitudes and behavior. Table 7.3 shows the age of children in urban area (10.6 ± 0.6 years) was slightly older than the age of children in rural area (10.4 ± 0.6 years). The results of the statistical tests showed a significant different (p <0.01) between the age of the child in urban and rural area.

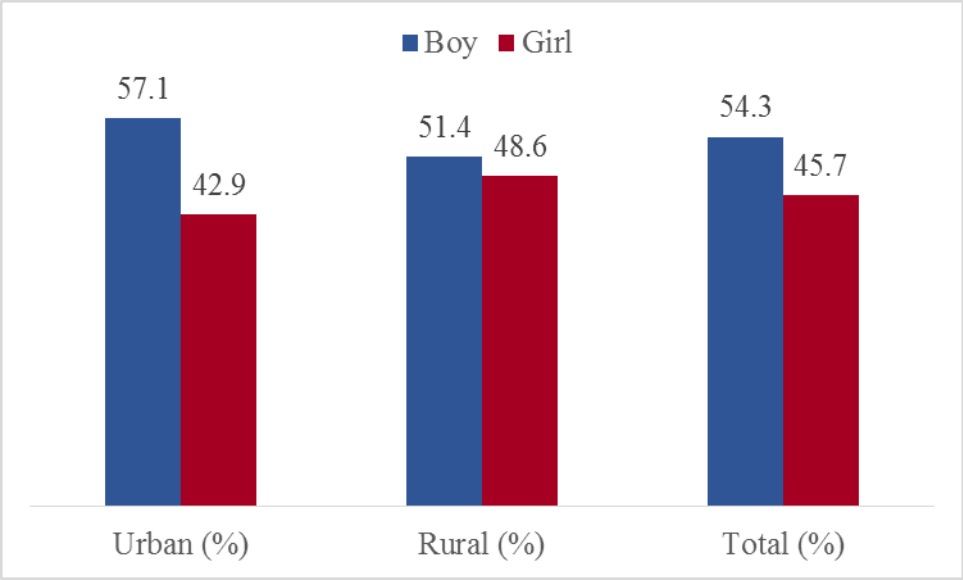


Figure 7.1. Distribution of the children by sex (%)

Pocket money is a part of household income allocation given to children for a certain period of time, such as daily, weekly, and monthly needs (Engel, Backwell, & Miniard 1994). The children in urban area got less pocket money (IDR 7,600 ± 3,480 per day) than children in rural area (IDR 9,004 ± 3,827 per day), this result is statistically different (p <0.01). According to Andarwulan, Madanijah, and Zulaikhah (2009), the greater their allowance was, the greater the chance of children to buy snacks, both in the canteen and outside the school.

Table 7.3 Characteristics of children‘s age, order in their family, sibling, and pocket money

Characteristics of Children	Total (n=210)	City (n=105)	Village (n=105)	p value
Age (Mean±SD)	10.5±0.6	10.6±0.6	10.4±0.6	0.006
Child order (Mean±SD)	2.0±1.0	2.0±1.0	2.0±1.0	0.801
Number of siblings (Mean±SD)	3.0±1.0	3.0±1.0	3.0±1.0	0.107
Pocket money (IDR/day) (Mean±SD)	8,302±3,716	7,600±3,480	9,004±3,827	0.006

The significant difference was calculated by independent t-test

7.3. Teachers' Characteristics

This study recruited six teachers for each school. The average age of teacher was 42.5 years old, where teachers in urban area were five years older than those in the rural area. Therefore, duration of teaching experience was also longer for the teachers in the city area. More than 60% of the teachers had more than ten years teaching experience. The mean of teaching experience was 14.5±9.4 years. As the school that was chosen for this study was public school, the teachers who worked there had a government official status which minimized the possibility of job-changing and quitting.

Table 7.4. Characteristics of teachers' age and length of teaching experience

Characteristics	Urban (n=18)	Rural (n=18)	Total (n=36)
Age group			
<30 years	1 (5.6)	1 (5.6)	2 (5.6)
30-39 years	2 (11.1)	10 (55.6)	12 (33.3)
40-49 years	11 (61.1)	1 (5.6)	12 (33.3)
≥ 50 years	4 (22.2)	6 (33.3)	10 (27.8)
Mean±SD	45.0±7.4	40.1±11.1	42.5±9.6
Sex			
Male	5 (27.8)	3 (16.7)	8 (22.2)
Female	13 (72.2)	15 (83.3)	28 (77.8)
Category of teaching length			
<5 years	1 (5.6)	3 (16.7)	4 (11.1)
5-<10 years	3 (16.7)	4 (22.2)	7 (19.4)
10-<15 years	6 (33.3)	5 (27.8)	11 (30.6)
≥ 15 years	8 (44.4)	6 (33.3)	14 (38.9)
Mean±SD	15.3±8.2	13.6±10.6	14.5±9.4
Education level			
S1 (Bachelor)	16 (88.9)	18 (100)	34 (94.4)
S2 (Master)	2 (11.1)	0 (0.0)	2 (5.6)
Job			
Homeroom Teachers	17 (94.4)	16 (88.9)	33 (91.7)
Subject teachers	1 (5.6)	2 (11.1)	3 (8.3)

Majority of teachers in both areas were female with undergraduate degree (S1) and positioned as homeroom teacher. According to Indonesian law (Law of The Republic Indonesia Number 14 Year 2005 about Teachers and Lecturers), minimum academic qualification for the teachers is bachelor degree thus it is not required to have master degree, so almost all of the eachers have similar education background. Only two teachers in the city area who held a master degree. For elementary school, the homeroom teachers are obligated to teach all subjects except for sport and religious education. In general the characteristics of the teachers in urban and in rural areas were similar.

7.4. Characteristics of Food Vendors

Gender for food vendors in both areas tend to be equally distributed between male and female. Age group of vendors in the city were mainly in 31-40 years, while in the rural were 41-50 years old. The distribution of age was similar to the previous study in Jakarta which found the age of food vendors ranged from 18 to 68 years with median of 34 (Vollaard *et al*. 2004). All vendors could be categorized to have low education

background where more than 90% were high school graduate or lower. This finding was also in line with study by Vollaard *et al* (2004) in which 78% of pushcart food vendors had education background of primary school or less. In addition, only a small percentage of the vendors in the city and the rural area, 13.3% and 3.1% respectively, have participated in food safety training. This indicated by the fact that knowledge on topic related to nutrition and food safety is also low.

Table 7.5. Characteristics of the food vendors

Characteristics	City (n=30)	Village (n=32)	Total (n=62)
Sex			
Male	12 (40.0)	15 (46.9)	27 (43.5)
Female	18 (60.0)	17 (53.1)	35 (56.5)
Age			
≤30 years	6 (20.0)	8 (25.0)	14 (22.6)
31-40 years	13 (43.3)	9 (28.1)	22 (35.5)
41-50 years	7 (23.3)	11 (34.4)	18 (29.0)
>50 years	4 (13.3)	4 (12.5)	8 (12.9)
Education level			
No formal education /not passing elementary school	1 (3.3)	3 (9.4)	4 (6.5)
SD or its equivalent	11 (36.7)	12 (37.5)	23 (37.1)
SMP or its equivalent	9 (30.0)	6 (18.8)	15 (24.2)
SMA or its equivalent	7 (23.3)	10 (31.3)	17 (27.4)
Diploma or Bachelor	2 (6.7)	1 (3.1)	3 (4.8)
Length of selling			
<2 years	8 (26.7)	9 (28.1)	17 (27.4)
2-<5 years	7 (23.3)	9 (28.1)	16 (25.8)
5-10 years	5 (16.7)	5 (15.6)	10 (16.1)
≥10 years	10 (33.3)	9 (28.1)	19 (30.6)
Have you ever followed a training/elucidation of food safety?			
Yes	4 (13.3)	1 (3.1)	5 (8.1)
No	26 (86.7)	31 (96.9)	57 (91.9)

Vendors in the city were more exposed to training. Probably it was because the authorities in the city planned more programs regarding food safety. Trainings which have ever been followed were a training held by University of Indonesia (2015), Health Department (2017), SDN Pamulang Tengah (2004 and 2008), Saung Merdeka (2015), and SMP 12 Tangerang (2015). But the location of training was unknown so there was a possibility that one vendor in the rural area had participated on food safety training in the city. There was no difference observed in duration of trading experience for both urban and rural. However, the question was not specific for trading only in school areas, so there was no conclusion which can be drawned. In general, characteristics of the vendors were similar for both area.

CHAPTER 8
FOOD HABITS

8.1. Children's Eating Habit

According to Khumaidi (1989), eating habits are human behavior towards food including attitudes, beliefs, selection in consuming food obtained repeatedly. Eating habits are formed in the first two years of a child's life and affect eating habits in the following years. Children's eating habits are very dependent on their family's eating habits at home. People's attitude towards food can be positive or negative. The positive and negative properties of food are based on values that can be directly felt because someone's preferences for things come from external and internal factors.

A habit of eating regularly in the family will form good habits for children. Making children to get used to having breakfast at home or bringing lunch from home is one example of a good practice. Furthermore, eating patterns in the family must also be considered, the frequency of eating together in the family, habits of eating foods that are in balanced nutrition, not getting used to sweet foods or drinks, and getting used to eating lots of fruits or vegetables between meals (Suprayatmi 2008).

The frequency of main food consumption also affects the total energy and nutrient intakes per day for school children. The frequency of food consumption 3 times per day has an impact on normal nutritional status, while the frequency of food > 3 times per day is related to increased of body mass index (overweight).

The eating habits of elementary school children in urban and in rural areas can be seen in Table 8.1. From Table 8.1, it can be seen that the majority (55.7%) of the students had a frequency of eating 3 times/day, while those who had a meal frequency of 2 times/day were 30.5%. There was a significant different between the frequency of eating of rural and urban students ($p < 0.05$). The frequency of meals 3 times/day of the students in urban area was 67.6% while in rural area was 43.8%. As for the frequency of eating 2 times/day of the students in urban area was 20.5% and in rural area was 49.5%.

Having breakfast for school-age children is very important because time in school is full of activity and requires considerable energy. Having breakfast must be accustomed to students, because they need nutrition for their growth and development, children will prefer to have breakfast with snacks in the school canteen. About snacks at school, which must be considered are factors of sanitation, hygiene, and food safety. An important role is needed from parents so that the main food of students comes from food prepared by their parents at home.

The benefits of having breakfast are very important, because the intake of nutrients consumed at breakfast will help the concentration of students in the morning which is full of activity. Breakfast also prevents fatigue in the morning and helps stabilize blood glucose levels. What is consumed when breakfast will affect one's nutritional status. Having breakfast is a part of the behavior to realize balanced nutrition which is important for living a healthy, active, and intelligent life. For school children, breakfast is proven to improve children's learning and stamina.

Table 8.1. Distribution of the school children by eating habit [n (%)]

Eating habit	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Frequency of children's eating				
1 time/day	3 (1.4)	2 (1.9)	1 (1.0)	0.033
2 times/day	83 (39.5)	31 (29.5)	52 (49.5)	
3 times/day	117 (55.7)	71 (67.6)	46 (43.8)	
4-6 times/day	7 (3.3)	1 (1.0)	6 (5.7)	
Mean±SD (time/day)	2.6±0.6	2.7±0.5	2.6±0.7	0.230
Habit of having breakfast*				
Always (every morning)	94 (44.8)	50 (47.6)	44 (41.9)	0.861
Sometimes (2-5 x/week)	106 (50.5)	46 (43.8)	60 (57.1)	
Never	10 (4.8)	9 (8.6)	1 (1.0)	
Common place for having breakfast				
Home	185 (88.1)	97 (92.4)	88 (83.8)	0.056
School	25 (11.9)	8 (7.6)	17 (16.2)	
Foods usually consumed for breakfast**				
Rice (plain/fried/cooked in coconut milk with some spices)	194 (92.4)	97 (92.4)	97 (92.4)	0.444
Bread	59 (28.1)	38 (36.2)	21 (20.0)	
Cereal	4 (1.9)	3 (2.9)	1 (1.0)	
Energen	45 (21.4)	26 (24.8)	19 (18.1)	
Noodle/ vermicelli	37 (17.6)	20 (19.1)	17 (16.2)	
Chicken porridge	25 (11.9)	12 (11.4)	13 (12.4)	
Buras/rice wrapped in banana leaf and boiled	9 (4.3)	3 (2.9)	6 (5.8)	
Fried foods	15 (7.2)	3 (2.9)	12 (11.5)	
Others	20 (9.5)	4 (3.8)	16 (15.3)	
Habits of bringing foods to school				
Yes	10 (4.8)	6 (5.7)	4 (3.8)	0.081
No	144 (68.6)	64 (61.0)	80 (76.2)	
Sometimes	56 (26.7)	35 (33.3)	21 (20.0)	
Habits of bringing drinks to school				
Yes	81 (38.6)	50 (47.6)	31 (29.5)	0.061
No	69 (32.9)	26 (24.8)	43 (41.0)	
Sometimes	60 (28.6)	29 (27.6)	31 (29.5)	

Notes: Statistic test using Chi square

*habits of having breakfast (which is meant by having breakfast is eating rice + sidedishes, bread, sereal or noodle/vermicelli)

**Choices may be more than one (foods which are usually consumed at breakfast are more than one)

The number of students in urban and in rural area who always had breakfast was relatively the same, that is, 47.6% (urban) and 41.9% (rural). Whereas those who had breakfast sometimes or 2-5 times per week in urban area were 43.8% and in rural area were 57.1%. Generally, the students (88.1%) had breakfast at home. A small proportion of the school children in urban area (7.65%) and rural area (16.2%) had breakfast at school.

Breakfast is one of the meals that contributes energy and nutrients to support the daily activities of school children and also influences their nutritional status. Children who skip breakfast have three times higher risk of eating snacks and have difficulty controlling their appetite which has an impact on obesity. The habits of eating breakfast before leaving school from the results of research in five elementary schools in South Tangerang were as follows: 89.6% of the children every morning always ate breakfast before leaving for school (Sukiniarti 2015).

Factors that influence children's willingness to eat breakfast are habits carried out by their parents. Children will tend to imitate the habits of their parents. In addition, the socio-cultural factors that occur around the children will contribute to their breakfast behavior. The habit of having breakfast made by friends will usually be imitated by other children, because at this age children tend to imitate what is seen around them. Furthermore, motivation from parents is an important factor to encourage children to get used to having breakfast before leaving for school.

The foods which were commonly and frequently consumed at breakfast included rice (92.4%), bread (28.1%), energy (21.4%), noodles/vermicelli (17.9%) and chicken porridge (11.9%). Very few were used to consuming cereals (1.9%), rice / rice cake (4.3%) and fried foods (7.2%). When viewed from the food habits that are often consumed between the urban and rural students, there was no significant difference ($p > 0.05$).

The habits of bringing food to schools for breakfast by the elementary school children in urban and rural area were relatively the same. Elementary school children in urban area who had never brought foods to school were 61.0%, while in the rural area were 76.2%. Very few students(4.8%) had the habit of bringing lunch to school. The students in urban area who were used to bringing drinking water to school were 47.6%, whereas in rural area were 29.5%. In urban area there were 24.8% students who never brought drinking water, this number is lower compared to the one in rural area with 41.09%.

The types of food often brought by the elementary school children to school included rice + side dishes, fried rice, noodles and nuggets/sausages (Table 8.2). The elementary school children who often brought rice + side dishes in urban area were 37.1% and by those in rural area were 21.9%, while those who brought fried rice were 10.5% in urban area and 9.5% in rural area. Others brought noodles and side dishes (nuggets, sausages).

Table 8.2. Distribution of the school students by kinds of foods and drinks they brought to school [n (%)]

Kinds of foods	Total (n=210)	Urban (n=105)	Rural (n=105)
Rice + side dishes (chicken/fish/egg/fried sausages)	62 (29.5)	39 (37.1)	23 (21.9)
Fried rice	21 (10.0)	11 (10.5)	10 (9.5)
Noodle	19 (9.0)	16 (15.2)	3 (2.9)
Sidedishes (nugget, sausage)	12 (5.7)	8 (7.6)	4 (3.8)

Notes: Choices can be more than one.

Food consumption is information about the type and amount of food consumed by a person or a group of people (family or household) at a certain time. This shows that the study of food consumption can be viewed from aspects of the type of food consumed and the amount of food consumed. The type of food that can be consumed based on certain criteria is called the food consumption pattern. The pattern of food consumption is the various types of commonly consumed foods and the consumption frequency, usually developing from local foods or from foods that have been planted in that place for a long period of time (MoT 2013).

The four types of staple foods most frequently consumed by urban and rural elementary school children were rice, cassava, sweet potato and potatoes, respectively (Table 8.3). Rice was a staple food consumed every day, 2.6 times/day for the urban elementary school children and 2.5 times/day for the rural elementary school children. Based on MoH (2014b), staple foods were consumed 3 times a day with a total of 3-4 servings a day. The frequency of consumption of the staple food of the elementary elementary school children in both areas has meet daily recommendation. Furthermore, it is also stated that people can eat a variety of other staple foods. The elementary school children in both urban and rural area have eaten a variety of staple foods other than rice but the frequency is not high.

Other staple foods such as cassava were consumed by the students in urban area for 1.0 times/month and by the students in rural area for 2.1 times/month. Potatoes were consumed more frequently by the elementary school children in urban area (4.2 times/month) compared to those in rural area (2.2 times/month). Statistical tests showed a significant different in the frequency of eating cassava and potatoes between the rural and urban elementary school children. While sweet potatoes were consumed 1.2 times/month by the urban elementary school children and 1.0 times/month by the rural elementary school children.

Table 8.3. The average frequency of carbohydrate food consumption

Food	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Rice (times/day)	2.6	2.6	2.5	0.229
Cassava (times/month)	1.6	1.0	2.1	0.037
Sweet potato (times/month)	1.1	1.2	1.0	0.662
Potato (times/month)	3.2	4.2	2.2	0.001

The significant difference was tested by an independent t-test

Foods of protein sources commonly consumed by the school students included animal foods such as chicken, beef, eggs and fish as well as foods of vegetable protein sources such as tofu and tempeh. The frequency of consumption of protein sources of the respondents can be seen in Table 8.4. The frequency of chicken meat consumption for respondents both in urban and rural area were relatively the same, namely 8.4 times/month. The frequency of consumption of beef of the elementary school children in the city averages 1.6 times/month and in the village 1.2 times per month. Overall, the frequency of

meat (beef and chicken) consumption of the students both in urban and rural area was still very low.

The frequency of average egg consumption was relatively similar between urban (12.9 times/month) and rural (14.2 times/month) area's students. This shown that the frequency of egg consumption was slightly better, 3-4 times a week compared to the frequency of meat consumption. The frequency of consumption of fish (sea, fresh, salted) was still relatively low, which was only 1.8-2.4 times per month

The frequency of consumption of vegetable protein, tofu and tempeh (soybean cake) for elementary school children was quite good, namely 7.1 times/month (tofu) and 6.7 times per month (tempeh). The average frequency of tofu consumption of the urban elementary school children was 8.1 times/month and the rural ones was 6.2 times/month. While the frequency of tempeh consumption of the urban elementary school children was 6.5 times/month and of the rural ones was 6.9 times/month. Tofu and tempeh are good sources of vegetable protein; with a high enough frequency of consumption, it is expected that the adequacy of protein in the elementary school children, both in urban and rural area is met.

Table 8.4. The average consumption frequency of protein food (times/month)

Food	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Animal Protein				
Chicken	8.4	8.4	8.4	0.984
Egg	13.6	12.9	14.2	0.493
Meat	1.4	1.6	1.2	0.307
Seafood	1.8	2.5	1.1	0.063
Fresh water fish	2.4	2.4	2.4	0.944
Salted fish	2.4	2.6	2.2	0.632
Vegetable Protein				
Tofu	7.1	8.1	6.2	0.183
Tempeh	6.7	6.5	6.9	0.699

The significant difference was tested by an independent t-test

Vegetables are a menu that is almost always found in everyday Indonesian dishes, either raw (fresh vegetables) or after being processed into various forms of cooking (Santoso 2011). The types of vegetables most frequently consumed by the respondents were water spinach, bean sprouts, spinach and carrots. According to Karyadi (1996) consuming foods that contain lots of vegetables can prevent a lack of vitamins and minerals. Vegetables are a source of iron minerals, calcium and potassium and sources of vitamins, especially vitamin C and beta carotene.

The vegetable sources of vitamins and minerals that were frequently consumed by the respondents were water spinach, spinach, carrots, cabbage, cassava leaves, cucumber and tomatoes. The respondents' vegetable food consumption can be seen in Table 8.5. The frequency of vegetable consumption of spinach, carrots and kale of the elementary school children was > 4 times/month in urban area and > 3 times/month in rural area. The average frequency of vegetable consumption of spinach and carrots for elementary school children in urban and rural area was significantly different ($p < 0.05$).

The average consumption of cucumber by students in rural area (3.2 times/month) was higher than students in urban area (1.3 times/month) ($p < 0.05$), while consumption of cabbage/mustard consumed students in urban area (3.8 times/month) was higher than by students in rural area (1.3 times/month) ($p < 0.01$).

Yellow fruits such as mango, papaya, and plantain contain beta carotene which is quite high, while fruits that have sour taste such as oranges, guava, papaya and rambutan are rich in vitamin C. Fruits are generally eaten without being cooked, and fruit ingredients are the main source of vitamin C (Almatsier 2002). Based on Table 8.5, it can be seen that the types of fruits most frequently consumed by the respondents were oranges.

The consumption of mangoes and watermelons was significantly higher in city students than in the rural students ($p < 0.05$). The consumption of other fruits was relatively the same. The fruit season in Indonesia comes one after another, so that a variety of fruits are available on the market according to the season.

The average fruit consumption of the urban and rural elementary school children was still relatively low. Ideally consumption of fruit is one serving for each meal or two to three times each day (MoH 2014b). Fruits are a good source of vitamins to improve better health.

Table 8.5. The average consumption frequency of vitamin dan mineral food (times/month)

Food	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Vegetables				
Spinach	4.4	5.4	3.5	0.019
Carrot	3.8	4.6	3.1	0.021
Water Spinach	4.2	4.4	4.0	0.470
Cabbage/mustard green	2.6	3.8	1.3	0.007
Cucumber	2.3	1.3	3.2	0.016
Tomato	1.2	1.1	1.2	0.630
Cassava leaves	0.9	1.0	0.7	0.297
Fruits				
Orange	5.4	6.7	4.1	0.064
Banana	5.1	4.8	5.5	0.519
Manggo	3.0	4.0	2.0	0.001
Watermelon	2.6	3.3	2.0	0.025
Pepaya	2.7	2.6	2.8	0.827
Melon	2.4	2.4	2.4	0.988

The significant difference was tested by an independent t-test

8.2. Children's habit of consuming street food

School children are the parties who most often get close to snacks. Therefore, the task of parents is very important to give understanding to children about good snacks, because children's knowledge about snacks is still very limited. Usually students buy snacks at street vendors around the school or in the school canteen. Therefore, food vendors also play an important role in providing healthy and nutritious snacks and guaranteeing their safety.

Most of the students in the urban (61.0%) and in the rural (76.2%) were used to having snack 4-6 times/week. Snacks have become part of students' food consumption patterns. What students need to understand is that most snacks are only high in carbohydrates, fats, and sugar. Therefore, students should know that meals that are consumed at home must be prioritized.

Table 8.6. Frequency of school children's snack consumption

Frequency of snacking at school	Total (n=210)	Urban (n=105)	Rural (n=105)
2-3 times/weeks	9 (4.3)	6 (5.7)	3 (2.9)
4-6 times/weeks	144 (68.6)	64 (61.0)	80 (76.2)
≥7 times/weeks	57 (27.1)	35 (33.3)	22 (21.0)
Mean±SD (times/weeks)	7.0±3.0	7.0±3.0	7.0±3.0

Types of snacks that are often consumed by school children include iced tea, fried foods, *cilor*, *papeda*, meatball, fried rice, *martabak mini*, and egg (Table 8.7). Four types of snacks that were often purchased were iced tea/ beverage with a taste (48.6%), fried foods (25.7%), noodles (24.8%), and *cilor* (22.9%).

Table 8.7. Types of snacks frequently consumed by the children at school [n (%)]

No.	Kinds of Street Food	Total (n=210)	Urban (n=105)	Rural (n=105)
1.	Iced tea/drinks with a taste (pop ice/sweet drinks)	102 (48.6)	54 (51.4)	48 (45.7)
2.	Fried foods (tofu/tempeh/*cireng*/*cimol*/ crispy mushroom)	54 (25.7)	14 (13.3)	40 (38.1)
3.	Noodle	52 (24.8)	25 (23.8)	27 (25.7)
4.	*Cilor* (starch and egg)/*cilung/cilok*	48 (22.9)	29 (27.6)	19 (18.1)
5.	*Papeda*	39 (18.6)	9 (8.6)	30 (28.6)
6.	Meatball	28 (13.3)	4 (3.8)	24 (22.9)
7.	Fried rice	27 (12.9)	10 (9.5)	17 (16.2)
8.	*Martabak (mini*/ vermicelli)	25 (11.9)	24 (22.9)	1 (1.0)
9.	Egg (whole/rolled/omelete)	23 (11.0)	19 (18.1)	4 (3.8)

Note: Choices can be more than one

Street foods are categorized in two types, namely one-dish snacks consisting of meatballs, *siomay (*a kind of dumplings), *lontong sayur* (rice cooked in banana leaves, served with curry) and *mpek-mpek (*fried food made of sago flour mixed with fish). While the other foods are wet snacks consisting of *martabak*, meat snacks, sponge, *papeda, cireng isi*, *cilor* and *otak-otak* (a baked snack made of sago flour mixed with fish and egg wrapped in banana leaves). The average consumption of one-dish snacks (meatballs) was 0.9 times per week among the school students in the urban and 1.4 times/week among the school students in the rural. The average consumption of *siomay* was 1.1 times/week among the students in the urban and 0.7 times / week among the students in the rural (Table 8.8).

Table 8.8. The average consumption of street foods by the school children (times/week)

Street foods	Total (n=210)	Urban (n=105)	Rural (n=105)	p value*
One-dish foods				
Bakso	1.2	0.9	1.4	0.030
Siomay	0.9	1.1	0.7	0.019
Lontong sayur/buras/gado-gado	0.9	0.7	1.2	0.042
Mpek-mpek	0.4	0.2	0.5	0.073
Wet Snacks				
Martabak	0.8	1.1	0.6	0.008
Meat/seafood snack (*takoyaki*. nugget. sausage. shrimp stick)	1.4	1.8	1.0	0.001
Cake	0.5	0.7	0.4	0.051
Papeda/cilung	1.3	0.9	1.6	0.001
Cireng isi	0.8	0.5	1.0	0.006
Cilor	1.0	1.2	0.7	0.023
Otak otak	1.1	1.4	0.7	0.001
Dry Snacks				
Biscuit	1.2	1.3	1.0	0.179
Dry noodle stick	0.2	0.3	0.1	0.026
Coco crunch	0.6	0.8	0.5	0.033
Drinks				
Ice (coconut ice, syrup ice)	1.9	2.7	1.0	0.001
Milk and its variants	1.8	2.1	1.5	0.085

*independent t-test

Generally the average frequency of snack consumption of the students in the cities and villages differed significantly ($p < 0.05$) (See Table 8.8). There was a relationship between children's snacking habits and knowledge, having breakfast, the habit of bringing food (cut lunch) and the amount of pocket money given by their parents (Robert & Sudarti 2014).

8.3. Food Intake

Intakes of energy and nutrients are very important for children. Intakes of energy and nutrients provide fuel for children to move and support metabolic processes in the children's body. The macronutrient intakes of school children are presented in Table 8.9. In Table 8.9, the energy, protein, fat, and carbohydrate intakes of the children in the city shows that the intake of children in the village was higher ($p < 0.05$). The level of adequacy of energy, protein, fat, and carbohydrate was also higher in the children in the city compared to that of the children in the village ($p < 0.05$). The proportion of energy derived from carbohydrates was 57%, from fat 32%, and from protein 11%.

The protein intake of children in the city was 46 g and this had fulfilled four fifths of the portion of protein adequacy, while in the village the intake of protein was 39 g or only fulfilled two-thirds of the protein adequacy of the children. The children's protein intake in the city was lower than the intake of children aged 5-12 years in the 2014 West Java Province Total Diet Study (TDS) of 56 g (MoH 2014c). The protein intake of the children in the village was also lower than that of the child protein intake of the Total Diet Study in rural West Java, which was 49.4 g (MoH 2014c). When viewed from the level of adequacy, the level of protein adequacy of the school children in this study was still lower

than the results of West Java TDS, both in the cities and in the villages, which had met or exceeded the RDA.

Table 8.9. Energy, protein, fat, and carbohydrate intakes of the school children

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Energy				
Intake (kcal)	1,576±441	1,699±437	1,454±413	0.000
RDA (kcal)	2,054±61	2,055±53	2,053±68	
Adequacy level (%RDA)	76.7±21.2	82.6±20.8	70.8±20.0	0.000
Protein				
Intake (g)	42.6±13.1	46.0±13.3	39.2±12.2	0.000
RDA (g)	58.0±2.0	58.0±2.0	58.0±3.0	
Adequacy level (%RDA)	73.9±23.6	80.0±23.9	67.8±21.7	0.000
Fat				
Intake (g)	55.0±20.3	58.0±21.0	51.9±19.3	0.028
RDA (g)	69.0±2.0	69.0±2.0	69.0±2.0	
Adequacy level (%RDA)	80.0±29.4	84.4±30.3	75.5±27.9	0.028
Carbohydrate				
Intake (g)	221.8±67.5	241.4±69.3	202.2±59.9	0.000
RDA (g)	283.0±8.0	283.0±7.0	282.0±9.0	
Adequacy level (%RDA)	78.5±23.6	85.3±24.1	71.6±21.1	0.000

The fat intake of the children in the city was 58 g and this had fulfilled 84% of fat adequacy, while the fat intake of the children in the village was 52 g or this only fulfilled three quarters of the fat adequacy. The child fat intakes in the city were lower than the intake of children aged 5-12 years in Total Diet Study (TDS) in West Java Province in 2014, that is, 68 g (MoH 2014c). The children's fat intake in the village was also lower compared to the children's fat intake based on the results of the Total Diet Study in rural West Java, which was 55.8 g (MoH 2014c)

The carbohydrate intake of the children in the city was 241 g or this met 85% of fat adequacy, while the carbohydrate intake of the children in the village was 202 grams or this met 72% of children's carbohydrate adequacy. The carbohydrate intake of the children in the city was relatively similar to the carbohydrate intake of children aged 5-12 years in the 2014 West Java Province Total Diet Study (SDT, 238 g (MoH 2014c). The children's carbohydrate intake in the village was lower than the carbohydrate intake of the children from the Total Diet Study in rural West Java, which was 237 g (MoH 2014c).

The proportion of children categorized as fulfilling or not meeting the adequacy of energy, protein, fat and carbohydrates is presented in Table 8.10. In Table 8.10, it can be seen that the proportions of the children whose energy, protein, fat and carbohydrate intakes were less than the RDA, were 86%, 88%, 76%, and 82% respectively. This means that only less than a quarter of the children whose energy, protein, fat, and carbohydrate intakes met their needs. These children were at risk of experiencing energy deficiencies, moreover these children tended to be physically active.

Table 8.10. The proportion of the school students by category of macronutrient adequacy level [n (%)]

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)
Energy			
Poor (<100% RDA)	181 (86.2)	84 (80.0)	97 (92.4)
Adequate (≥100% RDA)	29 (13.8)	21 (20.0)	8 (7.6)
Protein			
Poor (<100% RDA)	186 (88.6)	85 (81.0)	101 (96.2)
Adequate (≥100% RDA)	24 (11.4)	20 (19.0)	4 (3.8)
Fat			
Poor (<100% RDA)	160 (76.2)	71 (67.6)	89 (84.8)
Adequate (≥100% RDA)	50 (23.8)	34 (32.4)	16 (15.2)
Carbohydrate			
Poor (<100% RDA)	173 (82.4)	79 (75.2)	94 (89.5)
Adequate (≥100% RDA)	37 (17.6)	26 (24.8)	11 (10.5)

The inter-regional analysis showed that the proportion of children classified as not meeting the adequacy of energy, protein, fat, and carbohydrates was more common in the children in the rural compared to the children in the urban. This situation shows that children in the rural were more at risk of experiencing energy deficiencies compared to those in the urban.

Mineral intakes, in this case calcium, phosphorus and iron, are presented in Table 8.11. In Table 8.11 it can be seen that the average calcium intake is 309 mg, phosphorus 482 mg, and iron 8.5 mg. The intake of calcium, phosphorus and iron only fulfilled 26% RDA, 41% RDA, and 55% RDA, respectively. This situation indicates that the school children were prone to mineral deficiencies. Its possible consequences were prone to low bone density in the children even osteoporosis, and prone to anemia, especially in the girls who almost entered the age of menarche.

Table 8.11.Calcium, phosphorus and iron intakes of the school children

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Calcium				
Intake (mg)	310±156	341±167	278±137	0.004
RDA (mg)	1,198±19	1,198±20	1,198±20	
Adequacy level (%RDA)	25.9±13	28.4±13.9	23.3±11.5	0.004
Phosphorus				
Intake (mg)	482±194	506±203	458±182	0.071
RDA (mg)	1,193±68	1,193±68	1,193±68	
Adequacy level (%RDA)	40.7±17.4	42.6±17.1	38.9±17.6	0.128
Iron				
Intake (mg)	8.5±3.7	9.0±3.7	7.9±3.7	0.045
RDA (mg)	16.0±4.0	16.0±4.0	16.0±4.0	
Adequacy level (%RDA)	55.1±28.4	59.1±29.3	51.2±27	0.042

Intakes of calcium, phosphorus and iron in the children in the urban was higher than the intakes of calcium, phosphorus, and iron in the children in the rural. Nevertheless the mineral intakes of children in these two regions was far from being adequate. The low

mineral intake was suspected because food intakes of animal protein sources were poor, this can be seen from the contribution of energy derived from protein which was only about 11% and fat 32% from the total energy. This also indicates that children prefer foods with high energy density compared to high nutrient density foods. The snacks that were sold in the schools and which were mostly chosen by the children in general were foods with high energy density. Another possible factor is that the children consumed less vegetables and fruit.

The proportion of the children categorized as fulfilling or not meeting mineral adequacy is presented in Table 8.12. In Table 8.12, it can be seen that the proportions of the children with calcium, phosphorus and iron intake were less than the RDA, that is 99.5%, 96.7%, and 83%, respectively. This means that almost all of the children could not meet mineral needs, except iron; 17% of the children met iron adequacy. These children were at risk of developing mineral deficiencies.

The inter-regional analysis shows that the proportion of children classified as not meeting mineral adequacy was more prevalent among the rural children compared to the children in the urban. This situation shows that children in the rural were more at risk of developing mineral deficiencies compared to the children in the urban. In order to reduce the risk of mineral deficiency, there is no other choice, these children must be accustomed to eating a variety of foods.

Table 8.12. Proportion of the school children by mineral adequacy level category [n (%)]

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)
Calcium			
Poor (<77% RDA)	209 (99.5)	104 (99.0)	105 (100.0)
Adequate (≥77% RDA)	1 (0.5)	1 (1.0)	0 (0.0)
Phosporus			
Poor (<77% RDA)	203 (96.7)	101 (96.2)	102 (97.1)
Adequate (≥77% RDA)	7 (3.3)	4 (3.8)	3 (2.9)
Iron			
Poor (<77% RDA)	175 (83.3)	86 (81.9)	89 (84.8)
Adequate (≥77% RDA)	35 (16.7)	19 (18.1)	16 (15.2)

Intakes of vitamin A, vitamin B1 (thiamin), vitamin C, and water are presented in Table 8.13. Table 8.13 shows that the average intake of vitamin A was only 281 micrograms (mcg) or only met 47% of the adequacy of vitamin A.The intake of thiamin or vitamin B1 was 0.4 mg on average. This intake of thiamin only met about one third of its adequacy. Low intake of vitamin A and thiamin was suspected because children ate less foods rich in vitamin A and thiamin, such as vegetables. Vitamin C intake of children an average of 51 mg. This vitamin C intake has met the adequacy of children's vitamin C (102% RDA). The intake of vitamin C that has fulfilled the RDA was thought to be because the child liked a drink that had high vitamin C content

Inter-regional analysis showed that there was no difference in intakes of vitamin A, vitamin B2, and vitamin C between the children in the urban and the children in the rural. It is probable that this indicates that the children in the urban and in the rural consumed less vegetables and fruits.

One nutrient that has an important role but often forgotten is water. Water intakes are presented in Table 8.13. In Table 8.13, the average intake of water was 1,461 mL. The intake and level of water adequacy in the children in the urban was higher than the water intake of the children in the rural ($p < 0.001$). This water intake only met about 80% of the RDA. Water intakes that did not meet their needs were suspected because the children often carried or bought water in low amounts. Besides that the children often forget to drink because of the fun of playing. Usually children just drink when they feel thirsty. If ones feel thirsty they are usually mild or very mild dehydrated.

The proportion of the children categorized as fulfilling or not meeting vitamin adequacy is presented in Table 9.14. In Table 9.14 it can be seen that the proportions of the children who consumed vitamin A, vitamin B1 and vitamin C were less than the RDA, that is, 87%, 97% and 90%, respectively. This means that almost all the children could not meet these vitamin needs. Only a few children could meet those vitamin needs.

Inter-regional analysis shows that the proportion of the children classified as not meeting the needs of vitamin A and vitamin B1 was more common in the children in the urban, while vitamin C was more inadequate in the children in the rural. This situation shows that the children in the rural and in the urban were at risk of developing vitamin deficiencies. As with minerals, in order to reduce the risk of vitamin deficiency in children, children had to be accustomed to consuming a variety of foods.

Table 8.13. Vitamin and water intakes of the school children

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Vitamin A				
Intake (mcg)	281.0±229.0	290.1±197.0	271.8±257.6	0.564
RDA (mcg)	599.0±10.0	599.0±10.0	599.0±10.0	
Adequacy level (%RDA)	46.9±38.2	48.4±32.8	45.4±42.9	0.571
Vitamin B1				
Intake (mg)	0.4±0.5	0.3±0.1	0.4±0.7	0.246
RDA (mg)	1.1±0.1	1.1±0.1	1.1±0.1	
Adequacy level (%RDA)	37.1±51.8	32.7±12.2	41.4±72.2	0.229
Vitamin C				
Intake (mg)	51.0±264.2	86.7±368.4	15.3±44.7	0.051
RDA (mg)	50.0±2.0	50.0±0.0	50.0±2.0	
Adequacy level (%RDA)	101.9±528.4	173.4±736.8	30.5±89.4	0.051
Water				
Intake (ml)	1,461.5±411.2	1,568.4±415.4	1,354.6±379.7	0.000
RDA (ml)	1,802.0±17.0	1,801.0±10.0	1,803.0±22.0	
Adequacy level (%RDA)	81.1±22.8	87.1±23.1	75.1±21	0.000

The proportion of the children categorized as fulfilling or not water adequacy is presented in Table 8.14. In Table 8.14 it can be seen that the proportions of children whose water intake was less than the RDA were 72% in the urban and 86% in the rural. This situation shows that most of the children could nnot meet water needs. Only a few of the children could meet water needs.

Table 8.14. Proportion of the school children by vitamin and water adequacy level category [n (%)]

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)
Vitamin A			
Poor (<77% RDA)	183 (87.1)	89 (84.8)	94 (89.5)
Adequate (≥77% RDA)	27 (12.9)	16 (15.2)	11 (10.5)
Vitamin B			
Poor (<77% RDA)	204 (97.1)	105 (100.0)	99 (94.3)
Adequate (≥77% RDA)	6 (2.9)	0 (0.0)	6 (5.7)
Vitamin C			
Poor (<77% RDA)	188 (89.5)	90 (85.7)	98 (93.3)
Adequate (≥77% RDA)	22 (10.5)	15 (14.3)	7 (6.7)
Water			
Poor (<100% RDA)	166 (79.0)	76 (72.4)	90 (85.7)
Adequate (≥100% RDA)	44 (21.0)	29 (27.6)	15 (14.3)

Correlation between Energy and Nutrition Intakes and Morbidity

Theoretically there is a correlation between nutrient intakes and child morbidity. Child morbidity is closely related to the child's immune system. The immune system is influenced by many factors, both internal and external. Of all the factors that make up the immune response and affect their response, only nutrition provides important building materials and energy so that immunity can function (Satyaraj & Morley 2015). The interaction of malnutrition with infection is reversible. Infection and nutrient interactions will weaken the host's ability to fight infectious diseases (Orellana & Coss-Bu 2015). In Table 8.15 a cross tabulation of the relationship between macronutrient intakes and morbidity (diarrhea and thypus) is presented. Based on the Chi Square test presented in Table 8.15 there was no relationship ($p>0.05$) between energy, protein, fat and carbohydrate intakes and morbidity. The absence of a significant relationship is suspected because the proportion of the children who were sick (diarrhea and thypus) was too little; besides that because the proportion of the children with adequate macronutrient intakes was quite small.

Table 8.15. Correlation between Energy and Micro-nutrient Intakes and Morbidity

Variables	Total (n=210)	Sick (n=23)	Not Sick (n=187)	p value
Energy				
Poor (< 100% RDA)	181 (86.2)	19 (82.6)	162 (86.6)	0.598
Adequate (≥ 100% RDA)	29 (13.8)	4 (17.4)	25 (13.4)	
Protein				
Poor (< 100% RDA)	186 (88.6)	21 (91.3)	165 (88.2)	0.662
Adequate (≥ 100% RDA)	24 (11.4)	2 (8.7)	22 (11.8)	
Fat				
Poor (< 100% RDA)	160 (76.2)	18 (78.3)	142 (75.9)	0.805
Adequate (≥ 100% RDA)	50 (23.8)	5 (21.7)	45 (24.1)	
Carbohydrate				
Poor (< 100% RDA)	173 (82.4)	20 (87)	153 (81.8)	0.542
Adequate (≥ 100% RDA)	37 (17.6)	3 (13)	34 (18.2)	

The correlation between mineral intakes and morbidity is presented in Table 8.16. In Table 8.16 the results of the Chi Square test show that there was no significant correlation between mineral intakes and morbidity. The absence of a significant correlation is suspected because the proportion of children who were sick (diarrhea and thypus) was too few, besides that also because the proportion of children who had sufficient mineral intake was also small.

The correlation between vitamin and water intakes and morbidity is presented in Table 8.17. Table 8.17 shows the results of the Chi Square test which shows no significant correlation between intake of vitamins and water with morbidity. The absence of a significant correlation was suspected because the proportion of children who were sick (diarrhea and thypus) is too little, besides that also because the proportion of children who have sufficient intake of vitamins and water was also small.

Table 8.16. Correlation between mineral intakes and morbidity status

Variables	Total (n=210)	Sick (n=23)	Not Sick (n=187)	p value
Calcium				
Poor (< 77% RDA)	209 (99.5)	23 (100)	186 (99.5)	0.725
Adequate (≥ 77% RDA)	1 (0.5)	0 (0)	1 (0.5)	
Phosphorus				
Poor (< 77% RDA)	203 (96.7)	23 (100)	180 (96.3)	0.345
Adequate (≥ 77% RDA)	7 (3.3)	0 (0)	7 (3.7)	
Iron				
Poor (< 77% RDA)	175 (83.3)	19 (82.6)	156 (83.4)	0.921
Adequate (≥ 77% RDA)	35 (16.7)	4 (17.4)	31 (16.6)	

Table 8.17. Correlation between vitamin and water intakes and morbidity status

Variables	Total (n=210)	Sick (n=23)	Not Sick (n=187)	p value
Vitamin A				
Poor (< 77% RDA)	183 (87.1)	19 (82.6)	164 (87.7)	0.491
Adequate (≥ 77% RDA)	27 (12.9)	4 (17.4)	23 (12.3)	
Vitamin B				
Poor (< 77% RDA)	204 (97.1)	23 (100)	181 (96.8)	0.383
Adequate (≥ 77% RDA)	6 (2.9)	0 (0)	6 (3.2)	
Vitamin C				
Poor (< 77% RDA)	188 (89.5)	22 (95.7)	166 (88.8)	0.309
Adequate (≥ 77% RDA)	22 (10.5)	1 (4.3)	21 (11.2)	
Water				
Poor (< 100% RDA)	166 (79)	20 (87)	146 (78.1)	0.323
Adequate (≥ 100% RDA)	44 (21)	3 (13)	41 (21.9)	

8.4. Contribution of Snacks at School to Children's Daily Intakes

Children's snacking habits are one of the factors that can influence nutritional intake and nutritional status of children. Good snacking habits will be able to contribute enough energy and protein to children, but conversely, improper and unhealthy snacking habits can actually have a negative and harmful effect on children. This is because according to Sugiyatmi (2006), based on the Streetfood Project survey in 1989 in Jakarta,

Bogor, Rangkasbitung, and in small towns such as Cibadak, Rengasdeklok, Pacet, and Cikampek it turned out there were still many street food vendors who used artificial coloring materials in their merchandise in particular drinks.

The contribution of nutrients from street food to the energy and protein intakes of elementary school children can be seen in Table 8.18. The contribution of macro nutrients from street food in the urban was 21.7% energy and 18.1% protein, while the macro nutrient contribution of the respondents in the rural was 31.6% energy and 24.1% protein. The results of statistical tests showed that there were significant differences ($p<0.05$) between the contribution of energy and protein of the respondents in the urban and that of the respondents in the rural, where the contribution of energy and protein to snack foods of the respondents in the rural was higher than that of the respondents in the urban. The results showed that the contribution of energy and protein from the respondents' snack foods in the rural was close to the results of the BPPOM survey. The results of the BPPOM survey in 2009 in Jakarta showed snacks for school children accounted for 31.1% of energy and 27.4% of protein.

The contribution of macro nutrients (fats and carbohydrates) from the snacks of the urban respondents was fat as much as 24.4% and carbohydrates by 21.3%, while the contribution of macro nutrients from the respondents in the rural was fat as much as 32.8% and carbohydrates 32.4%. The statistical test results showed that there were significant differences ($p<0.05$) between the contribution of fat and carbohydrate snacks to the urban and rural respondents, where the contribution of fat and carbohydrate snacks to respondents in the rural was higher than that of the respondents in the urban.

Table 8.18. Contribution of street food nutrients to daily energy and macro nutrient intakes

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Energy				
Daily Intake (kcal)	1.576±441	1.699±437	1.454±413	
Street food (kcal)	412±216	366±186	457±234	0.002
Contribution of street food (%)	26.7±12.8	21.7±10.1	31.6±13.3	0.000
Protein				
Daily Intake (g)	42.6±13.1	46.0±13.3	39.2±12.2	
Street food (g)	8.8±5.5	8.4±5.4	9.2±5.6	0.302
Contribution of street food (%)	21.1±12.4	18.1±9.8	24.1±14	0.000
Fat				
Daily Intake (g)	55.0±20.3	58.0±21.0	51.9±19.3	
Street food (g)	15.8±11.2	14.1±9	17.6±12.9	0.025
Contribution of street food (%)	28.6±15.5	24.4±13.5	32.8±16.4	0.000
Carbohydrate				
Daily intake (g)	221.8±67.5	241.4±69.3	202.2±59.9	
Street food (g)	57±29	50±26	64±30	0.000
Contribution of street food (%)	26.9±13.1	21.3±10.4	32.4±13.1	0.000

The contribution of school children's snacks to their daily mineral intake can be seen in Table 8.19. The contribution of micronutrients (mineral) from the respondents' snack foods to daily consumption in the urban was 19.9% calcium, 17.2% phosphorus and 24.5% iron, while the contribution of micronutrients (minerals) to the daily consumption of the respondents in the rural was 26.3% calcium, 22.8% phosphorus and 28.5% iron. The results of statistical tests showed that there were significant differences ($p < 0.05$) between the contribution of calcium, phosphorus, and iron of the respondents in the urban and in the rural, where the contribution of snacks for the students in the rural was higher than that of the students in the urban.

Table 8.19. Contribution of nutrients from snacks to the daily mineral intakes

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Calcium				
Daily intake (mg)	310±156	341±167	278±137	
Snack (mg)	68±56	65±58	71±54	0.445
Snack contribution (%)	23.1±16.6	19.9±15.3	26.3±17.2	0.005
Phosporus				
Daily intake (mg)	482±194	506±203	458±182	
Snack (mg)	95±83	85±77	105±88	0.087
Snack contribution (%)	20±15.2	17.2±12.2	22.8±17.3	0.007
Iron				
Daily intake (mg)	8.5±3.7	9.0±3.7	7.9±3.7	
Snack (mg)	2.1±1.9	1.9±2	2.2±1.8	0.246
Snack contribution (%)	24.5±19.6	20.5±17.3	28.5±20.9	0.003

The contribution of vitamins from school children' snacks to their daily vitamin intakes can be seen in Table 8.20. The average daily vitamin intake of the school children in the urban was 290 mcg of vitamin A, 0.3 mg of vitamin B, and 86.7 mg of vitamin C. While the contribution of vitamin nutrients from the urban children's snack foods to their daily consumption is 13.4% vitamin A, 14.9% vitamin B, and 19.9% vitamin C. The average daily consumption of vitamin A, B and C in the rural children was 272 mcg of vitamin A, 0.4 mg of vitamin B, and 15.3 mg of vitamin C, while the vitamin contribution of the students to the consumption of food in the rural was 20.1% vitamin A, 24.2% vitamin B, and 14.2% vitamin C. The results of statistical tests showed that there were significant differences ($p<0.05$) between the contribution of vitamin A and vitamin B of the students in the urban and in the rural, where the contribution of vitamin A and vitamin B from snack foods of the respondents in the village was higher compared to that of the students in the city. Water consumption derived from snacks was higher for the students in the village than for the students in the city ($p < 0.05$). The habit of snacking on students in the village with more pocket money caused the contribution of nutrition/water intakes from snacks to the students in the rural was higher than that of the students in the urban.

Tabel 8.20. Contribution of iron from street foods to the daily vitamin and water intakes

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)	p value
Vitamin A				
Daily intake (mcg)	281±229	290±197	272±258	
Snack (mcg)	38±43	33±46	43±40	0.071
Snack contribution (%)	16.7±16.5	13.4±13.9	20.1±18.2	0.003
Vitamin B				
Daily intake (mg)	0.4±0.5	0.3±0.1	0.4±0.7	
Snack (mg)	0.1±0.2	0±0.1	0.1±0.3	0.054
Snack contribution (%)	19.5±18.1	14.9±12	24.2±21.6	0.000
Vitamin C				
Daily intake (mg)	51.0±264.2	86.7±368.4	15.3±44.7	
Snack (mg)	6.8±52.9	8.5±63.5	5±39.8	0.624
Snack contribution (%)	16.9±29.3	19.6±30.1	14.2±28.2	0.182
Water				
Daily intake (ml)	1.462±411	1.568±415	1.355±380	
Snack (ml)	303±191	275±187	331±191	0.033
Snack contribution (%)	21.4±13.2	17.7±11.8	25.1±13.5	0.000

8.5. Feeding Patterns

Parents are responsible for their children's diet, which includes the situation when eating at home, the type and amount of food served, and the children's meal time. Positive behavior of parents is needed by giving examples of good and healthy food (Brown *et al*. 2011). Based on Table 8.21, food caring pattern were categorized good in both urban (92.4%) and rural (83.8%) and there was no significant difference ($p>0.05$). Although there was no significant difference, the percentage of food caring pattern in the rural was relatively lower than that in the urban areas. According to (Hurlock 1996) it was influenced by socio-economic conditions and parents' education level.

Table 8.21. Distribution of the subjects by food caring pattern [n (%)]

Food Caring Practice	Total (n=210)	Urban (n=105)	Rural (n=105)	p value[1)]
Low (<60)	0 (0.0)	0 (0.0)	0 (0.0)	
Moderate (60-80)	25 (11.9)	8 (7.6)	17 (16.2)	
Good (>80)	185 (88.1)	97 (92.4)	88 (83.8)	
Mean±SD	88.6±6.5	89.3±5.8	88.0±7.1	0.132

[1)]t-test analysis

The measured food caring pattern consisted of 8 questions about maternal behavior related to their children's eating. The food caring pattern was related to the importance of breakfast, hand washing, the prohibition of careless consumption of snacks, the provision of fruit, reminding to eat vegetables, providing snacks, bringing lunch to school, and controlling whether the children eat or not. The results showed there was no

significant difference from each mother's food caring pattern except in providing snacks at home (Table 8.22)

Table 8.22. Food caring pattern in urban and rural

Food Caring Pattern	Total (n=210)	Urban (n=105)	Rural (n=105)	p value[1)]
I ask my children to eat breakfast every day				
Never	2 (1.0)	2 (1.9)	0 (0.0)	0.560
Sometimes	12 (5.7)	6 (5.7)	6 (5.7)	
Often	196 (93.3)	97 (92.4)	99 (94.3)	
I ask my children to wash hands before eating				
Never	0 (0.0)	0 (0.0)	0 (0.0)	0.098
Sometimes	6 (2.9)	5 (4.8)	1 (1.0)	
Often	204 (97.1)	100 (95.2)	104 (99.0)	
I prohibit my children from buying any foods without consideration				
Never	3 (1.4)	2 (1.9)	1 (1.0)	0.322
Sometimes	15 (7.1)	9 (8.6)	6 (5.7)	
Often	192 (91.4)	94 (89.5)	98 (93.3)	
I provide fruits at home				
Never	9 (4.3)	1 (1.0)	8 (7.6)	0.289
Sometimes	111 (52.9)	57 (54.3)	54 (51.4)	
Often	90 (42.9)	47 (44.8)	43 (41)	
I ask my children to eat vegetable every day				
Never	0 (0.0)	0 (0.0)	0 (0.0)	0.857
Sometimes	37 (17.6)	18 (17.1)	19 (18.1)	
Often	173 (82.4)	87 (82.9)	86 (81.9)	
I provide snacks at home				
Never	32 (15.2)	10 (9.5)	22 (21.0)	0.001
Sometimes	136 (64.8)	66 (62.9)	70 (66.7)	
Often	42 (20.0)	29 (27.6)	13 (12.4)	
I check whether my children has eaten a meal or not				
Never	1 (0.5)	1 (1.0)	0 (0.0)	0.596
Sometimes	13 (6.2)	5 (4.8)	8 (7.6)	
Often	196 (93.3)	99 (94.3)	97 (92.4)	
I provide my children with food and drink to be taken to school.				
Never	12 (5.7)	3 (2.9)	9 (8.6)	0.593
Sometimes	124 (59.0)	65 (61.9)	59 (56.2)	
Often	74 (35.2)	37 (35.2)	37 (35.2)	

[1)] Mann Whitney test

Most of the parents (93.3%) told their children to eat breakfast every day, and there was no significant difference between rural and urban areas ($p>0.05$) in this matter. Parents need to remind their children to have breakfast because according to Khomsan (2002) breakfast is one of the most important meal times. Carbohydrates consumed at breakfast can increase blood sugar levels which have a positive impact on the productivity and learning concentration of school students. Based on Table 8.23, 55.2% of the parents did not provide extra pocket money if the child did not have breakfast so that the children replaced breakfast with snacks.

Putri's study (2016) showed that mother's good knowledge played a role to shape children's behavior in terms of washing hands. Most of the mothers (97.1%) told their

children to wash their hands before eating. This is expected to shape the behavior of washing hands before eating among children.

According to Edwards *et al.* (2006), parents' feeding pattern plays a role in guiding children in choosing foods provided at home and outside the home. The type and amount of food provided at home has an effect on children's eating behavior. The provision of fruit food at home by parents was mostly (52.9%) classified as occasional, the other 42.9% classified as frequent and 4.3% never providing fruit.

There was a significant difference between the provision of snacks in the urban and rural areas ($p<0.01$). The parents in the urban areas often provided snacks at home. The possibility of this is done to reduce the habit of children to get snacks outside, which might not guarantee safety and cleanliness. This is also possible due to economic factors, namely the ability to buy snacks to be provided at home was higher in the urban areas than in the rural areas.

Controlling children's snacks can be done by prohibiting children from taking any snacks and preparing foods to be taken to school. As many as 91.4% of parents often reminded their children not to consume any snacks. According to Febry (2010) parents brought provisions for their children due to concerns about the safety of snacks sold at school. The results of the study showed that there were still few parents who provided cut lunch for children (35.2%) and more than half (59.0%) were classified as sometimes in the provision of cut lunch. In addition, only 9.5% of parents deliverd lunch for children to school.

Parents' behavior in controlling children's food such as making sure their children have eaten or not, telling their children to eat vegetables, is important so that children's nutritional needs are fulfilled.

Table 8.23. Distribution of the respondents by food caring pattern [n (%)]

Statements	Total (n=210)	Urban (n=105)	Rural (n=105)	p value[1)]
If you do not provide breakfast, is your child given additional money to buy food for breakfast at school?				
Yes	93 (44.3)	49 (46.7)	44 (41.9)	0.445
No	116 (55.2)	56 (53.3)	60 (57.1)	
Always having breakfast	1 (0.5)	0 (0.0)	1 (1.0)	
Does your mother send you meal for your lunch at school?				
Yes	20 (9.5)	14 (13.3)	6 (5.7)	0.061
No	190 (90.5)	91 (86.7)	99 (94.3)	

[1)] Mann Whitney test

The type of breakfast in this study was categorized into four groups (Table 8.24). According to Khomsan (2002), the breakfast menu needs to be as varied as consisting of rice, side dishes, fruit, vegetables, and milk to meet nutritional needs. Table 8.24 shows that 54.8% of students consumed breakfast consisting of staple foods and side dishes or vegetables. This was still not in accordance with the advice of diverse meals for breakfast. In addition, it is allegedly due to a short time so that parents provided a practical breakfast that was only staple food and one type of side dish or vegetable. Even 8.8% of children

only ate side dishes like sausage nuggets. Research by Jannah (2017) showed that most of the children consumed only staple foods and side dishes such as fried rice, white rice, instant noodles, and egg because the breakfast menu was suspected to be an easy and practical menu to be served in the morning with a short time.

Table 8.24. Breakfast commonly made by the mothers [n (%)]

Types of breakfast made	Total	Urban	Rural
Staple food	85 (17.8)	53 (21.5)	32 (13.9)
Staple food + side dishes/vegetable	262 (54.8)	134 (54.3)	128 (55.4)
Staple food + side dishes+vegetable	89 (18.6)	44 (17.8)	45 (19.5)
Others	42 (8.8)	16 (6.5)	26 (11.3)
Total	478 (100)	247 (100)	231 (100)

Notes: Choices can be more than one:
Others (only vegetable, only side dishes, *bakwan* (a kind of fried snack made wheat flour added by sliced vegetable and egg) , *bubur sumsum* (a kind of sweet porridge), *energen* (a kind of instant sweet porridge), sweet tea, and biscuit)

CHAPTER 9
SANITATION AND HYGIENE

9.1. Sanitation, Hygiene, and Housing

Healthy home is one of the facilities to achieve optimum health status. To get a healthy home is determined by the availability of housing sanitation facilities. Home sanitation is a public health effort that focuses on monitoring the physical structure where people use it for shelter that affects the degree of human health. The sanitation facilities include ventilation, temperature, humidity, residential density, natural lighting, building construction, waste disposal facilities, human waste disposal facilities and clean water supply (Yusuf & Sulistyorini 2005). The condition of the house in this study was measured from the source of clean water, ownership of the bathroom, defecation place, garbage dump, source of drinking water, type of house floor and type of wall of the house.

The availability of clean water facilities is one of the requirements of a simple, healthy home. Minimum availability of clean water per day is 120 liters/day/person. The quality of clean water that will be used as drinking water includes clear, colorless, tasteless, odorless and does not contain germs (Entjang 2000). The results showed that the respondents in the urban used the most bottled water/gallon as the main source of drinking water, which amounted to 68.6%, followed by well water which was only 18.1%. On the other hand, most of the respondents in the village used well water as the main source of drinking water, that is, 57.1%, and followed by bottled water/gallon as much as 40.0%. Overall bottled water/gallons (54.3%) and well water (37.6%) were the main sources of drinking water used. The test results showed there were significant differences between the main sources of drinking water used by the respondents in the urban and by those in the village.

According to Tersiawan (2002) clean water is very useful for the basic needs of people everyday, for example for drinking water, cooking and washing. The order of the main sources of clean water used by the respondents in the urban was well water (52.4%) and PAM/plumbing water (33.3%), while in the village were well water (85.7%) and water from springs (11.4 %). Overall well water was the main source of clean water for bathing (69.0%), followed by PAM (a company providing clean water)/plumbing (18.1%). The test results showed there was a significant difference between the main sources of clean water for bathing used between the respondents in the urban and in the rural.

The results showed that all of the respondents in the city (99.0%) and in the village (100.0%) had a bathroom and the test results showed no significant difference between the ownership of family bathrooms in the city and in the village. Families who have a bathroom will not automatically have their own toilet. Like the data presented in Table 9.1, most of the respondents in the city (93.3%) and in the villages (97.1%) already had their own latrines, but there were also respondents in the city (6.7%) and in the villages (1.9%) who still used public toilets as a means to defecate. The test results showed no significant difference between the defecation places for the people in the city and in the village.

In addition to water, environmental sanitation must be considered, namely a landfill. Waste is anything that is no longer used and must be discarded. Waste that is not handled properly results in the growth of germs as a cause of diarrhea, also invites flies that cause disease (Latifah *et al*. 2002 in Hajar 2011). The results showed that most of the respondents in the urban dumped their trash in the garbage disposal sites (85.7%) and only 14.3% managed the waste by burning it. Likewise, the respondents in the rural managed their waste by dumping it in the garbage disposal sites (62.9%) and burning it (34.3%). The results of the test showed that there was a significant difference between the respondents' garbage disposal sites in the urban and in the rural.

Table 9.1. Distribution of household's sanitation, hygiene, and housing

Home Condition	Total (n=210)	Urban (n=105)	Rural (n=105)	p value[1]
Main sources of drinking water				
Packaged Water	114 (54.3)	72 (68.6)	42 (40.0)	0.000
PAM/plumbing	16 (7.6)	14 (13.3)	2 (1.9)	
Well	79 (37.6)	19 (18.1)	60 (57.1)	
Others[2]	1 (0.5)	0 (0.0)	1 (1.0)	
Main sources of clean water (for bathing)				
Spring	26 (12.4)	14 (13.3)	12 (11.4)	0.000
Well	145 (69.0)	55 (52.4)	90 (85.7)	
River	1 (0.5)	1 (1.0)	0 (0.0)	
PAM/plumbing	38 (18.1)	35 (33.3)	3 (2.9)	
Ownership of household bathrooms				
Yes	209 (99.5)	104 (99.0)	105 (100.0)	0.317
No	1 (0.5)	1 (1.0)	0 (0.0)	
Defecation place				
Public toilet	9 (4.3)	7 (6.7)	2 (1.9)	0.055
Private toilet	200 (95.2)	98 (93.3)	102 (97.1)	
Others[3]	1 (0.5)	0 (0.0)	1 (1.0)	
Garbage disposal place				
Garbage disposal site	156 (74.3)	90 (85.7)	66 (62.9)	0.000
River	1 (0.5)	0 (0.0)	1 (1.0)	
Garden	2 (1.0)	0 (0.0)	2 (1.9)	
Burnt	51 (24.3)	15 (14.3)	36 (34.3)	
House floor				
Ceramics	172 (81.9)	88 (83.8)	84 (80.0)	0.572
Cement	32 (15.2)	12 (11.4)	20 (19.0)	
Soil	1 (0.5)	1 (1.0)	0 (0.0)	
Others[4]	5 (2.4)	4 (3.8)	1 (1.0)	
House wall				
Brick	199 (94.8)	97 (92.4)	102 (97.1)	0.119
Board	4 (1.9)	3 (2.9)	1 (1.0)	
Woven bamboo	4 (1.9)	2 (1.9)	2 (1.9)	
Others[5]	3 (1.4)	3 (2.9)	0 (0.0)	

[1]Mann Whitney test
[2]The other defecation place: fish ponds
[3]The other main source of water: spring
[4]Other house floors: board, granite, traso, tile
[5]The other house wall: plywood

At present, there are various types of house floors. House floors can be made of cement, tiles, wood, ceramics, or just compacted soil. A good floor is not dusty in the dry

season and is not muddy during the rainy season. Wet and dusty floors are a hotbed of disease (Notoatmodjo 2003b). The types of floors of the respondents' houses in the urban and in the rural were mostly from ceramics (83.8% vs. 80.0%) and cement/plaster (11.4% vs 19.0%). The test results showed there were significant differences between the type of floor of the respondent's house in the city and in the village.

The home wall serves to resist wind and dust, and is made not transparent. Wall material can be in the form of bricks, *batako* (a kind of bricks made of sand and cement), bamboo or wooden boards. The walls of the house should be equipped with ventilation to regulate air circulation (Saleh 2010). Almost all of the respondents in this study both in the urban (92.4%) and in the rural (97.1% used walls made of brick or *batako* for the walls of their houses. Only a few still used boards and bamboo. The test results showed there were significant differences between the types of walls of the respondents' houses in the urban and in the rural.

9.2. Personal Hygiene and Sanitation

In Table 9.2, the personal hygiene and sanitation conditions of the children are presented. The children who usually bathed 2 times per day were 76.7% and 3 times per day 22.9%, and the rest only took a bath once per day. In general, in Indonesia bathing is done twice a day. About 20% of the children in this study took a bath 3 times per day, this is probably due to the relatively hot weather in the study area, so that the children took a bath after school. The statistical test results showed there were differences in the frequency of bathing per day between the children in the urban and those in the rural ($p<0.01$). When bathing, almost all of the children applied soap. There was no significant difference in the use of soap when bathing between the children in the urban and those in the rural ($p>0.05$).

Table 9.2. Distribution of the children by personal hygiene dan sanitation

Children's personal hygiene and sanitation	Total (n=210)	Urban (n=105)	Rural (n=105)	p value[1]
Bathing habit				
1 time/day	1 (0.5)	1 (1.0)	0 (0.0)	0.000
2 times/day	161 (76.7)	67 (63.8)	94 (89.5)	
3 times/day	48 (22.9)	37 (35.2)	11 (10.5)	
Habits of applying soap when taking a bath				
Yes	208 (99.0)	103 (98.1)	105 (100.0)	0.156
No	2 (1.0)	2 (1.9)	0 (0.0)	
Habits of brushing teeth				
1 time/day	11 (5.2)	6 (5.7)	5 (4.8)	0.000
2 times/day	106 (50.5)	38 (36.2)	68 (64.8)	
3 times/day	93 (44.3)	61 (58.1)	32 (30.5)	
Habits of washing hands using clean water and soap				
Yes	125 (59.5)	76 (72.4)	49 (46.7)	0.000
No	18 (8.6)	8 (7.6)	10 (9.5)	
Sometimes	67 (31.9)	21 (20.0)	46 (43.8)	
Habits of putting on footwear when going out of the house				
Yes	183 (87.1)	96 (91.4)	87 (82.9)	0.067
No	1 (0.5)	0 (0.0)	1 (1.0)	
Sometimes	26 (12.4)	9 (8.6)	17 (16.2)	

[1]Mann Whitney test

One of the most important things to maintain oral and dental hygiene is the habit of brushing teeth. About 50% of the children brushed their teeth twice a day, 44% brushed their teeth three times a day, and the rest one time per day. More children in the rural brushed their teeth 2 times per day, while more children in the urban brushed their teeth 3 times per day ($p<0.001$).

Transmission of many diseases occurs through the hands. The habit of washing hands with clean water and soap will reduce the risk of disease transmission. Table 9.2 shows there were around 59.5% of the children that were used to washing their hands with clean water and soap. The proportion of children who were used to washing their hands with water and soap for the children in the urban reached 72%, this was far higher than the proportion of the children in the rural which was only 47% ($p<0.001$).

One way to transmit worms is through the feet and nails. The use of footwear can reduce the transmission. Therefore in this study we asked about the habit of using footwear when going out of the house, the results of which are presented in Table 9.2. Table 9.2 shows almost all of the children were accustomed to using footwear when going out, only 12% sometimes used footwear. There were no differences in the use of footwear between the children in the urban and in the rural.

9.3. Morbidity

In Table 9.3 is presented the distribution of the children based on their history of illness in the past one month. There were three types of diseases observed, namely diarrhea, thypus, and URI (Upper Respiratory Tract Infection) (cough/cold). The illness suffered was based on interviews with the respondents. Based on the combination of the three diseases, 63.3% of the children suffered the diseases for the past one month. The proportion of the sick children in the urban (56.2%) was smaller than that of the children in the rural (70.5%) ($p<0.05$).

Table 9.3. Distribution of the children by their illness history in the past one month

Illness History	Total (n=210)	Urban (n=105)	Rural (n=105)	p value[1]
Getting ill				
Yes	133 (63.3)	59 (56.2)	74 (70.5)	0.032
No	77 (36.7)	46 (43.8)	31 (29.5)	
Diarrhea				
Yes	18 (8.6)	9 (8.6)	9 (8.6)	1.000
No	192 (91.4)	96 (91.4)	96 (91.4)	
Average duration of illness	2.4±1.0	2.2±0.8	2.7±1.2	
Typhus				
Yes	6 (2.9)	3 (2.9)	3 (2.9)	1.000
No	204 (97.1)	102 (97.1)	102 (97.1)	
Average duration of illness	4.7±2.0	5.0±2.0	4.3±2.3	
URI (cough cold)				
Yes	125 (59.5)	54 (51.4)	71 (67.6)	0.017
No	85 (40.5)	51 (48.6)	34 (32.4)	
Average duration of illness	4.1±2.2	4.0±1.8	4.2±2.4	

[1]Mann Whitney test

Of the three types of diseases, most of the children suffered from URI (upper respiratory tract infection), 59.5%, followed by 8.6% diarrhea and 2.9% thypus. The proportions of the children who suffered from diarrhea and thypus were balanced in the urban and in the rural, but the children who suffered from URI were significantly more common among the children in the rural than those in the urban (67.6% vs. 51.4%) ($p<0.05$).

The duration of illness varied according to the type of disease. The most common disease was thypus for 4-5 days, followed by URI for about 4 days, and the shortest duration of illness was diarrhea for about 2-3 days.

Wholesome snacks will also cause children to be healthy. If snacks are not wholesome and children are accustomed to snacks, it is feared that children will be vulnerable to becoming sick. The relationship between morbidity and children's snack habits is presented in Table 9.4. The morbidity presented in this study is diarrhea and typhus. In Table 9.4 it can be seen that there was no correlation between snacking habits in schools with morbidity ($p> 0.05$). However, it appeared that the sick children were children who consumed street foods 4 times or more per week. There was no correlation between snacking habits and morbidity because the snack foods sold in the schools were generally safe and wholesome foods.

Table 9.4. Correlation between morbidity (diarrhea and typhus) and children's snacking habits

Snacking habits at school	**Morbidity Status**		**p value[1]**
	Diseases (Diarrhea and Typhus) (n=23)	**Not sick (n=187)**	
2-3 x/week	0 (0.0)	9 (4.8)	0.260
4-6 x/week	14 (60.9)	130 (69.5)	
≥7 x/week	9 (39.1)	48 (25.7)	
Total	23 (100)	187 (100)	

[1]Chi square test

Theoretically, morbidity is influenced by personal hygiene and sanitation. In Table 9.5, the relationship between morbidity and personal hygiene and sanitation is presented. The components of personal hygiene and sanitation of the children observed were five components, which consisted of bathing habits, the habit of using soap when bathing, the habit of brushing teeth, habits of hand washing by using clean water and soap, and the habit of using footwear when going out of the house. Of the five components, only bathing habits were associated with morbidity ($p<0.05$), the other components were not statistically significant.

In this study it was also observed whether there was a correlation between morbidity and personal hygiene and food vendor sanitation. The rationale for linking these two variables is that it was assumed that personal hygiene and sanitation of food vendors would infect disease to children through the food they sold. Table 9.6 shows the correlation between morbidity and personal hygiene and food vendor sanitation. It shows no statistically significant correlation between morbidity and personal hygiene and food

vendor sanitation. The duration of illness also did not show a significant difference in schools with good vendors and in schools with poor ones. The absence of such a correlation was suspected because snack foods served by vendors were classified as safe and wholesome.

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Table 9.5. Correlation between morbidity and children's personal hygiene and sanitation

Personal hygiene and children's sanitation	Total (n=210)	Sick (n=233)	Not sick (n=187)	p value[1]
Bathing habits				
1 time/day	1 (0.5)	1 (4.3)	0 (0.0)	0.017
2 times/day	161 (76.7)	17 (73.9)	144 (77.0)	
3 times/day	48 (22.9)	5 (21.7)	43 (23)	
Habits of applying soap whenever taking a bath				
Yes	208 (99.0)	23 (100.0)	185 (98.9)	0.792
No	2 (1.0)	0 (0.0)	2 (1.1)	
Habits of brushing teeth				
1 time/day	11 (5.2)	3 (13.0)	8 (4.3)	0.196
2 times/day	106 (50.5)	10 (43.5)	96 (51.3)	
3 times/day	93 (44.3)	10 (43.5)	83 (44.4)	
Having used to using clean water and soap				
Yes	125 (59.5)	9 (39.1)	116 (62.0)	0.077
No	18 (8.6)	2 (8.7)	16 (8.6)	
Sometimes	67 (31.9)	12 (52.2)	55 (29.4)	
Habits of wearing footwear when going out of the home				
1 time/day	183 (87.1)	20 (87.0)	163 (87.2)	0.936
2 times/day	1 (0.5)	0 (0.0)	1 (0.5)	
3 times/day	26 (12.4)	3 (13.0)	23 (12.3)	

[1]Chi Square test

Table 9.6. Correlation between morbidity and food vendors' personal hygiene and sanitation

Morbidity		Schools with good vendors		Schools with poor vendors		p value[1]
		n	%	n	%	
Diarrhea	yes	9	8.9	9	8.3	0.866
	no	92	91.1	100	91.7	
	sick duration	2.2 ± 1.3		2.7 ± 0.5		
Typhus	yes	3	3	3	2.8	0.925
	no	98	97	106	97.2	
	sick duration	5.7 ± 1.9		3.6 ± 1.2		
URI	yes	63	60.6	65	59.6	0.973
	no	41	39.4	44	40.4	
	sick duration	4.2 ± 1.8		4.1 ± 2.5		

[1]Chi Square test

CHAPTER 10
NUTRITION KNOWLEDGE, ATTITUDE, AND PRACTICE

10.1. Nutrition Knowledge, Attitude, and Practice of Mothers

Knowledge, attitudes, and nutritional behavior are three interrelated things. Beginning with increasing knowledge of nutrition that can be sourced from the media, health workers, teachers or others, then nutritional attitudes and nutritional behavior can also increase. Table 10.1 shows the distribution of maternal knowledge, attitudes, and nutritional behavior. The score of maternal nutrition knowledge in the urban (79.4) was slightly higher than that in the rural (76.8), but statistically there was no difference between the two ($p>0.05$). Data on distribution of nutritional knowledge shows that the number of mothers in rural with low nutritional knowledge (6.7%) was greater than that in the urban (1.0%), and conversely the number of mothers with good nutritional knowledge was more in the urban (40.0%) than in the rural (35.2 %). Mothers in the urban generally had higher education, and this can play a role in contributing to better nutrition knowledge.

Table 10.1. Distribution of the mothers by nutrition knowledge, attitude, and practice

Variables	Total (n=210)	Urban (n=105)	Rural (n=105)	p-value[1]
Nutrition knowledge				
Low (<60)	8 (3.8)	1 (1.0)	7 (6.7)	
Moderate (60-80)	123 (58.6)	62 (59.0)	61 (58.1)	
Good (>80)	79 (37.6)	42 (40.0)	37 (35.2)	
Mean±SD	78.1±9.6	79.4±9.0	76.8±10.0	0.054
Nutritional Attitude				
Negative (≤80)	19 (9)	6 (5.7)	13 (12.4)	
Positive (>80)	191 (91)	99 (94.3)	92 (87.6)	
Mean±SD	88.2±6.7	89.7±5.8	86.8±7.3	0.002
Nutritional Practice				
Low (<60)	0 (0.0)	0 (0.0)	0 (0.0)	
Moderate (60-80)	17 (8.1)	3 (2.9)	14 (13.3)	
Good (>80)	193 (91.9)	102 (97.1)	91 (86.7)	
Mean±SD	88.1±6.3	88.4±5.1	87.8±7.3	0.485

[1] Independent t-test

Nutritional attitudes were grouped into a negative category (score≤80) and a positive one (score>80). It can be seen from Table 10.1 that positive nutritional attitudes were more common among the mothers in the urban (94.3%) than those in the rural (87.6%). The average nutritional attitude score was significantly different ($p<0.01$) between the mothers in the urban and those in the rural, where the nutritional attitude score for mothers in the urban (89.7 ± 5.8) was higher than that for the mothers in the rural (88.2 ± 6.7) on average. Nutritional attitude is the tendency to act which in this study was measured by nutritional statements that must be approved or not approved by the respondents. The existence of a positive nutritional attitude indicates that the mothers tend to agree on a statement that is positive or disagreeing with a negative statement.

Nutritional practice among the mothers in urban was not significantly different ($p>0.05$) from that of the mothers in the rural; on average their nutritional practice scores were 88.4 and 87.8, respectively. In this study there were no mothers with low nutritional practice, while the number of the mothers in the urban with good nutritional practice (97.1%) was higher than that of the mothers in the rural (86.7%).

Table 10.2 shows the correlation of knowledge, attitudes and nutritional practice of mothers, where the nutritional knowledge was positively correlated ($r=0.348$; $p<0.01$) with the nutritional attitudes and also positively correlated ($r=0.200$; $p<0.01$) with nutritional practice. This shows how important nutritional knowledge is as a basis for changing nutritional attitudes and practice. Research by Mendagudali *et al*. (2015) also showed that there was a correlation between knowledge, attitudes and practice. The results of these studies showed that increased knowledge would support positive attitudes and good practices. Nutrition improvement efforts can work better if the target group can improve their nutritional knowledge. So, nutrition knowledge has an important role to play in changing behavior. These behavioral changes are reflected in the better food habits, parenting habits, breakfast habits etc.

Table 10.2. Correlation between the mothers' nutrition knowledge, attitude, and practice

Variable	Total[1]		Urban[1]		Rural[1]	
	r	p value	r	p value	r	p value
Knowledge, attitude	0.348	0.000	0.269	0.006	0.418	0.000
Knowledge, practice	0.200	0.004	0.135	0.169	0.235	0.016
Attitude, practice	0.214	0.002	0.387	0.085	0.259	0.008

[1]Pearson correlation

In the table it is also shown that nutritional attitudes were positively correlated ($r=0.214$; $p<0.01$) with nutritional practice. The linkage of knowledge-attitude-practice of nutrition as shown by the results of this study proves that efforts to improve nutritional practice are something that can be done through interventions to increase nutrition knowledge and attitudes. Health workers or nutrition cadres in carrying out their duties in the midst of the community should pay attention to the importance of the role of mothers as agents of nutritional behavior change for their families. Knowledge of parents' nutrition will influence their children's attitudes and behavior. The higher the knowledge of maternal nutrition, the better eating habits of their children. Yabanci and Kisac's (2014) study showed that most mothers who had a high level of nutritional knowledge had better parenting styles, namely feeding their children more with vegetables, fruits, nuts, and low-sugar drinks than the mothers who had a low level of nutrition knowledge. The study proves the level of knowledge of mothers affects children's eating habits. Knowledge of nutrition has an important role in forming a person's eating habits, because this will affect someone in choosing the type and amount of food consumed. The correlation among nutrition knowledge, attitude, and practice was also significant for the mothers in the rural, whereas in the urban a significant association was only found in the nutrition knowledge and attitude variables ($r=0.269$; $p<0.01$).

Table 10.3 shows the distribution of the mothers who answered correctly a number of questions on nutrition and food safety. Questions about aspects of nutrition that were answered correctly by >90% of mothers in urban and rural are: (1) Nutrition is important, for example carbohydrates that produce energy for daily activities, (2) The function of calcium is for growth of bones and teeth, (3) Lack of protein can cause barriers to body growth, and (4) Not eating breakfast can cause less concentration in learning. Meanwhile, the question "Oranges contain vitamin C which is higher than papaya" was only answered correctly by 33.3% of mothers in the urban and 38.1% of the mothers in the rural. The results of this study imply that the nutrient content of foods were not well understood by the mothers in urban and rural. Therefore, if health workers will conduct nutritional counseling among mothers, it should discuss nutrients content of foods, which would certainly be beneficial for mothers in food choice. Another question that the mothers have not understood so that it was not answered correctly is "One of the benefits of clean living behavior is preventing heart disease". Heart disease is not an infectious disease associated with sanitation and hygiene, but rather caused by incorrect diet and lifestyle. Too much fat and cholesterol intake, lack of exercise, and smoking habits are factors that cause heart disease. At present the tendency for degenerative diseases increases (Riskesdas 2018), while the problem of malnutrition (stunting) decreases. However, the magnitude of the problem of malnutrition (stunting) is still quite high, so the double burden of malnutrition remains a threat in Indonesia. Currently nutrition sensitive and specific programs are being run by the government to reduce nutritional problems in the community.

Other nutritional knowledge questions (Table 10.3) include aspects of "food safety" which consist of 11 questions. Of the 11 questions, which could be answered correctly by about 90% of the mothers are: (1) Cooked foods are safer than half-cooked foods, (2) Diarrhea and typhus are diseases caused by unclean food, (3) Too much use of flavoring is not good for health, (4) Sauces are examples of foods that often contain dangerous preservatives, and (5) Before and after meals you should wash your hands using soap.

In the community the use of *vetsin* (monosodium glutamate) in food processing is a common thing to do to improve the taste of food. Some popular snacks such as meatballs or chips also use vetsin as a flavoring. However, excessive consumption of vetsin should be considered because it may cause health problems, especially for someone who already has hypertension. Vetsin or flavoring has a high sodium content. The results of research by Mulyati, Syam, and Sirajuddin (2011), showed that consuming sodium in high amounts, the people were 5.6 times more likely to be affected by hypertension than those who consumed sodium in low amounts.

While the questions "Food sellers can be a source of disease transmission" and "Food can be a source of disease transmission" were answered correctly by $\pm$ 50% of mothers. Cleanliness of food sellers is very important to prevent transmission of disease. This needs to be realized by everyone. The cleanliness of food sellers reflected in personal hygiene includes: clothes worn, neat hair, clean nails, no wounds on the hands *etc*. Cleanliness of food must also be considered so that we avoid diseases such as diarrhea,

typhus etc. Some sellers of snacks in the school environment paid little attention to the hygiene aspects of the food they sold, so that dust or dirt contamination could easily occur.

Table 10.3. Mother's knowledge towards nutrition and food safety [n (%)]

No.	Nutrition Knowledge	Urban (n=105)		Rural (n=105)	
		Correct	False	Correct	False
Nutrition					
1	Nutrient is an important thing, for example carbohydrates that produce energy for daily activities.	102 (97.1)	3 (2.9)	104 (99.0)	1 (1.0)
2	One's nutritional needs can be met by getting used to consuming a variety of foods.	74 (70.5)	31 (29.5)	88 (83.8)	17 (16.2)
3	The function of calcium is for the growth of bones and teeth.	105 (100.0)	0 (0.0)	102 (97.1)	3 (2.9)
4	Protein deficiency can impair the body growth.	98 (93.3)	7 (6.7)	98 (93.3)	7 (6.7)
5	Oranges contain vitamin C higher than papaya.	35 (33.3)	70 (66.7)	40 (38.1)	65 (61.9)
6	Not having breakfast can cause a lack of concentration in learning.	103 (98.1)	2 (1.9)	102 (97.1)	3 (2.9)
7	Too much vitamin intake causes obesity.	52 (49.5)	53 (50.5)	36 (34.3)	69 (65.7)
8	One of the benefits of clean living behavior is preventing heart disease.	43 (41.0)	62 (59.0)	25 (23.8)	80 (76.2)
Food Safety					
9	Cooked foods are safer than half-cooked foods.	96 (91.4)	9 (8.6)	94 (89.5)	11 (10.5)
10	Diarrhea and typhus are diseases caused by food that is not clean.	101 (96.2)	4 (3.8)	103 (98.1)	2 (1.9)
11	Food sellers can be a source of disease transmission.	51 (48.6)	54 (51.4)	47 (44.8)	58 (55.2)
12	Snacks (for example: fried foods) wrapped in newspapers belong to unsafe snacks.	92 (87.6)	13 (12.4)	82 (78.1)	23 (21.9)
13	*Lontong* (*buras*) which is chewy and not fast stale is a characteristic that these foods contain borax (*pijer / bleng*).	96 (91.4)	9 (8.6)	85 (81.0)	20 (19.0)
14	Foods whose colours are light (striking) are dangerous for health.	83 (79.0)	22 (21.0)	80 (76.2)	25 (23.8)
15	The use of formalin to preserve tofu is dangerous.	91 (86.7)	14 (13.3)	88 (83.8)	17 (16.2)
16	Using too much flavoring (*vetsin*) is not good for health.	104 (99.0)	1 (1.0)	102 (97.1)	3 (2.9)
17	Sauces are examples of foods that often contain dangerous preservatives.	102 (97.1)	3 (2.9)	99 (94.3)	6 (5.7)
18	Food can be a source of disease transmission.	51 (48.6)	54 (51.4)	54 (51.4)	51 (48.6)
19	Before and after eating, you should wash your hands using soap.	105 (100.0)	0 (0.0)	104 (99.0)	1 (1.0)

The question "The use of formalin to preserve tofu is dangerous" was answered correctly by around 85% of mothers. Every consumer must be aware of the practice of using formalin by sellers, especially for popular food products such as noodles, tofu, salted fish *etc*. Formalin is not a food additive and can therefore contaminate food if intentionally

added with the intention of increasing food durability. Some people, including mothers, were aware of the dangers of formalin contamination in some food products. But often people become victims because of the lack of supervision from the government regarding illegal formalin use for food products.

In addition to formalin, ingredients that are sometimes mixed with certain foods (rice cake, crackers) are borax to make the food products chewy. In fact, borax (sodium biborate) in the world of industry is used as a cleaning agent, wood preservative, cockroach controller *etc*. The use of borax for food additives will lead to the spread of unsafe food in the community. Question "*Lontong* (*buras*) which is chewy and not fast stale is a characteristic that this food contains borax" was answered correctly by 91.4% of the mothers in the urban and 81% of the mothers in the rural.

The use of used paper (including newspapers) as a food wrapper is dangerous because of heavy metal contamination attached to the used paper. In practice, this is still easily found in many food vendors. Even though the community is aware of the danger, they are in a weak position and cannot refuse the packaging in the process of buying and selling food. Therefore, the supervision of food safety which is the duty of the government really must be upheld so that the consumer community is protected by their rights to get safe food. The question "Snacks (e.g. fried food) wrapped in newspapers belong to unsafe snacks" was answered correctly by 87.6% of the mothers in the urban and 78.1% of the mothers in the rural.

Table 10.4 shows the distribution of maternal nutritional attitudes to aspects of nutrition and food safety. Some attitudinal items that need to be discussed here, for example "In order for our nutritional needs to be met, we need to consume a variety of foods". There were still 15% - 25% of the mothers who disagreed / were doubtful about the statement. Consumption of a variety of foods is an important requirement for adequate nutritional needs. In the Indonesian Dietary Guidelines the message of consumption of a variety of foods is emphasized very much, but because there was still a lack of socialization, not all community members understood this message.

Another statement of attitude "In order that we do not get heart disease, we must apply clean living behavior". This was agreed by 68.6% of the mothers in the urban and 91.4% of the mothers in the rural. The onset of heart disease can be said to be not related to aspects of sanitation and hygine. If there are still many mothers who agree to the statement, it can be said that this attitude is formed due to misunderstanding/knowledge about the causes of heart disease.

"If we buy snacks (fried foods), we recommend that these snacks be wrapped in used paper". This statement was not agreed by 84.8% of the mothers in the urban and 70.5% of the mothers in the rural. The mothers who agreed/doubtful were still relatively large (15% - 30%), especially the mothers in the rural. Used paper or newsprint is not a safe snack wrapper. Often used paper was used by the food vendors for reasons of convenience and might be its cheap price. Ink marks on used paper/newspapers may contain lead or heavy metals that make food/snacks unsafe.

Table 10.4. Mother's attitude towards nutrition and food safety [n (%)]

No.	Statements of nutritional attitude	Urban (n=105)			Rural (n=105)		
		Agree	Doubtful	Disagree	Agree	Doubtful	Disagree
Nutrition							
1	If you want your energy needs to be fulfilled, then you need to eat foods that are carbohydrate sources (rice, cassava, sweet potatoes)	100 (95.2)	3 (2.9)	2 (1.9)	100 (95.2)	4 (3.8)	1 (1.0)
2	In order that our nutritional needs are fulfilled, we need to consume a variety of foods	79 (75.2)	11 (10.5)	15 (14.3)	90 (85.7)	9 (8.6)	6 (5.7)
3	In order not to be fat, don't consume too many vitamins.	50 (47.6)	24 (22.9)	31 (29.5)	67 (63.8)	15 (14.3)	23 (21.9)
4	In order that we do not get heart disease we must apply clean living behavior.	72 (68.6)	15 (14.3)	18 (17.1)	96 (91.4)	5 (4.8)	4 (3.8)
Food Safety							
5	If we don't want to get diarrhea, we must wash our hands with soap before and after eating.	105 (100.0)	0 (0.0)	0 (0.0)	105 (100.0)	0 (0.0)	0 (0.0)
6	If we cook food, we have to cook it until it is fully cooked to be safe for consumption.	96 (91.4)	6 (5.7)	3 (2.9)	96 (91.4)	4 (3.8)	5 (4.8)
7	In order not to get typhus, make sure the food you eat is safe and clean.	104 (99.0)	1 (1.0)	0 (0.0)	101 (96.2)	2 (1.9)	2 (1.9)
8	If we buy snacks (fried foods), the snacks should be wrapped in used paper.	9 (8.6)	7 (6.7)	89 (84.8)	17 (16.2)	14 (13.3)	74 (70.5)
9	*Lontong* (*buras*) which is chewy because of borax. still safe to eat.	7 (6.7)	7 (6.7)	91 (86.7)	17 (16.2)	14 (13.3)	74 (70.5)
10	If we want to buy snacks for our children, choose light-colored snacks.	6 (5.7)	8 (7.6)	91 (86.7)	13 (12.4)	15 (14.3)	77 (73.3)
11	If we want to buy snacks for children, then we should also pay attention to the cleanliness of the snack seller.	100 (95.2)	2 (1.9)	3 (2.9)	102 (97.1)	1 (1.0)	2 (1.9)
12	If food has been given formalin, it is not safe for consumption.	98 (93.3)	3 (2.9)	4 (3.8)	91 (86.7)	1 (1.0)	13 (12.4)
13	If you use too much flavoring (*vetsin*), your health will be disturbed..	98 (93.3)	5 (4.8)	2 (1.9)	94 (89.5)	2 (1.9)	9 (8.6)
14	If we eat food with bright-colored sauce, we can get cancer later on.	92 (87.6)	8 (7.6)	5 (4.8)	90 (85.7)	4 (3.8)	11 (10.5)

"*Lontong* (*buras*) which is chewy because of borax, remains safe to eat", this statement was not agreed by 86.7% of the mothers in the urban and 70.5% of the mothers

in the rural. It means that there are still many (the rest) of the mothers who agreed / were doubtful about the statement. The problem of food safety in Indonesia is related to the use of hazardous materials that do not qualify as food additives. The Indonesian government prohibits the use of borax in food. The detailed ban on borax use is regulated and limited by the National Health and Safety Law. Borax and formalin are prohibited from being used for food in accordance with the Regulation of the Minister of Health of the Republic of Indonesia Number 033 of 2012 concerning Food Additives. Borax is still often used in home-industry as a supporting component for making *gendar* (dough for making crackers), *lontong* (as a hardener), and meatballs (as preservatives and hardeners) which of course will endanger consumers.

"If you want to buy snacks for your children, choose striking-colored snacks". The number of mothers who agreed / were doubtful about the statement was 13.3% in the urban and 26.7% in the rural. This difference in the urban – in the rural shows that in the rural, the mothers were relatively more permissive to aspects of unsafe food. The striking-colored snacks are suspected of containing dangerous (non-food grade) dyes that are carcinogenic.

Various kinds of the mothers' answers in the urban and in the rural regarding to attitude towards nutrition and food safety indicate that there were indeed differences between the two groups of the mothers with a tendency for the mothers in the urban to provide better answers than the mothers in the village. Better formal education and better nutrition knowledge of the mothers in the urban were suspected to contribute to their nutrition attitude which was also better than the mothers in the rural.

The mothers' practice towards nutrition and food safety can be seen in Table 10.5. The overall tendency of the answers of the mothers in the urban and in the rural was relatively the same. Some of the mothers' practice that was rather different was "I don't care about snacks that I buy safe or not". The number of the mothers in the urban who answered "frequent" toward the statement was 4.8% and the mothers in the rural 10.5%. This indicates that practice of snacking unsafe foods was done more frequently by the mothers in the rural.

Another practice of the mothers was "I buy food that uses flavorings (*vetsin* or monosodium glutamate) because it tastes delicious". The number of mothers in the urban who answered "often" 4.8% and in the rural 9.5%, while those who answered never in the urban were 26.7% and in the rural 34.3%. This shows that behavior of eating *vetsin* is somewhat more prominent among the mothers in the rural than those in the urban. *Vetsin* so far can be considered safe as long as it is consumed in moderation, and people with high blood pressure should not consume it or reduce *vetsin* intakes.

Mother's practice "I add some sauce every time I buy snacks" is more common among the rural mothers than among the urban mothers. The number of the mothers who answered "often" in the rural was 38.2% and in the urban only 1.9%. Several types of snacks were commonly added in the way they were consumed. Cheap snacks often found in the village include *cireng*, *cilok*, *basreng etc*. Sauce is a flavoring ingredient when we consume those snacks.

Table 10.5. Mother's practice towards nutrition and food safety [n (%)]

No.	Nutritional Practice	Urban (n=105)			Rural (n=105)		
		Often	Sometimes	Never	Often	Sometimes	Never
Nutrition							
1	I choose nutritious foods to eat so that I get energy for my activities.	89 (84.8)	16 (15.2)	0 (0.0)	87 (82.9)	16 (15.2)	2 (1.9)
2	I eat a variety of foods so that my nutritional needs are met.	64 (61.0)	38 (36.2)	3 (2.9)	73 (69.5)	29 (27.6)	3 (2.9)
3	I consume meat so that my family members are not "lack of blood" (anemia).	22 (21.0)	78 (74.3)	5 (4.8)	30 (28.6)	72 (68.6)	3 (2.9)
4	I provide milk so that my bones become strong.	64 (61.0)	39 (37.1)	2 (1.9)	63 (60.0)	40 (38.1)	2 (1.9)
5	I eat fried snacks because this doesn't make me fat.	10 (9.5)	83 (79.0)	12 (11.4)	14 (13.3)	77 73.3)	14 (13.3)
6	I encourage my family members to consume enough food of protein sources (such as eggs, meat, tofu, tempeh *etc*.) to be able to grow optimally.	91 (86.7)	13 (12.4)	1 (1.0)	85 (81.0)	20 (19.0)	0 (0.0)
7	I provide fruits at home so that my family members get enough vitamins and minerals.	55 (52.4)	48 (45.7)	2 (1.9)	54 (51.4)	45 (42.9)	6 (5.7)
8	I apply clean and healthy life practices in my daily life.	99 (94.3)	5 (4.8)	1 (1.0)	100 (95.2)	4 (3.8)	1 (1.0)
9	I encourage my family members to have breakfast before starting their daily activities.	93 (88.6)	12 (11.4)	0 (0.0)	91 (86.7)	12 (12.4)	1 (1.0)
Food Safety							
10	I choose food that is closed and clean before I buy it.	90 (85.7)	13 (13.3)	1 (1.0)	86 (81.9)	18 (17.1)	1 (1.0)
11	I tell my family members to wash their hands using soap before and after eating.	99 (94.3)	5 (5.7)	0 (0.0)	102 (97.1)	3 (2.9)	0 (0.0)
12	I make sure the food is cooked until it is completely cooked for my family members.	99 (94.3)	5 (4.8)	1 (1.0)	100 (95.2)	4 (4.8)	0 (0.0)
13	I pay attention to food hygiene so that my family members free from diarrhea and typhus.	101 (96.2)	4 (3.8)	0 (0.0)	103 (98.1)	2 (1.9)	0 (0.0)
14	I buy snacks (fried foods) wrapped in used paper.	6 (5.7)	55 (52.4)	44 (41.9)	10 (9.5)	47 (44.8)	48 (45.7)
15	I buy chewy rice (*lonthong*).	1 (1.9)	22 (21.9)	81 (77.1)	7 (6.7)	29 (27.6)	69 (65.7)
16	I buy food/drinks that are striking because they are interesting.	1 (1.0)	25 (23.8)	79 (75.2)	7 (6.7)	23 (21.9)	75 (71.4)

Table 10.5. Mothers' practice towards nutrition and food safety [n (%)] [continued]

No.	Nutritional behaviour	Urban (n=105)			Rural (n=105)		
		Often	Sometimes	Never	Often	Sometimes	Never
17	I buy snacks from sellers who looked clean.	90 (85.7)	14 (13.3)	1 (1.0)	88 (83.8)	16 (15.2)	1 (1.0)
18	I do not care about snacks that I buy, whether safe or not.	5 (4.8)	22 (21.0)	78 (74.3)	11 (10.5)	17 (16.2)	77 (73.3)
19	I buy food that uses flavorings (*vetcin*) because it tastes savory.	5 (4.8)	72 (68.6)	28 (26.7)	10 (9.5)	59 (56.2)	36 (34.3)
20	I add sauce every time I buy snacks	2 (1.9)	62 (59.0)	41 (39.0)	38 (38.2)	60 (57.1)	7 (6.7)

10.2. Nutrition Knowledge, Attitude, and Practice of Children

Distribution of school children based on nutrition knowledge, attitude, and practice can be seen in Table 10.6. Overall there were no differences in the scores of the students in the urban and rural ($p>0.05$). The nutritional knowledge scores of the students in the urban was 68.3 ± 12.9 and in the rural 68.8 ± 13.8, nutritional attitudes were 86.2 ± 7.4 (urban) and 85.9 ± 6.5 (rural), and nutrition practice 82.3 ± 8.2 (urban) and 83.1 ± 7 (rural). Nutrition knowledge of the students may come more from the subjects taught in class, and in accordance with the national education curriculum so throughout Indonesia the subjects taught are the same, which may differ only in certain subjects called local content. In terms of nutritional knowledge, most of the students (>70%) belonged to the moderate category (score 60-80), as is the case with nutritional attitudes where more than 80% of the students had a positive attitude. While for nutrition practices, the number of students in the urban who had good practice was 56.2% and in the rural 71.4%.

Picture 10.1. Data collection: interviewing the student

Table 10.6. Distribution of school children based on nutrition knowledge, attitude, and practice

Variable	Total (n=210)	Urban (n=105)	Rural (n=105)	p-value[1]
Nutritional Knowledge				
Low (<60)	38 (18.1)	19 (18.1)	19 (18.1)	
Moderate (60-80)	151 (71.9)	75 (71.4)	76 (72.4)	
Good (>80)	21 (10)	11 (10.5)	10 (9.5)	
Mean±SD	68.5±13.3	68.3±12.9	68.8±13.8	0.809
Nutritional Attitude				
Negative (≤80)	36 (17.1)	19 (18.1)	17 (16.2)	
Positive (>80)	174 (82.9)	86 (81.9)	88 (83.8)	
Mean±SD	86.0±7.0	86.2±7.4	85.9±6.5	0.713
Nutritional Practices				
Poor (<60)	0 (0)	0 (0)	0 (0)	
Moderate (60-80)	76 (36.2)	46 (43.8)	30 (28.6)	
Good (>80)	134 (63.8)	59 (56.2)	75 (71.4)	
Mean±SD	82.7±7.7	82.3±8.2	83.1±7	0.430

[1]Independent t-test

Knowledge, attitude and practice are three interrelated things. Based on Lawrence Green's theory, a person's behavior is influenced by predisposition factors. Part of the predisposition factor is knowledge and attitude. A person's knowledge will shape the attitude of the person and then support the occurrence of behavior. Table 10.7 shows a significant association between nutrition knowledge and attitude ($r=0.452$; $p<0.01$), nutrition knowledge with practice ($r=0.145$; $p<0.05$), and nutrition attitude with practice ($r=0.248$; $p<0.01$). In the urban a significant correlation was found in nutrition knowledge-attitude and nutrition attitude-practice. The same thing was found among the students in the rural. This study showed results similar to those of Kigaru *et al*. (2015) which showed that there was a nutrition knowledge-attitude correlation. Children who had high knowledge also had a positive attitude. Attitudes also had a correlation with nutritional practices. A good attitude about nutrition plays an important role in improving nutrition practices among school children.

Table 10.7. Correlation between children's knowledge, attitude, and nutrition practices

Variable	Total[1]		Urban[1]		Rural[1]	
	r	p value	r	p value	r	p value
Knowledge, attitude	0.452	0.000	0.442	0.000	0.486	0.000
Knowledge, practice	0.145	0.035	0.120	0.224	0.174	0.075
Attitude, practice	0.248	0.000	0.247	0.011	0.253	0.009

[1] Pearson correlation

Table 10.8 shows children's knowledge towards nutrition and food safety. For the aspect of nutrition, there were two questions that were relatively not understood, namely: (1) Oranges contain vitamin C higher than papaya and (2) One of the benefits of clean living behavior is preventing heart disease. More than 65% of students both in the urban and in the rural answered incorrectly on those questions.

Oranges are fruits that are popular in Indonesia and are available at all times. In Indonesia, there are several local varieties such as medan orange, pontianak orange, siam

orange, *purut* orange, *etc*. Oranges are understood by many as fruit with very high vitamin C, although in fact there are other fruits with higher vitamin C content such as papaya and guava. This is what most of the students did not seem to understand.

The low level of understanding of non-communicable diseases is shown by a large number of the students who answered that heart disease is related to clean behavior. In fact, non-communicable diseases (including heart disease) are more caused by the application of the wrong diet and lifestyle. Consuming too much fat, cholesterol, lack of exercise and smoking habits are more responsible for the emergence of heart disease.

For the food safety aspect, there are three questions that have not been understood, namely: (1) Food sellers can be a source of disease transmission, (2) Snacks (eg. fried foods) wrapped in newspapers belong to unsafe snacks, and (3) Food can become a source of disease transmission.

Food sellers can be a source of disease transmission. Personal hygiene from food sellers becomes important to note, for example hair and nails hygiene, and the presence or absence of a wound in the hands of food sellers. The practice of presenting unsafe food was also often found when food sellers used packages that did not meet the requirements for food packaging. The use of newspaper and the like is an indication of negligence in terms of food security.

Tabel 10.8. Children's knowledge towards nutrition and food safety [n (%)]

No.	Nutrition Knowledge	Urban (n=105)		Rural (n=105)	
		Correct	False	Correct	False
Nutrition					
1	Nutrient is an important thing, for example carbohydrates that produce energy for daily activities.	97 (92.4)	8 (7.3)	100 (95.2)	5 (4.8)
2	The function of calcium is for the growth of bones and teeth.	72 (68.6)	33 (31.4)	88 (83.8)	17 (16.2)
3	Protein deficiency can impair body growth.	81 (77.1)	24 (22.9)	76 (72.4)	29 (27.6)
4	Oranges contain vitamin C higher than papaya.	40 (38.1)	65 (61.9)	35 (33.3)	70 (66.7)
5	Too much vitamin intake causes obesity.	58 (55.2)	47 (44.8)	67 (63.8)	38 (26.2)
6	One of the benefits of clean living behavior is preventing heart disease.	38 (36.2)	67 (63.8)	38 (36.2)	67 (63.8)
7	Not having breakfast can cause a lack of concentration in learning	91 (86.7)	14 (13.3)	88 (83.8)	17 (16.2)
8	Iron is a group of mineral nutrients found in the liver and meat	76 (72.4)	29 (27.6)	83 (79.0)	22 (21.0)

Tabel 10.8. Children's knowledge towards nutrition and food safety [n (%)] [continued]

No.	Nutrition Knowledge	Urban (n=105)		Rural (n=105)	
		Correct	False	Correct	False
Food Safety					
9	Diarrhea and typhus are diseases caused by food that is not clean..	89 (84.8)	16 (15.2)	88 (83.8)	17 (16.2)
10	Food sellers can be a source of disease transmission.	55 (52.4)	50 (47.6)	55 (52.4)	50 (47.6)
11	Snacks (for example: fried foods) wrapped in newspapers including unsafe snacks.	70 (66.7)	35 (33.3)	61 (58.1)	44 (41.9)
12	Using too much flavoring (*vetsin*) is not good for health.	89 (84.8)	16 (15.2)	82 (78.1)	23 (21.9)
13	Sauces are examples of foods that often contain dangerous preservatives.	80 (76.2)	25 (23.8)	90 (85.7)	15 (14.3)
14	Food can be a source of disease transmission.	38 (36.2)	67 (63.8)	29 (27.6)	76 (72.4)
15	Before and after eating you should wash your hands using soap.	102 (97.1)	3 (2.9)	103 (98.1)	2 (1.9)

Food can be a cause of toxication. Unsafe foods due to microbial contamination or other contaminants can cause illness to anyone who consumes them. Many students do not understand this. Therefore, socialization of healthy and safe foods is very necessary so that students increasingly understand that unsafe foods around us are very likely to be able to transmit the disease.

Table 10.9 shows children's attitude towards nutrition and food safety. In the aspect of nutrition, it can be said that students had a positive attitude on almost all items asked. But on the item "To avoid getting heart disease, we must apply clean living behavior" many students (>75%) agreed. This shows that heart disease as a non-communicable disease was indeed not understood by many students. In the food safety aspect, some student attitudes that need attention are related to items:

1) *Lontong* (*buras*) which is rubbery because of borax, remains safe to eat (34.3% - 51.4% of the students disagreed, the rest were still quite a lot of students who agreed/were doubtful with the statement). An understanding of the dangers of borax needs to be socialized more often so that it can change the students' attitudes about borax. Some of the harmful effects that might occur if eating foods containing borax are fever, vomiting, nausea, red eyes, coughing, headache, diarrhea, shortness of breath, and bleeding from the nose.
2) If we want to buy snacks, choose bright (striking)-colored snacks (55.2% - 56.2% of students did not agree, but there were still many of the students who answered agreed/ were doubtful). Striking colored snacks are suspected of containing non-food grade dyes. Usually the dyes used were for textiles which are carcinogenic. Textile dyes that were cheaper wre used by irresponsible sellers of snacks without paying attention to their danger for the consumers.

3) If food has been given formalin, it is not safe for consumption (56.2% - 67.6% of the students agreed, and there were still quite a lot of the students who disagreed/were doubtful). Some food products suspected of containing formalin were tofu, noodles, salted fish, and even chicken. Adding formalin to food is illegal and breaking the law. Food sellers use formalin so that the food sold becomes more durable and is not easily spoiled. Formalin is a chemical commonly used to eradicate bacteria or function as a desinfectant. Formalin can be used to eradicate various types of bacteria, fungi or mold. Formalin is also used as a corpse preservative. Misuse of formalin for food additives can result in hardening of body tissues.

4) If we use too much flavoring (*vetsin*), health will be disturbed (54.3% - 66.7% of the students agreed, there were still quite a lot of the students who answered disagree-doubtful). *Vetsin* or monosodium glutamate is a flavoring that is often used for cooking. WHO has stated that vetsin is safe, but excessive use can cause Chinese Restaurant Syndrome.

5) If we consume street foods with bright/striking colors, we can get cancer later on (41.9% - 58.1% of the students agreed, there were still many who said they didn't agree/were doubtful). Striking/bright colors can be caused by contamination of Rhodamin B. Sauces that are of good quality and sold in supermarkets are generally safe, but some which are sold in traditional markets contain Rhodamin B. Rhodamin B is a synthetic coloring agent that is prohibited from using in Indonesia since 1985 through the Minister of Health Regulation. WHO has also officially announced that the substance is dangerous because of its heavy metal content and chemical properties. In Europe, this substance has long been banned because it is classified in the category of carcinogens that can trigger cancer. Because of the huge side effects, this substance is not only dangerous if used as food coloring, but also in cosmetic products.

Table 10.9. Children's attitude towards nutrition and food safety [n (%)]

No.	Statement of nutritional attitude	Urban (n=105)			Rural (n=105)		
		Agree	Doubtful	Disagree	Agree	Doubtful	Disagree
Nutrition							
1	If you want your energy needs to be met, you need to eat foods that are carbohydrate sources (rice, cassava, sweet potatoes)	101 (96.2)	4 (3.8)	0 (0.0)	101 (96.2)	3 (2.9)	1 (1.0)
2	In order not to experience lack of blood, we must consume enough food sources of iron (liver and meat).	78 (74.3)	12 (11.4)	15 (14.3)	85 (81.0)	16 (15.2)	4 (3.8)
3	If we want optimal bone and tooth growth, we have to consume high calcium food (milk).	89 (94.8)	9 (8.6)	7 (6.7)	94 (89.5)	6 (5.7)	5 (4.8)
4	In order that our bodies are tall, we must consume enough side dishes.	78 (74.3)	16 (15.2)	11 (10.5)	80 (76.2)	18 (17.1)	7 (6.7)

Table 10.9. Children's attitude towards nutrition and food safety [n (%)] [continued]

No.	Statement of nutritional attitude	Urban (n=105)			Rural (n=105)		
		Agree	Doubtful	Disagree	Agree	Doubtful	Disagree
5	So as not to have sprue, we must consume enough fruits such as oranges and papaya..	87 (82.9)	9 (8.6)	9 (8.6)	90 (85.7)	11 (10.5)	4 (3.8)
6	To avoid getting heart disease, we must apply clean life behaviors.	89 (84.8)	7 (6.7)	9 (8.6)	80 (76.2)	5 (4.8)	20 (19.0)
7	If we want optimal learning concentration, we must have breakfast.	96 (91.4)	7 (6.7)	2 (1.9)	102 (97.1)	3 (2.9)	0(0.0)
Food Safety							
8	Food must be clean so as not to cause disease.	98 (93.3)	4 (3.8)	3 (2.9)	99 (94.3)	1 (1.0)	5 (4.8)
9	In order not to get diarrhea, we must wash our hands with soap.	100 (95.2)	3 (2.9)	2 (1.9)	104 (99.0)	1 (1.0)	0 (0.0)
10	To be safe for consumption, the food must be cooked until completely cooked.	89 (84.8)	12 (11.4)	4 (3.8)	95 (90.5)	10 (9.5)	0 (0.0)
11	In order not to get typhus, make sure the food we eat is safe and clean.	92 (87.6)	10 (9.5)	3 (2.9)	93 (88.6)	9 (8.6)	3 (2.9)
12	*Lontong* (*buras*) which is chewy because of borax, is still safe to eat.	29 (27.6)	22 (21.0)	54 (51.4)	42 (40.0)	27 (25.7)	36 (34.3)
13	If we want to buy snacks, choose snacks that are bright (striking)-colored	23 (21.9)	23 (21.9)	59 (56.2)	18 (17.1)	29 (27.6)	58 (55.2)
14	If we want to buy snacks, we should also pay attention to the cleanliness of the snack seller.	92 (87.6)	9 (8.6)	4 (3.8)	94 (89.5)	7 (6.7)	4 (3.8)
15	If food has been given formalin, it is not safe for consumption.	71 (67.6)	12 (11.4)	22 (21.0)	59 (56.2)	10 (9.5)	36 (34.3)
16	If you use too much flavoring (*vetsin*), your health will be disturbed.	70 (66.7)	12 (11.4)	23 (21.9)	57 (54.3)	11 (10.5)	37 (35.2)
17	If we eat food with a bright/striking- colored sauce, we can get cancer later on.	61 (58.1)	12 (12.4)	31 (29.5)	44 (41.9)	24 (22.9)	37 (35.2)

Table 10.10 shows the children's practice towards nutrition and food safety. Animal foods such as meat, milk and anchovy were commonly consumed by students. The consumption of animal food has been linked to understanding "blood deficiency" (anemia) and strengthening bones/nutrition. The number of the students who often ate meat reached 36.2% in the urban and 44.8% in the rural. While those who often consumed anchovy and drank milk reached the same number in the urban and rural, that is 58.1%.

The number of students who often consumed fried foods was 21.9% both in the urban and in the rural, while the number those who consumed fried foods sometimes was 63.8% in the urban and 58.1% in the rural. Fried food is a popular snack in the community as well as among the school students. Most of the fried foods were made of flour and sago flour. Fried foods are also a source of protein such as fried tofu, fried tempeh, and fried flour-egg mixture.

Table 10.10. Children's practice towards nutrition and food safety [n (%)]

No.	Nutritional Attitude	Urban (n=105)			Rural (n=105)		
		Often	Sometimes	Never	Often	Sometimes	Never
Nutrition							
1	I choose nutritious foods to eat so that I get energy for my activities	80 (76.2)	23 (21.9)	2 (1.9)	84 (80.0)	19 (18.1)	2 (1.9)
2	I eat meat in order that I am not "lack of blood" (anemia).	38 (36.2)	59 (56.2)	8 (7.6)	47 (44.8)	49 (46.7)	9 (8.6)
3	I consume anchovy or milk so that my bones and teeth become strong.	61 (58.1)	36 (34.3)	8 (7.6)	61 (58.1)	36 (34.3)	8 (7.6)
4	I like consuming fried food.	23 (21.9)	67 (63.8)	15 (14.3)	23 (21.9)	61 (58.1)	21 (20.0)
5	I eat eggs, meat, tofu, tempeh in order that I can grow optimally.	68 (64.8)	35 (33.3)	2 (1.9)	75 (71.4)	26 (24.8)	4 (3.8)
6	I eat fruits to meet my vitamin needs.	69 (65.7)	31 (29.5)	5 (4.8)	71 (67.6)	31 (29.5)	3 (2.9)
7	I apply clean and healthy life behaviour in my daily life.	80 (76.2)	19 (18.1)	6 (5.7)	87 (82.9)	15 (14.3)	3 (2.9)
8	I have breakfast every morning before going to school.	75 (71.4)	25 (23.8)	5 (4.8)	77 (73.3)	25 (23.8)	3 (2.9)
Food Safety							
9	I choose food that is covered and clean before I buy it.	56 (53.3)	41 (39.0)	8 (7.6)	70 (66.7)	31 (29.5)	4 (3.8)
10	I wash my hands by using soap before and after eating.	89 (84.8)	15 (14.3)	1 (1.0)	92 (87.6)	13 (12.4)	0 (0.0)
11	I pay attention to food hygiene in order that I can avoid diarrhea and typhus.	69 (65.7)	28 (26.7)	8 (7.6)	60 (57.1)	37 (35.2)	8 (7.6)
12	I buy snacks (for example: fried food) which is wrapped in used paper.	4 (3.8)	38 (36.2)	63 (60.0)	16 (15.2)	51 (48.6)	38 (36.2)
13	I buy snacks from the sellers who look clean.	63 (60.0)	38 (36.2)	4 (3.8)	70 (66.7)	31 (29.5)	4 (3.8)
14	I buy food that uses flavorings (*vetsin*) because it tastes savory.	16 (15.2)	54 (51.4)	35 (33.3)	26 (24.8)	68 (64.8)	11 (10.5)
15	I add sauce every time I buy snacks	17 (16.2)	62 (59.0)	26 (24.8)	21 (20.0)	65 (61.9)	19 (18.1)

Various food sources of animal protein were consumed by the students. The number of students who answered often consuming those foods was 64.8% in the urban and 71.4% in the rural. Meanwhile, the number of the students who consumed fruits with frequency often was 65.7% in the urban and 67.6% in the rural.

Breakfast habits also looked good, the students who stated having breakfast often amounted to 71.4% in the urban and 73.3% in the rural. Breakfast is very important as a source of stamina for students. Many studies reveal breakfast habits are positively correlated with students' achievement.

In relation to food safety, it could be seen that most of the students already practiced good behavior. They bought food that was covered and clean, the students also were used to washing their hands before and after meals, the students bought snacks from the sellers who looked clean, *etc*.

Food safety is something that must be considered by everyone because the impact of eating unsafe foods can be direct or indirect. Direct impacts such as diarrhea, nausea and vomiting, while an indirect impact is such as the emergence of cancer due to consuming food containing carcinogens. Therefore, education on choosing safe foods must always be socialized to students at school. The school must also carry out strict supervision on the cleanliness and safety aspects of food vendors in schools.

10.3. Nutrition Knowledge, Attitude, and Practice of Teachers

The teacher plays a role in influencing the attitudes and behavior of students in school. According to Brown *et al.* (2011) teachers play a role in forming children's attitudes and behavior. Teachers who exemplify healthy life behaviors will support their students in developing healthy eating patterns. Table 10.11 shows the distribution of teacher scores, attitudes and practices. Based on the nutrition knowledge distribution, 55.6% of teachers were classified as good (score > 80). There was a significant difference between the knowledge of the teachers in the rural and that in the urban ($p<0.01$). This may occur because the level of the teacher education in the city is higher than the education of teachers in the village. For teachers' nutrition attitudes and practices there were no significant differences ($p>0.05$) between urban and rural. However, the teachers with a positive attitude in the urban (100%) were higher than in the rural (88.9%). The same thing is seen in nutrition practices, the number teachers in urban with good nutrition practices reached 100% while in rural only 83.3%.

Table 10.11. Distribution of teachers based on nutrition knowledge, attitude, and practice

Variables	Total (n=36)	Urban (n=18)	Rural (n=18)	p value[1]
Nutrition knowledge				
Low (<60)	0 (0.0)	0 (0.0)	0 (0.0)	
Moderate (60-80)	16 (44.4)	5 (27.8)	11 (61.1)	
Good (>80)	20 (55.6)	13 (72.2)	7 (38.9)	
Mean±SD	83.0±9.8	87.1±10.4	78.9±7.4	0.011
Nutritional attitude				
Negative (<60)	2 (5.6)	0 (0)	2 (11.1)	
Positive (>80)	34 (94.4)	18 (100)	16 (88.9)	
Mean±SD	88.5±5.3	90.1±4.6	86.9±5.6	0.072
Nutritional ractice				
Poor (<60)	0 (0.0)	0 (0.0)	0 (0.0)	
Moderate (60-80)	3 (8.3)	0 (0.0)	3 (16.7)	
Good (>80)	33 (91.7)	18 (100.0)	15 (83.3)	
Mean±SD	86.7±5.5	87.6±4.8	85.8±6.0	0.340

[1]Independent t-test

Table 10.12 shows that there was a significant relationship between teacher nutrition knowledge and teacher nutrition attitudes ($p<0.01$). In rural areas there was a

correlation between knowledge and attitudes (r=0.429; p<0.01). Knowledge is the basis of one's attitude. Teachers' good nutrition knowledge, attitudes and practices can be caused by high levels of education and access to nutritional information and interest in reading among teachers. Teachers are agents of change in attitudes and behaviors of children, so teachers are expected to disseminate nutrition knowledge and attitudes and good nutrition practices to their students.

Table 10.12. Correlation between the teachers' nutrition knowledge, attitude, and practice

Variable	Total[1]		Urban[1]		Rural[1]	
	r	p value	r	p value	r	p value
Knowledge, attitude	0.429	0.009	0.438	0.069	0.429	0.009
Knowledge, practice	0.190	0.266	0.172	0.496	0.190	0.266
Attitude, practice	0.059	0.732	0.025	0.922	0.059	0.732

[1]Pearson Correlation

Table 10.13 shows the distribution of teachers who answered correctly on a number of questions on nutrition knowledge and food safety. There were 5 questions that were understood by the teacher, where the percentage of the teachers who answered the question correctly was ≥90%. These questions include: 1) nutrients are important, for example carbohydrates that produce energy to carry out daily activities, 2) a person's nutritional needs can be met by familiarizing him with various kinds of foods, 3) calcium function is for the growth of bones and teeth , 4) lack of protein can cause the body growth inhibitted, and 5) not having breakfast can cause less concentration in learning.

On the other hand, there was still some nutritional knowledge that had not been widely understood by the teachers. Among others were questions related to the nutritional content of fruits. There were 44.4% of the teachers in the urban and 77.8% of the teachers in the rural who still considered that vitamin C in oranges was higher than in papaya. According to Muchtar (2010) almost most people assume that oranges contain the most vitamin C because it tastes sour. In fact, oranges only contain 49 mg of vitamin C per 100 g of orange. Papaya contains higher vitamin C, that is 78 mg per 100 g papaya. In addition, the teachers also did not understand the function of nutrients in the urban or in the rural. As many as 66.7% of the teachers in the rural considered that excessive consumption of vitamins can cause obesity. The statement is wrong, which causes obesity, one of which is fat, not vitamins. According to Sumbono (2016) too much consumption of vitamin C can have potential toxicity with intra-intestinal events and the effects of metabolites in the urinary system. In addition, almost the same as the motherss knowledge, most of the teachers in the rural still considered heart diseases due to a lack of hygiene and sanitation. Heart diseases are not caused by poor hygiene and sanitation, but a wrong lifestyle pattern.

Table 10.13. Teacher's nutritional knowledge and food safety [n (%)]

No.	Nutritional Knowledge	Urban (n=105)		Rural (n=105)	
		Correct	False	Correct	False
Nutrition					
1	Nutrients are important, for example carbohydrates that produce energy for daily activities.	18 (100.0)	0 (0.0)	18 (100.0)	0 (0.0)
2	One's nutritional needs can be met by familiarizing him with a variety of foods.	10 (55.6)	8 (44.4)	14 (77.8)	4 (2.2)
3	Calcium function is for the growth of bones and teeth	18 (100.0)	0 (0.0)	18 (100.0)	0 (0.0)
4	A lack of protein can impair the body growth	17 (94.4)	1 (5.6)	17 (94.4)	1 (5.6)
5	Oranges contain vitamin C higher than papaya.	10 (55.6)	8 (44.4)	4 (22.2)	14 (77.8)
6	Not having breakfast can cause less concentration in learning.	18 (100.0)	0 (0.0)	17 (94.4)	1 (5.6)
7	Too much vitamin intake causes obesity.	11 (61.1)	7 (38.9)	6 (33.3)	12 (66.7)
8	One of the benefits of clean life behavior is preventing heart diseases.	14 (77.8)	4 (22.2)	4 (22.2)	14 (77.8)
Food Safety					
9	Cooked foods are safer than half-cooked foods.	16 (88.9)	2 (11.1)	14 (77.8)	4 (22.2)
10	Diarrhea and typhus are diseases caused by food that is not clean.	18 (100.0)	0 (0.0)	18 (100.0)	0 (0.0)
11	Food sellers can be a source of disease transmission.	13 (72.2)	5 (27.8)	13 (72.2)	5 (27.8)
12	Snacks (for example: fried foods) wrapped in newspapers belong to unsafe snacks.	17 (94.4)	1 (5.6)	14 (77.8)	4 (22.2)
13	*Lontong* (*buras*) which is chewy and not fast stale is a characteristic that that food contains borax (*pijer/bleng*).	17 (94.4)	1 (5.6)	16 (88.9)	2 (11.1)
14	Foods that have bright (striking) colours are dangerous for health.	18 (100.0)	0 (0.0)	12 (66.7)	5 (33.3)
15	The use of formalin to preserve tofu is dangerous.	17 (94.4)	1 (5.6)	17 (94.4)	1 (5.6)
16	Using too much flavoring (*vetsin*) is not good for health.	18 (100.0)	0 (0.0)	18 (100.0)	0 (0.0)
17	Sauces are examples of foods that often contain dangerous preservatives.	17 (94.4)	1 (5.6)	18 (100.0)	0 (0.0)
18	Food can be a source of disease transmission.	13 (72.2)	5 (27.8)	14 (72.8)	4 (22.2)
19	Before and after eating, you should wash your hands using soap.	0 (100.0)	0 (0.0)	0 (100.0)	0 (0.0)

The teacher's knowledge of food safety could be said good because 8 of the 11 food safety questions were answered correctly by ≥90% of the teachers. The questions that have not been understood or there were still many teachers who answered incorrectly were 1) cooked food is safer than half-cooked food, 2) food sellers can be a source of disease transmission, and 3) food can be a source of disease transmission. According to Idris (2009) food is one of the media for the spread of diseases, both infectious (at most) and not contagious. Foods that have been contaminated with bacteria can cause diseases. Likewise, sellers who suffer from diseases or are not clean can transmit the diseases through food that is processed directly by the sellers. It is of paramount important to improve nutritional education, especially regarding transmission of diseases from food and sellers among the teachers. This is important because the teachers are a role model for their students and a source of information for their students.

Table 10.14 shows the distribution of the teachers' nutritional attitudes to nutrition and food safety. There were still around 20-83% of the teachers who had a wrong attitude in some statements. These statements are "In order not to be fat, don't consume too many vitamins". More than 20% of the teachers agreed to the statement. This is wrong because excessive vitamins are not related to obesity. Another statement is "In order for us not to get any heart diseases, we have to apply clean life behavior". It is also wrong because heart diseases are more related to lifestyle, not hygiene and sanitation behavior. This could be due to the lack of knowledge of the teachers so that it affected the attitude of the teachers.

The teachers' nutritional attitude about food safety could be said to be positive. About 88% of the teachers had a positive attitude to various statements such as agreeing to the statement "If we don't want to get diarrhea, we have to wash our hands with soap before and after eating ", "If we cook food, we have to cook it properly to be safe for consumption ". "If we want to buy snacks for children, we should also pay attention to the cleanliness of the snack seller", "If the food has been given formalin, it is not safe to consume", and "If we use too much flavoring (*vetsin*), our health will be disturbed ", and "In order not to get typhus, make sure the food we eat is safe and clean".

The teacher also had a positive attitude in both the urban and the rural for several other aspects. As many as 83.3% of the teachers did not agree to the use of used newspapers to wrap food and did not agree that borax-fed food was still consumed. Nevertheless, there are still some teachers who still had a hesitant attitude. The most dubious statement expressed in the use of striking colored sauces can cause cancer. Several studies have suggested that there are several sauces on the market that contain dangerous coloring agents, namely rodhamin B. The research of Laksmita, Widayanti, and Refi (2018) found that market-sold sauces contain rodhamine B. The use of Rodhamin B may be rarely known. Rhodamin B could be carcinogenic and stimulated the growth of cancer cells if used continuously. There needs to be an increase in education for the teachers so that there will be no mistake or doubt on the teacher regarding nutritional and food safety attitudes.

Tabel 10.14. Teachers' attitude towards nutrition and food safety [n (%)]

No.	Statements of nutritional attitude	Urban (n=105)			Rural (n=105)		
		Agree	Doubtful	Disagree	Agree	Doubtful	Disagree
Nutrition							
1	If you want your energy needs to be met, you need to eat foods that are carbohydrate sources (rice, cassava, sweet potatoes)	16 (88.9)	1 (5.6)	1 (5.6)	16 (88.9)	0 (0.0)	2 (11.1)
2	In order that our nutritional needs are met, we need to consume a variety of foods.	12 (66.7)	5 (27.8)	1 (5.6)	13 (72.2)	5 (27.8)	0 (0.0)
3	In order not to be fat, don't consume too many vitamins.	4 (22.2)	6 (33.3)	8 (44.4)	6 (33.3)	8 (44.4)	4 (22.2)
4	In order that we do not get heart diseases,we must apply clean behavior.	14 (77.8)	3 (16.7)	1 (5.6)	15 (83.3)	3 (16.7)	0 (0.0)
Food Safety							
5	If we do not want to get diarrhea, we must wash our hands with soap before and after eating.	18 (100.0)	0 (0.0)	0 (0.0)	17 (94.4)	1 (5.6)	0 (0.0)
6	If we cook food, we have to cook it until it is fully cooked to be safe for consumption.	16 (88.9)	1 (5.6)	1 (5.6)	15 (83.3)	2 (11.1)	1 (5.6)
7	In order not to get typhus, make sure the food we eat is safe and clean.	17 (94.4)	1 (5.6)	0 (0.0)	16 (88.9)	2 (11.1)	0 (0.0)
8	If we buy snacks (fried foods), the snacks should be wrapped in used paper.	3 (16.7)	0 (0.0)	15 (83.3)	2 (11.1)	1 (5.6)	15 (83.3)
9	*Lontong* (*buras*) which is chewy because of borax is still safe to eat.	1 (5.6)	0 (0.0)	17 (94.4)	1 (5.6)	2 (11.1)	15 (83.3)
10	If we want to buy snacks for children, choose light colored snacks.	1 (5.6)	0 (0.0)	17 (94.4)	14 (77.8)	3 (16.7)	1 (5.6)
11	If we want to buy snacks for children, we should also pay attention to the cleanliness of the snack seller.	17 (94.4)	1 (5.6)	0 (0.0)	16 (88.9)	1 (5.6)	1 (5.6)
12	If food has been given formalin, it is not safe for consumption.	18 (100.0)	0 (0.0)	0 (0.0)	17 (94.4)	0 (0.0)	1 (5.6)
13	If we use too much flavoring (*vetsin*), our health will be disturbed.	17 (94.4)	1 (5.6)	0 (0.0)	17 (94.4)	0 (0.0)	1 (5.6)
14	If we eat street food with bright/ striking-colored sauce, we can get cancer later on.	14 (77.8)	4 (22.2)	0 (0.0)	10 (55.6)	7 (38.9)	1 (5.6)

Table 10.15 shows the distribution of the teachers' nutrition practices in aspects of nutrition and food safety. As many as 99.4% of teachers in the urban and 83.3% of the teachers in the rural often chose nutritious foods to eat. However, the percentage of the teachers who often consumed a variety of foods and meat was still below 80%. As many as 83.3% of the teachers in the urban and 72.2% of the teachers in the rural stated that they sometimes consumed foods that were varied and meat. In terms of milk consumption there

was a considerable difference between the teachers in the rural and those in the urban. The teachers in the urban (83.3%) consumed milk more often than the teachers in the rural (27.8%). Most of the teachers in the urban (77.8%) and in the rural (94.4%) stated that they sometimes consumed fried snacks and considered that fried snacks did not make them fat. In fact, if consumed continuously, fried foods can contribute to a high fat intake.

Table 10.15. Teachers' practice towards nutrition and food safety [n (%)]

No.	Nutritional practices	Urban (n=105)			Rural (n=105)		
		Often	Sometimes	Never	Often	Sometimes	Never
Nutrition							
1	I choose nutritious foods to eat so that I get energy for my activities	17 (94.4)	1 (5.6)	0 (0.0)	15 (83.3)	3 (16.7)	0 (0.0)
2	I eat a variety of foods so that my nutritional needs are met	18 (55.6)	8 (44.4)	0 (0.0)	13 (72.2)	5 (27.8)	0 (0.0)
3	I consume meat so that my family members are not "lack of blood" (anemia).	3 (16.7)	15 (83.3)	0 (0.0)	5 (27.8)	13 (72.2)	0 (0.0)
4	I provide milk so that my bones become strong	15 (83.3)	2 (11.1)	1 (5.6)	5 (27.8)	12 (66.7)	1 (5.6)
5	I like fried snacks because they don't make me fat.	1 (5.6)	14 (77.8)	3 (16.7)	1 (5.6)	17 (94.4)	0 (0.0)
6	I encourage my family members to consume enough protein sources (such as eggs, meat, tofu, tempeh, etc.) to be able to grow optimally.	17 (94.4)	1 (5.6)	0 (0.0)	12 (66.7)	6 (33.3)	0 (0.0)
7	I provide fruits at home so that my family members get enough vitamins and minerals.	14 (77.8)	4 (22.2)	0 (0.0)	12 (66.7)	6 (33.3)	0 (0.0)
8	I apply clean and healthy life behaviour in my daily life.	17 (94.4)	0 (0.0)	1 (5.6)	16 (88.9)	2 (11.1)	0 (0.0)
9	I encourage my family members to have breakfast before starting their daily activities.	17 (94.4)	1 (5.6)	0 (0.0)	16 (88.9)	2 (11.1)	0 (0.0)
Food Safety							
10	I chose food that was covered and clean before I bought it.	15 (83.3)	3 (16.7)	0 (0.0)	16 (88.9)	2 (11.1)	0 (0.0)
11	I tell my family members to wash their hands using soap before and after eating.	17 (94.4)	1 (5.6)	0 (0.0)	15 (83.3)	3 (16.7)	0 (0.0)
12	I make sure the food is cooked until it is completely cooked for my family members.	14 (77.8)	4 (22.2)	0 (0.0)	15 (83.3)	3 (16.7)	0 (0.0)
13	I pay attention to food hygiene so that my family members do not suffer diarrhea and typhus.	18 (100.0)	0 (0.0)	0 (0.0)	18 (100.0)	0 (0.0)	0 (0.0)
14	I buy snacks (fried foods) wrapped in used paper.	1 (5.6)	9 (50.0)	8 (44.4)	3 (16.7)	9 (50.0)	6 (33.3)
15	I buy chewy *lontong (buras*).	0 (0.0)	5 (33.3)	12 (66.7)	0 (0.0)	7 (38.9)	11 (61.1)
16	I buy food / drinks that have a bright/striking colour because they are interesting.	1 (5.6)	8 (44.4)	9 (50.0)	1 (5.6)	7 (38.9)	10 (55.6)

Table 10.15. Teachers' practice towards nutrition and food safety [n (%)] [continued]

No.	Nutritional practices	Urban (n=105)			Rural (n=105)		
		Often	Sometimes	Never	Often	Sometimes	Never
17	I buy snacks from sellers who looked clean.	14 (77.9)	4 (22.2)	0 (0.0)	17 (94.4)	1 (5.6)	0 (0.0)
18	I do not care about snacks that I buy safe or not.	2 (11.1)	9 (50.0)	7 (38.9)	2 (11.1)	5 (61.1)	1 (5.6)
19	I buy food that uses flavorings (*vetsin*) because it tastes savory.	1 (5.6)	16 (88.9)	1 (5.6)	1 (5.6)	16 (88.9)	1 (5.6)
20	I add sauce every time I buy snacks	0 (0.0)	12 (66.7)	6 (33.3)	0 (0.0)	16 (88.9)	2 (11.1)

The teachers' nutrition practices in food safety aspects were quite good. More than 75% of the teachers stated often in terms of choosing foods that are covered and clean, hand washing using soap, cooking food carefully, paying attention to food hygiene to avoid illness, considering the sellers' cleanliness.

As many as 50% of the teachers both in the rural and in the urban stated that they sometimes bought snacks wrapped in used paper. In addition, 50% of the teachers in the urban and 61.1% of the teachers in the rural sometimes care whether the snacks purchased were safe or not. Thus, for these aspects, nutrition education and snack food safety for teachers are still needed.

10.4. Nutrition Knowledge, Attitude, and Practice of Food Vendors

Nutritional knowledge, attitudes and practices and food safety of good snack sellers of school children is very important in determining safe and healthy snacks. Table 11.16 shows the distribution of knowledge scores, attitudes and practices of the vendors. Most (71.0%) vendors had moderate nutrition knowledge with an average score of 72.7 and 62.9% of vendors which were classified as poor nutrition practices. While the attitude of vendor nutrition is 88.7% classified as positive. The average knowledge, attitudes and practices of vendor nutrition in the urban was greater than in that in the rural. Statistically, only attitudes differed significantly between the urban and the rural ($p<0.05$). This may be due to more food safety training experiences in the urban than in the rural. It can be seen in Table 7.5 that the percentage of vendors who have participated in food safety training was greater in the urban than in the rural.

The lack of vendors' good nutrition practices can be caused by low levels of vendors' education, lack of access to nutrition and food safety information such as the participation of food safety training and limited trading capital. Based on Table 10.17 there was a significant correlation between knowledge and attitudes as a whole ($r=0.312$; $p<0.01$). If differentiated by urban and rural, there was a correlation between knowledge and attitudes in the urban and a correlation between attitudes and practices in the rural. High knowledge is directly proportional to a positive attitude. A good attitude will determine good practice. A similar study (Sari 2018) showed that there was a correlation between knowledge and attitude. Knowledge is the foundation for people to behave.

Table 10.16. Distribution of the food vendors based on nutrition knowledge, attitude, and practice

Variables	Total (n=62)	Urban (n=30)	Rural (n=32)	p value[1]
Nutrition Knowledge				
Low (<60)	7 (11.3)	3 (10.0)	4 (12.5)	
Moderate (60-80)	44 (71.0)	21 (70.0)	23 (71.9)	
Good (>80)	11 (17.7)	6 (20.0)	5 (15.6)	
Mean±SD	72.7±10.0	73.2±9.4	72.2±10.7	0.712
Nutritional Attitude				
Negative (60-80)	7 (11.3)	1 (3.3)	6 (18.8)	
Positifve (>80)	55 (88.7)	29 (96.7)	26 (81.3)	
Mean±SD	85.8±4.9	87.2±3.8	84.4±5.5	0.021
Nutritional Practice				
Poor (<60)	39 (62.9)	16 (53.3)	23 (71.9)	
Moderate (60-80)	22 (35.5)	14 (46.7)	8 (25.0)	
Good (>80)	1 (1.6)	0 (0.0)	1 (3.1)	
Mean±SD	50.8±18.6	52.1±18.7	49.6±18.7	0.587

[1]Independent t-test

Table 10.17. Correlation between knowledge, attitude, and nutritional practice of the food vendors

Variable	Total[1]		Urban[1]		Rural[1]	
	r	p value	R	p value	r	p value
Knowledge, attitude	0.312	0.013	0.437	0.016	0.246	0.175
Knowledge, practice	0.213	0.096	0.213	0.096	0.270	0.136
Attitude, practice	0.052	0.689	0.052	0.689	0.356	0.045

[1]Pearson correlational test

Picture 10.2. Data collection: interviewing the street food vendor

Table 10.18 shows the distribution of the vendors' knowledge in aspects of nutrition and food safety. Most (>75%) of the vendors already understood nutritional knowledge: 1) nutrition is important, for example carbohydrates that produce energy for daily activities, 2) a person's nutritional needs can be met by getting a variety of foods, 3) the function of calcium is for the growth of bones and teeth, 4) a lack of protein can cause barriers to body growth, and 5) not eating breakfast can cause a lack of concentration in learning.

Table 10.18. Percentage of the food sellers answering the nutritional knowledge questions correctly [n (%)]

No.	Nutritional Knowledge	Urban (n=105)		Rural (n=105)	
		Correct	False	Correct	False
Nutrition					
1	Nutrients are important, for example carbohydrates that produce energy for daily activities.	30 (100.0)	0 (0.0)	32 (100.0)	0 (0.0)
2	One's nutritional needs can be met by familiarizing him with a variety of foods.	25 (83.3)	5 (16.7)	28 (87.5)	4 (12.5)
3	Calcium function is for the growth of bones and teeth.	29 (96.7)	1 (3.3)	31 (96.9)	1 (3.1)
4	A lack of protein can impair the body growth.	29 (96.7)	1 (3.3)	25 (78.1)	7 (21.9)
5	Oranges contain vitamin C higher than papaya.	7 (23.3)	23 (76.7)	9 (28.1)	23 (71.9)
6	Not having breakfast can cause less concentration in learning.	28 (93.3)	2 (6.7)	29 (90.6)	3 (9.4)
7	Too much vitamin intake causes obesity.	10 (33.3)	20 (66.7)	11 (34.4)	21 (65.6)
8	One of the benefits of clean life behavior is preventing heart diseases.	4 (13.3)	26 (86.7)	7 (21.9)	25 (78.1)
Food Safety					
9	Cooked foods are safer than half-cooked foods.	29 (96.7)	1 (3.3)	30 (93.8)	2 (6.2)
10	Diarrhea and typhus are diseases caused by food that is not clean.	29 (6.7)	1 (3.3)	30 (93.8)	2 (6.2)
11	Food sellers can be a source of disease transmission.	13 (43.3)	17 (56.7)	14 (43.8)	18 (56.2)
12	Snacks (for example: fried foods) wrapped in newspapers belong to unsafe snacks.	25 (83.3)	5 (16.7)	20 (62.5)	12 (37.5)
13	*Lontong* (*buras*) which is chewy and not fast stale is a characteristic that that food contains borax (*pijer/bleng*).	25 (83.3)	5 (16.7)	23 (71.9)	9 (28.1)
14	Foods that have bright (striking) colours are dangerous for health.	19 (63.3)	11 (36.7)	18 (56.2)	14 (43.8)
15	The use of formalin to preserve tofu is dangerous.	23 (76.7)	7 (23.3)	29 (90.6)	3 (9.4)
16	Using too much flavoring (*vetsin*) is not good for health.	26 (86.7)	4 (13.3)	26 (81.2)	6 (18.8)
17	Sauces are examples of foods that often contain dangerous preservatives.	21 (70.0)	9 (30.0)	27 (84.4)	5 (15.6)
18	Food can be a source of disease transmission.	15 (50.0)	15 (50.0)	18 (56.2)	14 (43.8)
19	Before and after eating, you should wash your hands using soap.	30 (100.0)	0 (0.0)	32 (100.0)	0 (0.0)

Table 10.19 shows the attitude of the vendors regarding nutrition and food safety. At least 75% of vendors agree on several statements, namely: 1) if we want our energy needs to be met, we need to eat foods that are carbohydrate sources (rice, cassava, sweet potatoes), 2) in order that our nutritional needs are met we need to consume a variety of

foods, and 3) in order that we do not get heart diseases, we must apply clean life behavior. There was a wrong attitude among the vendors by agreeing to the statement that the application of clean and healthy life behaviors is to prevent heart diseases. In fact, heart diseases are more related to lifestyle.

Table 10.19. Food vendors' attitude towards nutrition and food safety [n (%)]

No.	Statements of Nutritional Attitude	Urban (n=105)			Rural (n=105)		
		Agree	doubtful	Disagree	Agree	doubtful	Disagree
Nutrition							
1	If you want your energy needs to be met, you need to eat foods that are carbohydrate sources (rice, cassava, sweet potatoes)	28 (93.3)	1 (3.3)	1 (3.3)	31 (96.9)	1 (3.1)	0 (0.0)
2	In order that our nutritional needs are met, we need to consume a variety of foods.	24 (80.0)	3 (10.0)	3 (10.0)	24 (75.0)	5 (15.6)	2 (9.4)
3	In order not to be fat, don't consume too many vitamins.	17 (56.7)	8 (26.7)	5 (16.7)	23 (71.9)	3 (9.4)	6 (18.8)
4	In order that we do not get heart diseases,we must apply clean behavior.	24 (80.0)	2 (6.7)	4 (13.3)	29 (90.6)	1 (3.1)	2 (6.2)
Food Safety							
5	If we do not want to get diarrhea, we must wash our hands with soap before and after eating.	30 (100.0)	0 (0.0)	0 (0.0)	31 (96.9)	1 (3.1)	0 (0.0)
6	If we cook food, we have to cook it until it is fully cooked to be safe for consumption.	27 (90.0)	2 (6.7)	1 (3.3)	31 (96.9)	1 (3.1)	0 (0.0)
7	In order not to get typhus, make sure the food we eat is safe and clean.	30 (100.0)	0 (0.0)	0 (0.0)	30 (93.8)	2 (6.2)	0 (0.0)
8	If we buy snacks (fried foods), the snacks should be wrapped in used paper.	2 (6.7)	1 (3.3)	27 (90.0)	5 (15.6)	3 (9.4)	24 (75.0)
9	*Lontong* (*buras*) which is chewy because of borax is still safe to eat.	1 (3.3)	3 (10.0)	26 (86.7)	8 (25.0)	2 (6.2)	22 (68.8)
10	If we want to buy snacks for children, choose light colored snacks.	4 (13.3)	5 (20.0)	20 (66.7)	9 (28.1)	5 (15.6)	18 (56.2)
11	If we want to buy snacks for children, we should also pay attention to the cleanliness of the snack seller.	28 (93.3)	1 (3.3)	1 (3.3)	32 (100.0)	0 (0.0)	0 (0.0)
12	If food has been given formalin, it is not safe for consumption.	25 (83.3)	1 (3.3)	4 (13.3)	25 (78.1)	0 (0.0)	7 (21.9)
13	If we use too much flavoring (*vetsin*), our health will be disturbed.	25 (83.3)	4 (13.3)	1 (3.3)	28 (87.5)	0 (0.0)	4 (12.5)
14	If we eat street food with bright/ striking-colored sauce, we can get cancer later on.	19 (63.3)	11 (36.7)	0 (0.0)	26 (81.2)	2 (6.2)	4 (12.5)

Most vendors (>75%) have shown a positive attitude by agreeing to several food safety aspects. The statement includes: 1) if we do not want to get diarrhea, we must wash our hands by using soap before and after eating, 2) if we cook food, we have to cook it until it is fully cooked to be safe for consumption, 3) in order that you do not get typhus, make sure the food you eat is safe and clean, 4) if we want to buy snacks for children, we should also pay attention to the cleanliness of the snack seller, 5) if the food has been given formalin, it is not safe to consume, 6) if we use too much flavoring (*vetsin*), our health will be disturbed, and 7) if we consume snacks with striking/bright-colored sauce, we can get cancer later on.

A positive attitude was also shown by not agreeing on the use of newspapers to wrap snacks, using borax which is safe for rice cake. In the rural areas there were still many vendors who agreed the use of newspapers for wrapping snacks, that is 25.0% and 6.2% doubtful. These percentage were higher than those in the urban area.

Table 10.20 shows the vendors' behavior in managing food starting from preparing, cooking, serving, touching food, food-selling facilities, and food handling. In the preparation process there were still traders who used food coloring. The use of food coloring is permitted, but must be according to dosages and food-specific dyes. Based on the results of lab analysis, the food sold around the school used safe dyes that were safe for consumption. Regarding storage behavior, there were vendors who did not store food (e.g. eggs) in the refrigerator before processing. Eggs should be stored in refrigerator temperature 12-150 ^{0}C and humidity 70-80%. If below or above the temperature it will have an adverse effect on egg quality (Afifah 2013).

The use of or manufactured flavoring still couldnot be separated from the food vendors. The reason given was to keep it tasty. The use of flavoring is permissible, but may not be too much because of the high content of sodium. There were still some traders who did not use boiled water. This can be because the vendors were lack of knowledge regarding the dangers of non-boilded water and limited capital. In the process of serving food, some of the vendors (>50%) served food covered or wrapped. But there were still vendors who ignored food serving. Foods that are not covered are at risk of being contaminated by dust so the food is not clean anymore. There were still >50% of the vendors not using gloves or spoons in serving. This is feared to cause food pollution from the vendors who are not clean.

Most of the vendors had a good health status. However, in terms of hand, hair, nails and clothes hygiene there were still 30% of the vendors in the city and 43.8% in the villages that were not clean. Nutrition education regarding hygiene and sanitation was needed so that the vendors paid more attention to their cleanliness in selling. Agustina, Pambayun, and Febry's (2009) research shows that the sellers' behavior was still not good in hygiene, sanitation and hygiene of equipment. The snacks sellers also still did not prioritize the provision of trash bins. The trash of selling was dumped in the land around the place they were selling. This is feared to be able to pollute the food sold.

Table 10.20. Distribution of food vendors based on food practice [n (%)]

No	Food Practice	Urban (n=105)			Rural (n=105)		
		Yes	No	Not Applicable	Yes	No	Not Applicable
	Preparing						
1	Sellers use food additives (sweeteners: sugar, saccharine; preservatives: borax, formalin; coloring: natural, synthetic)	12 (40.0)	10 (33.3)	8 (26.7)	15 (46.9)	14 (43.8)	3 (9.4)
2	Traders store food before processing it in the refrigerator	12 (40.0)	12 (40.0)	6 (20.0)	9 (28.1)	18 (56.2)	5 (15.6)
	Cooking						
3	Sellers use commercial flavorings	21 (70.0)	4 (13.3)	5 (16.7)	20 (62.5)	7 (21.9)	5 (15.6)
4	Sellers use boiled water	22 (73.3)	5 (16.7)	3 (10.0)	24 (75.0)	5 (15.6)	3 (9.4)
5	Sellers cook food until it is cooked	25 (83.3)	2 (6.7)	3 (10.0)	29 (90.6)	0 (0.0)	3 (9.4)
	Serving						
6	Sellers packs the food in a closed condition so that flies cannot come down on the food.	17 (56.7)	13 (43.3)	0 (0.0)	16 (50.0)	15 (46.9)	1 (3.1)
7	Sellers use gloves or use a spoon, fork or food tongs to serve food	11 (36.7)	17 (56.7)	2 (6.7)	14 (43.8)	17 (53.1)	1 (3.1)
8	Sellers serve food in clean and safe containers	19 (63.3)	11 (36.7)	0 (0.0)	21 (65.5)	11 (34.4)	0 (0.0)
	Touching food						
9	Do those who touch the food suffer from infectious diseases such as coughs, colds, influenza, diarrhea, other stomach diseases; if you have a wound, is the wound closed?	6 (20.0)	24 (80.0)	0 (0.0)	1 (3.1)	31 (96.9)	0 (0.0)
10	Hands, hair, nails and clothing are clean.	21 (70.0)	9 (30.0)	0 (0.0)	18 (56.2)	14 (43.8)	0 (0.0)
	Facilities for selling food						
11	The place and the tool to sell food are easy to clean	24 (80.0)	6 (20.0)	0 (0.0)	22 (68.8)	10 (31.2)	0 (0.0)
12	The sellers wash tools and serving containers in clean and flowing water.	13 (43.3)	12 (40.0)	5 (16.7)	13 (40.6)	12 (37.5)	7 (21.9)
	Handling the leftovers						
13	The sellers prepare trash bins	18 (60.0)	12 (40.0)	0 (0.0)	13 (40.6)	18 (56.2)	1 (3.1)
14	The sellers resell the leftovers	13 (43.3)	17 (56.7)	0 (0.0)	8 (25.0)	21 (65.6)	3 (9.4)

CHAPTER 11
CONCLUSIONS AND RECOMMENDATIONS

11.1. Conclusions

1. The morbidity proportion in the urban (56%) is smaller than in the rural (70%), especially in Upper Respiratory Tract Infection. Personal hygiene and sanitation of students in the urban is better than students in the rural, especially habit of bathing, hand washing with water and soap, and using footwear when going out of the house

   Result shown no correlation between morbidity and snacking habit at school ($p>0.05$). As for student's personal hygiene and sanitation, correlation was found only for bathing habit and morbidity ($p<0.05$). There's no significant correlation between morbidity and food vendor's personal hygiene and sanitation ($p>0.05$)

2. There was a significant different between eating frequency for both respondents in urban and rural area ($p<0.05$). Majority (67.6%) of respondents in urban area eat 3 times/day, while in rural area majority (49.5%) eat 2 times/day.

   Majority of students in urban area (61.0%) and rural area (76.2%) had snacking habit for 4-6 times/week. Four types of most frequent snacks bought by respondets are flavoured drink (48.6%), fried foods (25.7%), noodle (24.8%), and *cilor* (22.9%). Macro nutrients contribution from snack were 21.7% of energy and 18.1% of protein in urban area, while in rural area were 31.6% of energy ad 24.1% of protein. There was a significant different for energy and protein contribution between urban and rural area ($p<0.05$).

   There were still 30% vendors in urban area and 43.8% vendors in rural area that still lack of personal hygiene. However, there's no cross-contamination as all snack foods sampled from school in Tangerang Selatan City (urban) and Tangerang District (rural) were found to be safed from microbial contamination and forbidden food additives. Only one food (noodle) was considered not safe because it was contaminated by formalin.

3. There was no significant different for knowledge, attitude, and practice on nutrition and food safety for students in urban and rural area ($p>0.05$). There were significant correlation between knowledge and attitude ($r=0.452$; $p<0.01$), knowledge and practice ($r=0.145$; $p<0.05$), and attitude and practice ($r=0.248$; $p<0.01$).

   There was no significant different for knowledge and practice on nutrition and food safety for the mothers in urban and rural areas ($p>0.05$). However mother's attitude in urban area were significantly better than those in rural area ($p<0.05$). Mother's attitude ($r=0.214$; $p<0.01$) had positive correlation with practice.

   There was a significant different on knowledge between teachers in urban and rural area ($p<0.05$) in which teacher's knowledge in urban area was better. However, no significant different were found for teachers' attitude and practice in both areas ($p>0.05$). There was a significant correlation between teachers' knowledge and attitude ($r= 0.429$; $p< 0.01$).

Food vendors' attitude on nutrition and food safety was found better in urban area compared to rural area ($p<0.05$), but there were no significant different for knowledge and practice of vendors in both areas ($p>0.05$).

11.2. Recommendations

1. The school must continue to supervise food vendors who sold snack around the school. Although almost all snacks tested are classified as safe, the presence of formalin contamination in noodles shows the potential for food hazard.
2. Authorities from Education Offices and Health Offices need to train food vendors and teachers regularly regarding food safety of snack sold at school thus the schools can create policies for the vendors in aspects of sanitation and food safety.
3. Parents need to pay more attention to children's food consumption, especially regarding breakfast habits that many students leave behind as well as the quality of breakfast that lack of diversity.

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