UNIVERSITAS INDONESIA

CONTRIBUTION OF STREET FOOD TO NUTRIENT INTAKE AND CONTAMINANT EXPOSURE AMONG SCHOOL CHILDREN AT SENEN SUBDISTRICT, JAKARTA

THESIS

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FACULTY OF MEDICINE UNIVERSITAS INDONESIA
STUDY PROGRAM IN NUTRITION
JAKARTA
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In partial fulfillment of the requirements for the degree of
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AUTHOR'S DECLARATION OF ORIGINALITY PAGE

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PREFACE

Praise and gratitude to Allah SWT, God Almighty, as without His grace, blessings and guidance, this thesis wouldn't be completed in time.

This thesis is submitted in partial fulfillment of the requirements for the degree of Master of Science in Community Nutrition. It is a study about street food contribution to nutrient intake and contaminant exposure among school children in Senen Subdistrict, Jakarta.

Doing research and writing this thesis in a year was a tedious work. I would have not finished it without support and guidance from several people. Therefore, I would like to express my gratitude to:

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Jakarta, July 2012

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PUBLICATION APPROVAL FOR ACADEMIC PURPOSE

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ABSTRACT

Name : Karina Rahmadia Ekawidyani
Study Program : Nutrition
Title : Contribution of street food to nutrient intake and contaminant exposure among school children at Senen Subdistrict, Jakarta

School children spent most of their daily activity at school. They need adequate nutrient to provide their growth, body maintenance and daily activities. Street food can provide some nutrient for their daily need, although its safety is still doubtful due to presence of chemical contaminants. This study assessed the contribution of street food to nutrient intake and contaminant exposure among school children in Senen subdistrict, Jakarta, Indonesia. A cross sectional study was done with purposive sampling of school and students from grade 4-5 selected randomly. Several methods were used, such as structured interview, food checklist, repeated 24 hour recalls, anthropometric measurement and chemical analysis of contaminants. Street food contributed about one fifth to one third to nutrient intake. Contaminants found in this study were formaldehyde, cyclamate and lead. Some subjects were exposed to formaldehyde (9.2% using WHO cutoff, 77.6% using NADFC cutoff) and cyclamate (11.8%) above their individual safety level.

Keywords:
street food, school children, nutrient intake, chemical contaminants

ABSTRAK

Nama : Karina Rahmadia Ekawidyani
Program Studi : *Ilmu Gizi*
Judul : *Kontribusi makanan jajanan terhadap asupan gizi dan pajanan kontaminan di antara anak-anak sekolah di Kecamatan Senen, Jakarta*

Anak sekolah menghabiskan sebagian besar aktivitas sehari-hari di sekolah. Mereka memerlukan asupan gizi yang cukup untuk pertumbuhan, pemeliharaan tubuh, dan aktivitas sehari-hari. Makanan jajanan dapat memenuhi sebagian kebutuhan gizi mereka, walaupun keamanannya masih diragukan karena mengandung kontaminan kimia. Studi ini menilai kontribusi makanan jajanan terhadap asupan gizi dan pajanan kontaminan di antara anak-anak sekolah di Kecamatan Senen. Studi ini merupakan studi potong lintang dengan metode pengambilan contoh secara purposif untuk sekolah dan acak untuk siswa kelas 4 dan 5 SD. Beberapa metode yang digunakan antara lain wawancara terstruktur, daftar ceklis makanan, 3 hari recall *24 jam, pengukuran antropometri, dan analisis kimia kontaminan. Makanan jajanan berkontribusi sekitar seperlima hingga sepertiga terhadap asupan gizi sehari. Kontaminan yang ditemukan adalah formaldehid, siklamat, dan timbal. Sebagian subjek terpajan formaldehid (9.2% jika menggunakan batas aman WHO, 77.6% jika menggunakan batas aman BPOM) dan siklamat (11.8%) di atas batas aman individual mereka.*

Kata kunci:
makanan jajanan, anak sekolah, asupan gizi, kontaminan kimia

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LIST OF ABBREVIATIONS

AAS	atomic absorption spectrophotometry
ADI	Acceptable Daily Intake
CCC	Calorie Control Council
CHD	Coronary heart disease
DNA	deoxyribo nucleic acid
DRI	Dietary Reference Intake
EAR	Estimated Average Requirement
EER	Estimated Energy Requirement
FAO	Food and Agriculture Organization
FDA	Food and Drug Administration
FSANZ	Food Standard Australia New Zealand
JECFA	Joint FAO/WHO Expert Committee on Food Additives
NADFC	National Agency of Drug and Food Control (Badan Pengawasan Obat dan Makanan/POM)
Permenkes	*Peraturan Menteri Kesehatan* (Minister for Health Regulation)
PMT-AS	*Pemberian Makanan Tambahan Anak Sekolah* (School Children Feeding Program)
RDA	Recommended Dietary Allowance
RISKESDAS	Riset Kesehatan Dasar (Basic Health Research)
TDI	Tolerable Daily Intake
WHO	World Health Organization

OPERATIONAL DEFINITIONS

Acceptable Daily Intake (ADI)	:	Estimate of the amount of a substance in food and/or drinking water, expressed on a body weight basis that can be ingested daily over a lifetime without appreciable health risk to the consumer on the basis of all the known facts at the time of the evaluation. It is used for substances that have a reason to be found in food.
Chemical contaminants	:	Presence of unwanted chemical substance in food, making it hazardous for consumption. In this study, only formaldehyde, borax, rhodamine B, cyclamate and lead were assessed.
Contaminant exposure	:	Exposure to chemical substance through any part of the body. In this study, only exposure through digestive tract from food consumed by the subjects was assessed.
Elementary school	:	Primary school, school for children aged 6-12 years old.
Food borne disease	:	Any diseases caused by consuming contaminated foods or beverages. Contaminants may be microbes or pathogens, chemicals, or other harmful substances.
Food pattern	:	Regular food eating behaviour, including type, frequency and amount of food usually consumed.
Non-street food	:	Food other than street food. In this study, only home made food was assessed.
Prevalence of inadequate intakes	:	Estimation of proportion in a population who have intakes less than the EAR thus were at risk of inadequacy.
Public school	:	School managed by the government.
Street food	:	Wide range of ready-to-eat foods and beverages prepared and/or sold by stationary vendors and hawkers. In this study only foods in school canteen and surroundings were chemically assessed.
Tolerable Daily Intake (TDI)	:	An estimate of the amount of a substance in air, food or drinking water that can be taken in daily over a lifetime without appreciable health risk. It is used for substances that do not have a reason to be found in food.

CHAPTER 1
INTRODUCTION

1.1 Background

School children is the future generation of a nation, therefore they have to be healthy. They are still in growth and development period and vulnerable to any diseases. Prevalence of wasting among school children (6-14 years old) in Indonesia was 13.3% in boys and 10.9% in girls (RISKESDAS 2007). On the other hand, prevalence of obesity was 9.5% in boys and 6.4% in girls (RISKESDAS 2007). In Jakarta, the prevalence of wasting was 14.9% in boys and 10.6% in girls. The prevalence of obesity in Jakarta was 12.0% in boys and 8.4% in girls which was higher than the national prevalence.

The common nutritional problems among school children is anemia. Prevalence of anemia among children aged 5-14 years old was 9.4% (RISKESDAS 2007). Microcytic hypochrome anemia was the most common type in children, as the proportion was 70.1% among anemic children (RISKESDAS 2007). This type usually was caused by iron deficiency.

School children spent most of their daily activity at school. They study, exercise and play with their friends at school. These activities require a lot of energy. Besides, they also have high nutritional requirements to provide growth and body maintenance (Weichselbaum and Buttriss, 2011). Therefore they need to eat safe and nutritious food.

According to Indonesian RDA, the energy requirement of school children aged 7-9 years old is 1600 kcal/day and 10-12 years old is 2050 kcal/day. At least, one third of this requirement is obtained from food they consume at school. Some of them bring food from home but some others like to buy food from school canteen or street food vendor around school. Thus, food sold by school canteen and street food vendor around school must meet certain nutrient and energy value.

Besides the nutrient content, safety of food in school canteen and street food vendor still remain an issue. School children is one of the frequent consumer of street food. They are in growth and development period and also vulnerable to any harmful substances. Street food may be unsafe if the preparation and serving

are not hygienic or they contain dangerous chemical substance. Badan POM (National Agency of Drug and Food Control) has found that 218 out of 575 food samples didn't meet food safety requirement. They didn't meet the safety requirement because they use artificial sweetener (saccharin, cyclamate) not for low calorie food, contain benzoic preservatives more than safety cut off, contain prohibited substance such as rhodamine B, borax and formaline, or have microbe contaminants more than safety cut off (NADFC, 2003 and 2004).

Chemical contaminant not only come from food additives, it can come from all stage in the food chain, e.g from environment. Contaminants from environment may come from pesticides, air, water and ground pollution. Some of contaminants from environment are heavy metals such as lead (Pb), mercury (Hg), cadmium (Cd), and arsenic (As).

Chemical contaminant can cause several health problems. Formaldehyde is an irritant, thus may cause acute symptoms such as abdominal pain and vomitting if ingested. In longer term effect, it also may cause degenerative changes in liver, kidney, heart and brain, even death due to respiratory failure. (Keith L.H., 2002 and National Cancer Institute, 2011). Borax also has a long term health effect. It can be accumulated in the brain, kidney, liver and fat cells and cause damage to those cells (Panjaitan, 2010). On the other hand, cyclamate is known to be safe for human consumption but only permitted to be used in low calorie food product. Some studies show cyclamate can cause bladder tumor in rats (NADFC, 2008). Other contaminants from the environment, such as lead can inhibit learning abilities in children, thus affect their achievement in school. It also has carcinogenic effect (Ardyanto, 2005 and Natural Resources Institute, 2001).

Besides street food, NADFC also has found several raw materials sold in the market contains formaldehyde and borax. Formaldehyde was found in seafood, freshwater fish, salty fish, tofu and chicken. Borax was found in processed food such as meatball, sausage and nugget.

Many studies only focuses on nutrient content (Mwangi et al., 2002) or food safety especially microbial contaminants, hygiene and sanitation of street food in general (Omemu and Aderoju, 2007; Choudhury et. al., 2011). A few focuses on chemical additives that may influence health (Maskar, 2004; Sawaya et

al., 2007; Lok et.al., 2011). Study that assess both aspects, nutrient content and safety of street food sold around school was rarely done.

1.1 Problem statements and rationale of the study

It is difficult to assess nutrient content of street food because of wide variety and type of preparation and serving. On the other hand, safety of street food is doubtful due to findings of several cases of illegal additives in street food. Furthermore, illegal additives were not only found in street food but also raw materials sold in the market. This raw materials may be bought by mothers, made into dishes at home and served to the children. Thus, it is important to assess the contribution of street food and non-street food to nutrient intake and contaminant exposure among school children to provide information on school food environment.

1.2 Goal of the study

Goal of this study is to contribute to the improvement of safe and nutritious food among school children in Senen subdistrict.

1.3 Purpose of the study

Purpose of this study is to provide information and suggestion for the improvement in promotion of safe and nutritious food.

1.4 Objectives

1.4.1 General objective

General objective of this study is to assess the contribution of street food to nutrient intake and contaminant exposure among school children in Senen subdistrict.

1.4.2 Specific objectives

a. To describe the pattern of street food and non-street food consumption (type, frequency and portion) among elementary school children in Senen subdistrict.
b. To assess the contaminant level (illegal preservatives, artificial sweetener and lead) of street food and non-street food consumed by elementary school children in Senen subdistrict.
c. To assess the nutrient intake from street food and non-street food among elementary school children in Senen subdistrict.
d. To assess the contaminant exposure from street food and non-street food among elementary school children in Senen subdistrict.

1.5 Research questions

a. How is the the pattern of street food and non-street food consumption (type, frequency and portion) among elementary school children in Senen subdistrict?
b. How is the contaminant level (illegal preservatives, artificial sweetener and lead) of street food and non-street food consumed by elementary school children in Senen subdistrict?
c. How is the nutrient intake from street food and non-street food among elementary school children in Senen subdistrict?
d. How is the contaminant exposure from street food and non-street food among elementary school children in Senen subdistrict?

1.6 Conceptual framework

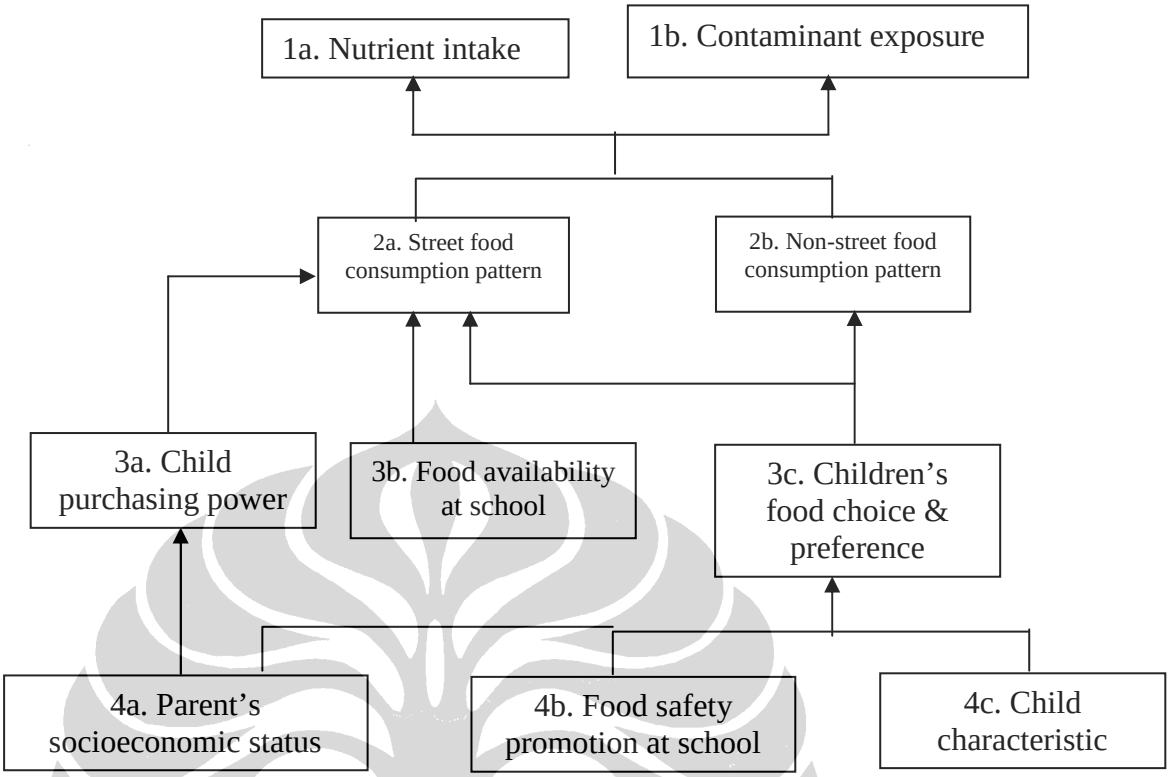

Figure 1.1 Conceptual framework of the study

1.7 Fact and Hypothesis Matrix

Table 1.1 Fact and hypothesis matrix

Variable 1	Variable 2	Reference(s)
1a. Nutrient intake	2a. Street food consumption pattern	Sjöberg et. al., 2003
	2b. Non-street food consumption pattern	Sjöberg et. al., 2003
1b. Contaminant exposure	2a. Street food consumption pattern	Hypothesis
	2b. Non-street food consumption pattern	Hypothesis
2a. Street food consumption pattern	3a. Child purchasing power	Frazao et. al., 2007
2a. Street food consumption pattern	3b. Food availability	Hypothesis
2a. Street food consumption pattern 2b. Non-street food consumption pattern	3c. Child's food choice and preference	Rasmussen et. al., 2006
3a. Child purchasing power	4a. Parent's socioeconomic status	Hypothesis
3c. Child's food choice and preference	4a. Parent's socioeconomic status	Colapinto et. al., 2007
3c. Child's food choice and preference	4b. Food safety promotion at school	Hypothesis
3c. Child's food choice and preference	4c. Child's characteristics	Lanfer et. al., 2011; Hallström et. al., 2011

CHAPTER 2
LITERATURE REVIEW

2.1 Street food

Street food is ready-to-eat food and beverage that was sold, and sometimes prepared, in public places for immediate consumption (Mensah et al, 2002 and Tinker, 2003). FAO (1997) describes street foods as wide range of ready-to-eat foods and beverages prepared and/or sold by mobile or stationary vendors and hawkers especially on streets and around public institutions such as schools, hospitals, railway stations and bus terminals. It can be snacks or complete meals.

Street foods often reflect traditional local cultures. Street food beverages, snacks and meals have many kinds of variety with various raw materials and different kind of preparation. Vendors' stalls are easily accessible from the street. They are usually located outdoors or under a roof. Marketing of street foods depends on location and word-of-mouth promotion. The business itself usually owned and run by individuals or families (Winarno and Allain, 1991).

2.2 Nutrient content of street food

Healthy street food must have certain amount of calorie and nutrient required by the students. School children need high energy intake for their activities and to provide growth and development. Nutrient intake inadequacy may result in difficulty to concentrate during study, thus decreasing student achievement (Febry, 2006).

The energy requirement of school children aged 7-9 years is 1600 kcal/day and 10-12 years is 2050 kcal/day (Indonesian RDA, 2004). Protein requirements are 45 g and 50 g for school children aged 7-9 years and 10-12 years, respectively.

Street food should contain 200-300 kcal of energy and 5-7 g protein as required by the School Children Feeding Program (*Pemberian Makanan Tambahan Anak Sekolah*/ PMT-AS).

2.3 Chemical contaminants

Street food must be safe for consumption, either biologically, physically and chemically. Biological contaminants such as bacteria, parasite, fungi and virus may come from unhygienic preparation of food. Physical contaminantion may come from something falling to the food during preparation or manufacturing, such as stone, bone, hair and finger nails. Chemical contaminants can come from food additives and environment. Non-food grade chemical additives, such as colorants and preservatives, and contaminants, such as pesticide residues and heavy metals, have also been found in street foods (Draper, 1996 and Winarno and Allain, 1991).

2.3.1. Preservatives

Chemical preservatives have been widely used in food manufacturing for many years to inactivate and control the growh of yeasts, bacteria and moulds, thus extending the 'shelf-life' of the food. Chemical preservatives have contributed to the availability of safe, convenient and cost effective food. (FSANZ, 2005)

Despite the significant benefits of preservatives to the community, there may be risks associated with their use. Food additives safety, including preservatives, is monitored and assessed internationally by the Joint FAO/WHO Expert Committee on Food Additives (JECFA). There are Acceptable Daily Intakes (ADIs) for most food additives established by JECFA. It is an estimation of the amount of a food additive, expressed on a body weight basis, that can be ingested daily over a lifetime without appreciable health risk. (FSANZ, 2005).

2.3.1.1 Formaldehyde

Formaldehyde is a chemical usually used in building materials and to produce many household products. It is colorless, flammable and has strong-smell. It is also used in pressed-wood products, such as particleboard, plywood, and fiberboard; glues and adhesives; permanent-press fabrics; paper product coatings; and certain insulation materials. Besides, formaldehyde is commonly used as an industrial fungicide, germicide, and disinfectant, and as a preservative in

mortuaries and medical laboratories. Formaldehyde also occurs naturally in the environment. Most living organisms produced formaldehyde in small as part of normal metabolic processes. (National Cancer Institute, 2011)

Although use of formaldehyde as food additive has been banned by the government, some food vendors still use it to preserve some food such as dried foods, fish and Italian cheese (Agency for Toxic Substances and Disease Registry, 1999). In Indonesia, formaldehyde is commonly used as preservation for tofu and wet noodles (NADFC, 2003).

Formaldehyde exposure primarily happens by inhaling formaldehyde gas or vapor from the air or by absorbing liquids containing formaldehyde through the skin. It has short term health effects and potential long term effects. (Keith L.H., 2002 and National Cancer Institute, 2011)

Presence of formaldehyde in the air at levels exceeding 0.1 ppm, may cause some individuals to experience adverse effects such as watery eyes; burning sensations in the eyes, nose, and throat; coughing; wheezing; nausea; and skin irritation. Some people are very sensitive to formaldehyde, while others have no reaction to the same level of exposure. Long term exposure may result in frequent dermatitis and hypersensitivity. (Keith L.H., 2002 and National Cancer Institute, 2011)

Symptoms following ingestion include immediate intense pain in the mouth and pharynx, abdominal pains with nausea, vomiting and possible loss of consciousness. Proteinuria, acidosis, hematemesis, hematuria, anuria, vertigo, coma and even death due to respiratory failure may occur. Other symptoms such as occasional diarrhea (possibly bloody), pale, clammy skin and other signs of shock, difficult micturition, convulsions and stupor may also occur. Irritation of gastrointestinal mucosa also common. Degenerative changes may be found in the liver, kidneys, heart and brain. (Keith L.H., 2002)

Formaldehyde concentration in food can be reduced by several processes, such as heating or soaking with acidic materials (vinegar and cucumber tree fruit juice). Hardoko et al (2006) concluded that milkfish processing by pressure cooker (*presto*) could reduce formaldehyde concentration by 34%. Soaking food combined with deep frying could reduce formaldehyde concentration by 60-89%.

Soaking fresh fish in vinegar 5% for 15 minutes could reduce formaldehyde concentration by 100%. Addition of cucumber tree fruit juice significantly reduced formaldehyde residues concentration in white shrimp (Wikanta, 2011).

2.3.1.2 Borax

Borax is a chemical compound known as sodium tetraborat (NaB4O7). It is solid and if dissolve in water, will form sodium hydroxide and boric acid. Borax and boric acid have antiseptic effect, thus they are commonly used in several medicine. They are also used as preservative and antiseptic for wood.(Panjaitan, 2010)

Borax and its derivative are prohibited to use in food because they were irritant and toxic for body cells, especially nervous system, kidney and liver. In Indonesia, borax (also known as "bleng") was found in some food inspected by NADFC, such as meatballs, *gendar* crackers and rice cake. It is used as preservatives and firming agent. If it is ingested, it will cause damage in intestine, brain and kidney. The toxicity of borax will occur as a long term effect, being accumulated in the brain, liver, kidney and fat cells. Abundant use may cause fever, deppression, kidney defect, anorexia, digestive disorder, skin inflammation, anemia, convulsion, syncope, coma, even death. (Panjaitan, 2010)

2.3.2 Cyclamate

There are five artificial sweeteners approved by FDA for consumption: acesulfame-K, aspartame, neotame, saccharin and sucralose (Brown et al., 2010). In Indonesia, minister for health has established a regulation approving four artificial sweeteners: aspartame, saccharin, cyclamate and sorbitol (Indonesian Minister for Health Regulation, 1988), but the regulation also limit the maximum use of those sweeteners in food.

The major source of artificial sweetener in the diet is beverages. Therefore, estimates of artificial sweetener consumption usually based on artificially-sweetened drinks or sodas. Consumption of artificially-sweetened soft drink is increasing in children, both with age and over time (Brown et al., 2010).

In Indonesia, use of artificial sweetener such as saccharin and cyclamate are only permitted for low calorie food intended for diabetics (NADFC, 2003).

Cyclamate which is derived from N-cyclo-hexyl-sulfamic acid (CHS), was utilized as a non-caloric artificial sweetener in foods and beverages as well as in the pharmaceutical industry. It is odorless and soluble in water, alcohol and propylene glycol. It is more stable than aspartame and saccharine, thus may submitted to variations in temperature (Martins et al., 2005).

Cyclamate was discovered by Michael Sveda, in 1937. He accidentally perceived its sweet taste which is 30 times sweeter than saccharin but without its bitter after taste. In 1959, the Food and Drug Administration (FDA) approved its use as a non-caloric artificial sweetener for diabetics (Martins et al., 2005).

In 1970, Price et al. Found tumor development in the bladder of rats treated with high doses of cyclamate. Other studies also found that high doses of cyclamate in rats, caused lung, liver and spleen tumor, genetic defect and testicular atrophy. Information collected by CCC stated that cyclamate consumption doesn't cause cancer and non mutagenic. JECFA stated that cyclamate is safe for human consumption with ADI 11.0 mg/kg body weight. CCC regulated the maximum use of cyclamate in various food products between 100-2000 mg/kg product. Despite these regulation, Canada and USA don't approve the use of cyclamate as food additives (Martins et al., 2005 and NADFC, 2008).

2.3.3 Lead (Pb)

Lead or plumbum (Pb) is a blue grey heavy metal with melting point at 327^{o}C and boiling point at 1620^{o}C. At 550-600^{o}C, lead is volatile and formed lead oxide. Lead is not soluble in water but is soluble in nitric acid, asetic acid and sulfuric acid. (Ardyanto, 2005)

Lead exposure may come from food, drinks, air, public environment and ocupational environment. Non-occupational exposure usually caused by ingesting food and drinks polluted by lead. Occupational exposure usually through respiratory and digestive tract. Lead exposure reach 100-350 μg/day and 20 μg is absorped through inhalation from polluted air. (Ardyanto, 2005)

Lead exposure have negative effect for health, especially in central and peripheral nervous system, cardiovascular system, hematopoietic system, kidney, digestive system and reproductive system. Lead cause inhibition in children's learning abilities and can affect their behaviour, even if consumed in very small amounts. Lead also have carcinogenic effect (Ardyanto, 2005 and Natural Resources Institute, 2001).

CHAPTER 3
METHODOLOGY

3.1 Variable Indicator Method Matrix

Table 3.1 Variable Indicator Method Matrix

Variable	Indicator (s)	Method (s)	Reference (s)
1a. Nutrient intake	• Usual energy intake of school children • Usual macronutrients (carbohydrate, protein and fat) intake • Usual micronutrients (calcium, iron, zinc, vitamin B1, B2, B3, B12 and C) intake • Contribution of energy intake from street food • Contribution of macronutrients and micronutrients intake from street food	3-day repeated 24 hour recalls Recipe approach	Gibson, 2005
1b. Contaminant exposure	• Level of illegal preservatives (formaldehyde, borax), rhodamine-B, cyclamate and lead in street food and non-street food consumed by school children	Chemical analysis	
	• Exposure of illegal preservatives (formaldehyde, borax), rhodamine B, cyclamate and lead from street food and non-street food	3-day repeated 24 hour recalls	Gibson, 2005 WHO, 1985
2a. Street food consumption pattern	• Type, frequency and amount of street food usually consumed	Food checklist 3-day repeated 24 hour recalls	Gibson, 2005
2b. Non-street food consumption pattern	• Type, frequency and amount of non-street food usually consumed	Food checklist 3-day repeated 24 hour recalls	Gibson, 2005

Variable	Indicator (s)	Method (s)	Reference (s)
3a. Child purchasing power	• Child's pocket money in a day • Pocket money used to buy street food	Structured interview	Maskar, 2004
3b. Food availability at school	• Type of street food available at school	Observation	
3c. Child's food choice and preference	• Reason to choose certain street food	Structured interview	Maskar, 2004
	• Food acceptance	Food acceptance questionnaire	Kolopaking, 2010
4a. Parent's socioeconomic status	• Parent's education • Parent's occupation	Structured interview School registry (secondary data)	
4b.Food safety promotion at school	• Teacher promoting food safety in lesson • Food safety program from government/NGO	Self administered questionaire for teacher	
5c. Child's characteristics	• Age • Sex	Structured interview	
	• Anthropometric data	Antropometric measurement	Gibson, 2005

1.1 Study design

This survey was a cross sectional study and designed as baseline survey for Senen sub-district, Central Jakarta, DKI Jakarta province. This survey was conducted on March to April 2012.

1.2 Study area

This survey was conducted at public elementary schools in Senen sub-district, Central Jakarta, DKI Jakarta province. Senen subdistrict is one of the urban slum area in Central Jakarta. With an area of 422 ha, it has population density 24,230 people/km^2 (Jakarta Government Official Website, 2011).

1.3 Study population

Population of this study was school children grade 4-5 who study at public elementary schools in Senen subdistrict, Central Jakarta. School children grade 4-5 were chosen because children aged over nine years old were better at recalling intakes than the younger children (Baxter SD, 2009).

1.4 Sample size and sampling method

1.4.1 Sample size

Sample size was calculated using formula for estimating a population proportion with specified absolute precision. Population proportion was 25%, taken from Maskar (2004) which was the proportion of school children eating food containing formaldehyde (fried tofu) in regular school (Table 3.2).

Table 3.2 Proportion of Regular School Children who Eat Suspected Street Food

Suspected Street Food	Proportion of School Children (%)	Sample Calculation (n)
Fried tofu (formaldehyde)	25	73
Batagor (borax and formaldehyde)	14	47
Red syrup (rhodamine B)	10	35

$$n = \frac{Z^2_{1-\alpha/2} \cdot P(1-P)}{d^2}$$

n = sample size

α = confidence level (%) = 95

P = population proportion = 0.25

d = absolute precision = 0.1

Minimal sample size calculated using the formula was 73 subjects. Considering 10% drop out rate, sample size for this study was 81 subjects. Subjects was chosen equally from four public elementary schools. Therefore, number of subjects from each school were at least 21 subjects.

1.4.2 Sampling method

Four public elementary schools were chosen purposively. Each school was selected from different village in Senen subdistrict according to the following criteria:

- It had canteen
- There were street food vendors around the school.
- Students were allowed to buy food from street food vendor around school during breaktime.
- There were at least five types of street food sold in the school surrounding.

There were 41 public elementary school in Senen subdistrict. Three schools were solitary, while the rest were clustered in 11 area. Each school clusters consist of 2 – 6 schools. Eight school clusters met the purposive sampling criteria. From these eight school clusters, four school clusters were selected randomly then one school from each selected school clusters was also selected randomly.

Simple random sampling was used to chose school student who will be interviewed and measured. The inclusion criteria for the school student are grade 4-5, apparently healthy and frequently consumed food from school canteen and/or food vendor around school at least equal or more than three times a week (Figure 3.1).

Food sampling was done purposively. Type of street food and non-street food which were analyzed further were typical food that had been reported containing suspected contaminants previously by NADFC or in the mass media. Formaldehyde was suspected to be in tofu, wet noodle, chicken and seafood. Borax was suspected to be in processed food, such as nugget, meatball and sausage. Rhodamine B previously was found in red coloured beverages, jelly and red sauce (NADFC, 2003 and Maskar, 2004). Cyclamate was common in sweetened beverages (NADFC, 2003). Lead was suspected to be in foods which were exposed to outdoor polluted air (Ardyanto, 2005).

Street food was taken from at least two schools, then combined before chemical analysis. For non-street food, raw materials were bought from three

local markets near the schools, cooked by three subjects' mothers then combined prior to chemical analysis.

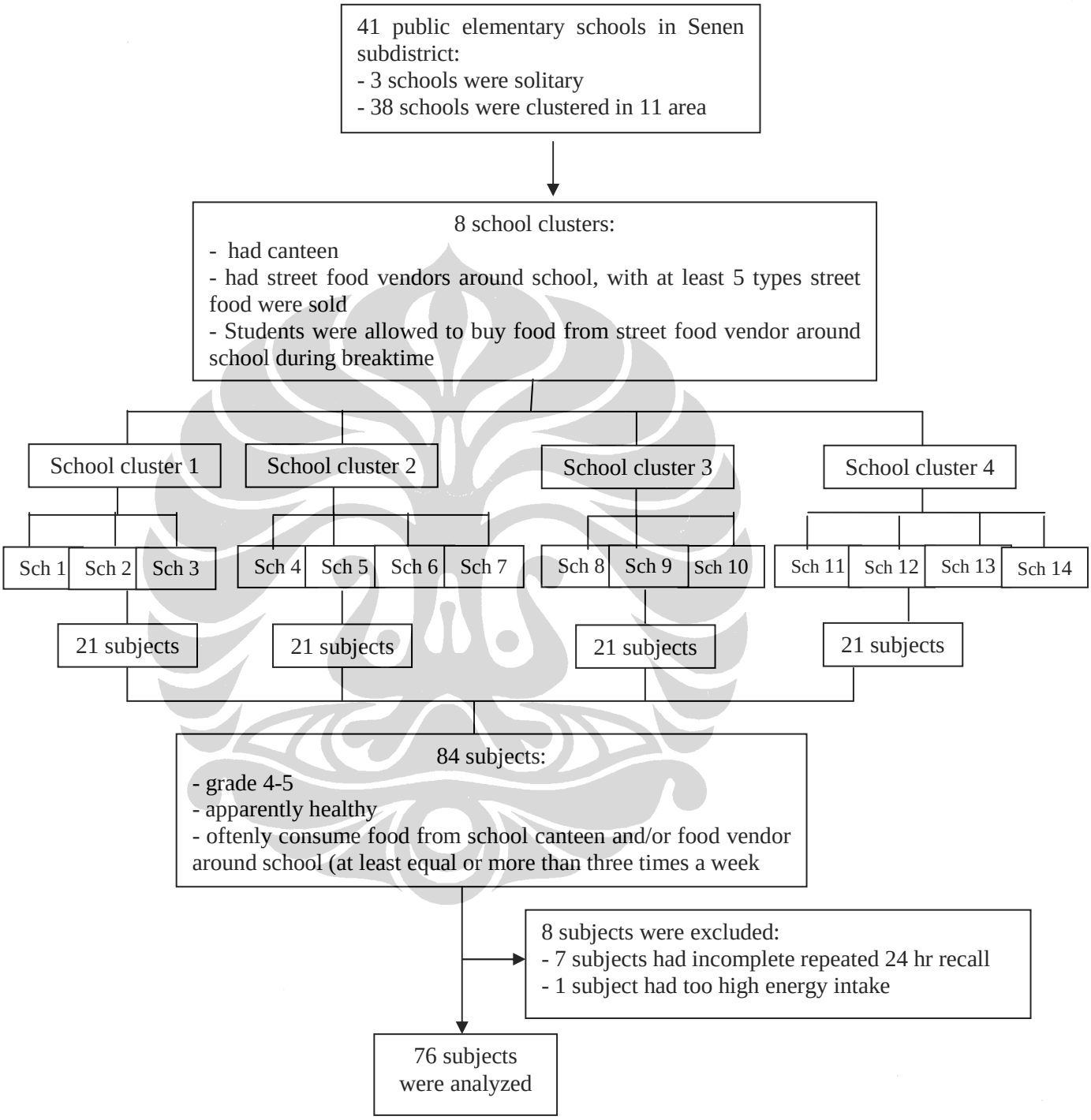

Figure 3.1 Sampling method

1.5 Data collection procedure

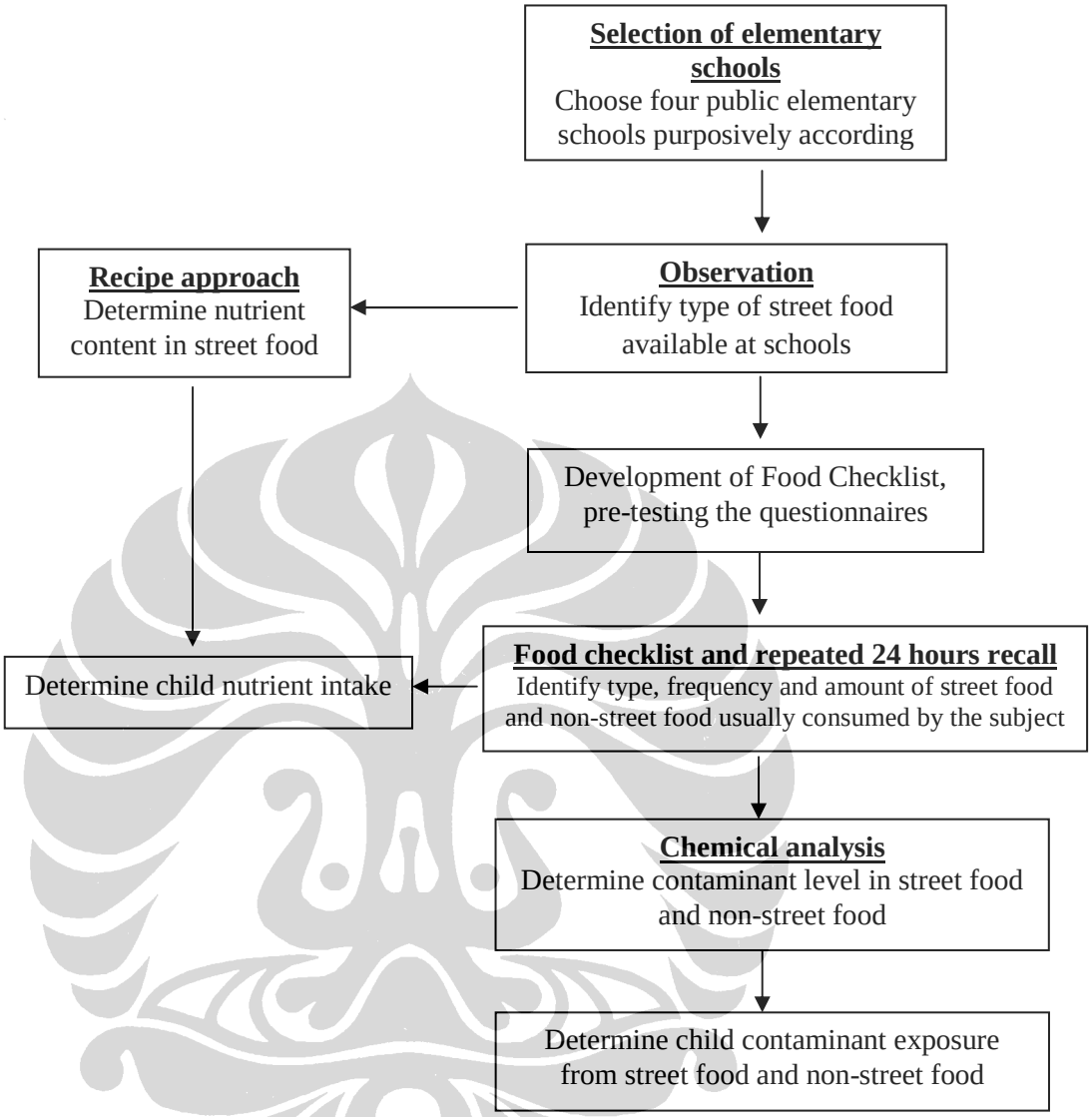

Figure 3.2 Flow diagram of the study

1.5.1 Structured interview

Structured interview was done to school children and street food seller. School children were asked about demographic data, such as age and sex, pocket money, parent's occupation and education, and food choice and preference. Questionnaire was pre-tested before data collection.

Pre-testing of the questionnaire was done in one school from one of the school cluster choosen. It was not the school which had been chosen as sample.

Twenty children from grade 4 and 5 was selected as pre-testing subjects. Pre-testing was done to familiarize the enumerators with the field situation and looking for the appropriate questionnaire. All questionnaire, including food checklist, 24 hour recalls to assess quantitative nutrient intakes and semi-quantitative food questionnaire (SQ-FFQ) to assess food pattern (frequency per week and average portion) were pre-tested. Besides, anthropometric data was also taken.

Street food seller in the school environment was interviewed if their food was consumed by the school children.. They were asked about ingredients, preparation method and any additives used to make the food they sold. These information would be useful to assess the nutrient content of street food with recipe approach.

1.5.2 Food checklist

School children were interviewed with a set of food checklist in a week. The food checklist contains list of street food sold at school and some rows to be fulfilled by list of street food they bought outside school hour. The interviewer gave check mark (√) in the cells if they eat certain street food during that day.

1.5.3 Repeated 24 hour recalls

Repeated 24 hour recalls was chosen over SQ-FFQ because it was more appropriate for subjects' range of age. SQ-FFQ required cognitive skills which were lack among this range of age (Baxter SD, 2009). Repeated 24 hour recalls was done to all subjects using multiple-pass interviewing technique (Gibson, 2005). This technique has four stage as follows:

- First pass: Obtaining a complete list of all food and beverage consumed on the previous day.
- Second pass: Description of each food and beverage consumed in detail, including cooking methods and brand names (if possible).

- Third pass: Estimation of each food and beverage consumed in household measures. Food models can be used to help the estimation. Information on the ingredients of mixed dishes also be obtained.
- Fourth pass: Reviewing the recall to ensure that all items have been recorded correctly.

The 24 hour recall was repeated three times, in two weekdays and one weekend.

1.5.4 Food acceptance questionnaire

Food acceptance questionnaire is a food preference inventory with list of food in colourful pictures. It was used to measure preference for fruit and vegetables, more rich-protein food and healthful snacks (Kolopaking, 2010).

Food were classified into seven groups, i.e. carbohydrate source, fruits, vegetables, plant protein souce, animal protein source, beverages, and street food and snacks. Each groups was represented by six different food. Subjects had to choose between two different groups in a box.

The questionnaire had an evaluation form (Appendix 1). Food choosen by the subject contributes a score to its groups in the form. Result score was the sum of horizontal and vertical score. Scores might range between 0 – 12. Basically there was no cutoff score, thus food group with the highest score means subjects had more tendency to consume it.

1.5.5 Anthropometric measurement

Anthropometric measurement was done by measuring body weight and height of school children.

1.5.5.1 Body weight

Body weight of school children was measured by using SECA electric weight scale. The scale must be positioned in flat surface and the starting point should be on zero. At the start of measurement, the scale must be set on zero. Then the child has to stand in the center of the platform (the two feet should be on the rubber mat of the scale) with upright positition (looking straight ahead).

During the measurement the child should not use slipper or shoes, socks, hat and belt, empty their pockets and use minimal clothing as possible. The body weight was recorded to the nearest 0.1 kg. The measurement was done twice for every children and the end result was the average of two measurements.

1.5.5.2 Body height

Body height of school children was measured by using microtoise. It must be positioned two meters from the floor on a flat wall. Masking tape was used in securing the equipment to the wall. Child must remove shoes, hat and unbraid any hair that would interfere the measurement. Child must stand erect in the middle of the platform and lean against the wall with buttocks and heels aligned with the wall. Child was asked to breathe in and look straight ahead while the headboard of microtoise was lowered until it reaches the scalp of the child. The height was measured twice and recorded into the data sheet. The end result was the average of the two measurements.

1.5.6 Chemical analysis

Chemical analysis was used to know the level of contaminants in street food. Contaminants analyzed were borax, formaldehyde, rhodamine-B, cyclamate and lead. All contaminants were analyzed quntitatively (Table 3.3). Chemical analysis was conducted in Sucofindo Laboratory, Cibitung.

Table 3.3 Analysis Method of Contaminants

No.	Type of contaminant	Method
1.	Borax	Comparison with curcuma paper
2.	Formaldehyde	Spectrophotometry
3.	Rhodamine B	Thin Layer Chromatography
4.	Cyclamate	Gravimetry
5.	Lead	Atomic Absorption Spectrophotometry

1.6 Data and statistical analysis

Data entry and statistical analysis was done with SPSS for Windows version 16.0. Descriptive statistic was used to determine frequency, central tendency, standard deviation and range value.

Nutrient content of the street food was analyzed using Nutrisurvey 2004 portions with recipe approach. It also was used to assess nutrient intake of the school children from repeated 24 hours recall.

Z-score of height for age, and BMI for age were calculated by using WHO Anthro Plus 2005.

PC side was used to estimate prevalence of inadequacy intakes using EAR as cutoff, derived by multiplying Indonesian RDA with conversion factor. The prevalence was sex spesific since the cutoffs were different between boys and girls.

Contaminant level per portion of street food and non-street food was calculated by multiplying the level of contaminant (mg/kg or mg/L) with the weight (gram) or volume (mL) of the food then divided by 1000.

Contaminant exposure from street food and home food was presented descriptively. Contaminant exposure of each subjects was the average sum of each contaminants consumed by subjects based on 3 days repeated 24 hour recalls. It was compared to the safety level (Tolerable Daily Intake/TDI and Acceptable Daily Intake/ADI) of each contaminants presented in Table 3.4 below.

Table 3.4 Safety level of contaminants assesed in this study

No.	Type of contaminant	Safety level (mg/kg bw)
1.	Boron	0.16 mg/kg bw[1]
2.	Formaldehyde	0.15 mg/kg bw[1], No TDI[2]
3.	Rhodamine B	No TDI[2]
4.	Cyclamate	11.0 mg/kg bw[2]
5.	Lead	3.6 µg/kg bw[3]

Source: [1]WHO, 2011; [2]NADFC, 2008; [3]Winter-Sorkina et al., 2003

1.7 Ethical consideration

The ethical clearance was obtained from the ethical committee of Medical Faculty, University of Indonesia. Permission from the local government and school was obtained before data collection started.

The involvement of the school children in this survey is voluntary and with permission from their parents or guardians. They received an explanation letter and permission form to be signed if they allowed their child to participate in the study. All subjects may withdraw from the study anytime they wanted without any sanction. All data obtained was treated confidentially and used only for the purpose of this study.

CHAPTER 4
RESULT

4.1 Subject Characteristics

There were 84 school children from four elementary school in Senen subdistrict enrolled in this study. They were between 9-13 years old. Eight children were excluded, seven due to incomplete food recall, one because the calorie report from food recall was too high which was more than 160% of the subject's predicted total energy expenditure (pTEE). Therefore, only 76 subjects were analyzed.

Most subjects came from middle education family, as nearly two thirds of fathers (64.5%) and more than half of mothers (57.9%) finished senior high school (10-12 years of schooling). Nearly two thirds of mothers were housewife (65.8%), while some fathers were labor (25.0%) and private employee (19.7%). (Table 4.1)

Table 4.1 Subject Characteristics

Subject characteristics n=76	n (%)
Child sex	
Boys	33 (43.4)
Girls	43 (56.6)
Child age (years)[1]	10.5 ± 0.9
School grade	
Grade 4	37 (48.7)
Grade 5	39 (51.3)
Mother's education	
Finished elementary school	9 (11.8)
Finished junior high school	16 (21.1)
Finished senior high school	44 (57.9)
Finished college	7 (9.2)
Father's education	
Finished elementary school	5 (6.6)
Finished junior high school	13 (17.1)
Finished senior high school	49 (64.5)
Finished college	9 (11.8)
Mother's occupation	
Housewife	50 (65.8)
Private employee	10 (13.2)
Enterpreneur	8 (10.5)
Civil servant	1 (1.3)
Labor	1 (1.3)
Others	3 (3.9)
Deceased	3 (3.9)

Subject characteristics n=76	n (%)
Father's occupation	
Labor	19 (25.0)
Private employee	15 (19.7)
Enterpreneur	9 (11.8)
Army/ Police	7 (9.2)
Ojek	6 (7.9)
Security	4 (5.3)
Courier	4 (5.3)
Civil servant	2 (2.6)
Others	5 (6.6)
Deceased	5 (6.6)
Pocket money/day (Rp) [2]	6000 (2000, 20000)
Pocket money used to buy street food/day (Rp) [2]	5000 (1000, 20000)

1 mean ± SD
2 median (min, max)

4.2 Nutritional Status

Based on height-for-age z score (HAZ), one fifth of subjects (21.0%) were stunted. Prevalence of stunting were higher in girls (23.3%) than boys (18.2%) (Figure 4.1).

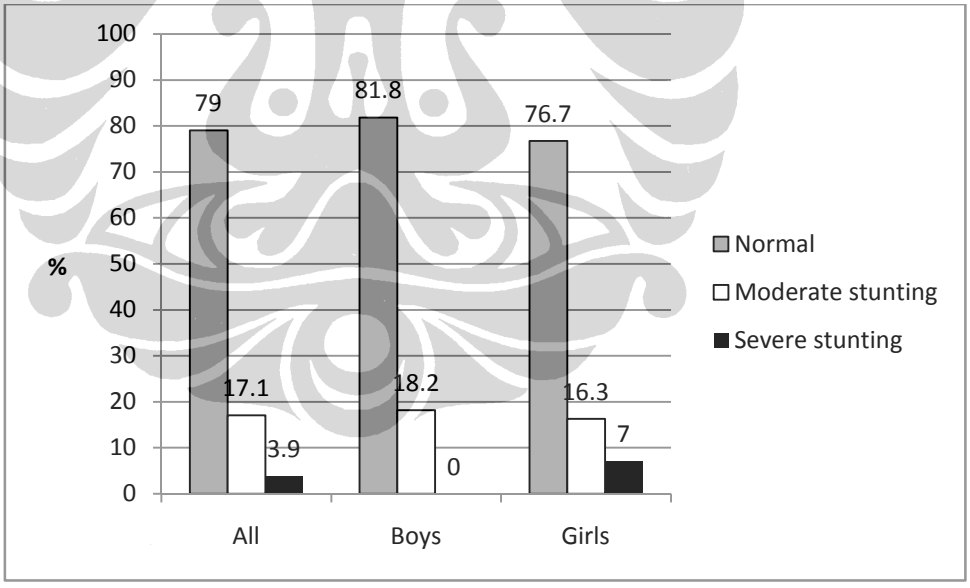

Figure 4.1 Prevalence of Stunted School Children Grade 4-5 in Senen Subdistrict

Based on BMI-for-age z score (BAZ), almost one fifth of subjects were overweight and obese (19.8%). Prevalence of overweight and obesity were higher

in girls (23.3%), as compared to boys (15.2%). Meanwhile, there were some subjects (10.5%) who were thin (Figure 4.2).

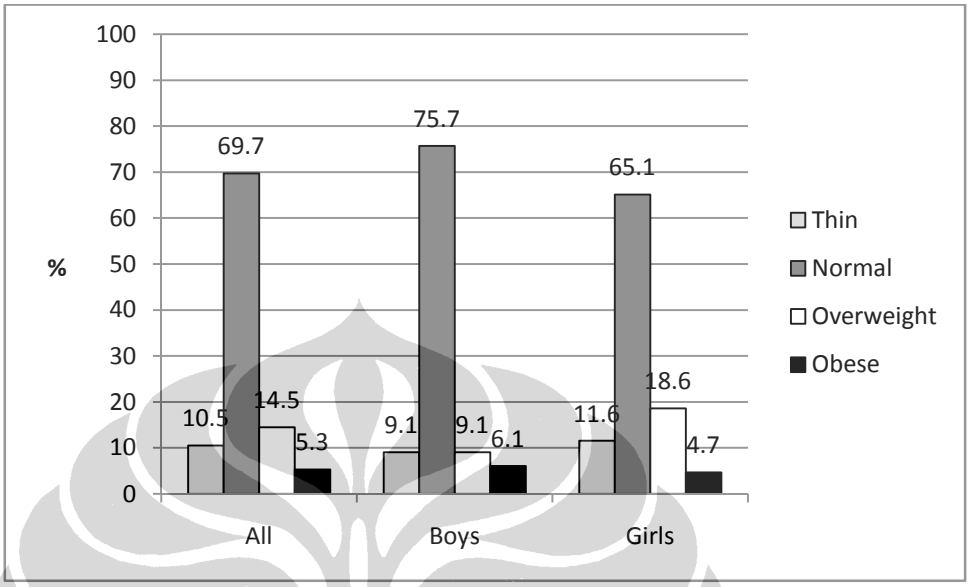

Figure 4.2 Prevalence of Thin, Overweight and Obese School Children Grade 4-5 in Senen Subdistrict

4.3 Food Pattern and Suspected Contaminants

Table 4.2 shows a list of street food consumed by the subjects, grouped into several type of food with the frequency of consumption (person-day). Subjects mostly consumed tea whether sweetened ice tea or cup tea that was suspected to contain cyclamate.

Carbohydrate source of food mostly consumed were fried rice and rice with coconut milk. Processed food such as sausage, nugget and meatball were the most consumed foods from animal protein source group. Among the plant protein source of food, tempeh and tofu were commonly consumed. From the fruit group, fried banana was consumed the most. Other type of food were mix dishes, such as fried tofu-fish-flour mix (*batagor*), fried vegetable-flour mix (*bakwan*), chicken noodle, meatball noodle and steamed fish-flour mix (*siomay*).

Table 4.2 List of Street Food and Suspected Contaminants

No.	Food	Person-day[1]	F	B	RB	C	Pb
	Cerealia, bread and tubers (carbohydrate source)						
1.	Fried rice	102					
2.	Rice with coconut milk	93					
3.	French fries	45					
4.	Toast	35					
5.	Yellow rice	18					
6.	*Mie raut*	16					
7.	Fried noodle	7					
8.	Rolled noodle	3					
9.	Macaroni	2					
10.	Bread with condensed milk	2					
11.	Cassava chips	2					
12.	Fried rice vermicelli	1					
13.	Boiled potato	1					
14.	Rice cake with mix vegetables	1		√			
15.	*Ulam* rice	1					
	Egg, poultry, fish and meat (animal protein source)						
16.	Grilled sausage	80					
17.	Nugget	74		√			√
18.	Fried sausage	61					
19.	Meatball soup	42		√			√
20.	Egg crust	8					
21.	Intestine satay	3					
22.	Omelette	2					
23.	Grilled chicken	1					
	Nuts and other seeds (plant protein source)						
24.	Fried tempeh	68					
25.	Round tofu	57	√				√
26.	Fried tofu	48	√				√
	Fruits						
27.	Fried banana	57					
28.	Ice mix fruit	29			√	√	
	Beverages						
29.	Sweetened ice tea	157				√	
30.	Cup tea	102				√	
31.	Ice syrup	50			√	√	
32.	Ice coconut	34				√	
33.	Fruit juice	2					
34.	Ice chocolate milk	1				√	

No.	Food	Person-day[1]	F	B	RB	C	Pb
	Others						
35.	*Batagor*	46	√ (tofu)	√ (batagor)			√
36.	Bakwan	43					
37.	Chicken noodle	42	√ (noodle and chicken)				√
38.	Meatball noodle	39		√ (meatball)			√
39.	*Cakwe*	38					
40.	Ice cream	37				√	
41.	*Cireng*	34		√			√
42.	*Siomay*	32	√ (tofu)	√ (siomay)			√
43.	*Pempek*	29		√			√
44.	*Cilok*	28		√			√
45.	Jelly	26			√	√	
46.	*Risoles*	23					
47.	*Es goyang*	3				√	
48.	Chicken porridge	2	√				√
49.	Burger	2					
50.	*Cilok bakar*	2		√			
51.	*Cimol*	2		√			
52.	*Kue cubit*	2					
53.	*Martabak manis*	2					
54.	*Otak-otak*	2		√			
55.	Banana with chocolate	2					
56.	Mixed ice and fruit	1				√	

1 Person-day is sum of days in a week when the subjects consumed certain street food, n=76
F=formaldehyde, B=borax, RB=rhodamine B, C=cyclamate, Pb=lead

Table 4.3 presents a list of non-street food consumed by the subjects, mostly were home-made food. Food and beverages sold by fast food restaurants were not included. Almost all subjects consumed rice (96.1%). The second most consumed food was instant noodle (67.1%). Both were from carbohydrate source group. In animal protein source group, the most consumed were omelette (39.5%) and fried chicken (35.5%). Other food groups such as plant protein, vegetables and fruits were less consumed by the subjects.

Table 4.3 List of Non-street Food and Suspected Contaminants

No.	Food	n	%	F	B
	Cerealia, bread and tubers (carbohydrate source)				
1.	Rice	73	96.1		
2.	Instant noodle	51	67.1		
3.	Fried rice	12	15.8		
4.	French fries	4	5.3		
5.	Bread with condensed milk	3	3.9		
6.	Bread with cheese and chocolate	2	2.6		
7.	Toast	2	2.6		
8.	Bread with chocolate	6	7.9		
9.	Fried rice vermicelli	2	2.6		
10.	Boiled potato	2	2.6		
11.	Potato cake	2	2.6		
12.	Noodle pizza	1	1.3		
13.	Bread with cheese	1	1.3		
14.	Fried noodle	1	1.3		
15.	Bread wirh sugar	1	1.3		
	Egg, poultry, fish and meat (animal protein source)				
16.	Omelette	30	39.5		
17.	Fried chicken	27	35.5	√	
18.	Sunny side up	19	25.0		
19.	Nugget	13	17.1		√
20.	Boiled egg	13	17.1		
21.	Fried sausage	11	14.5		√
22.	Hot tuna fish	9	11.8	√	
23.	Fried catfish	9	11.8		
24.	Beef *rendang*	8	10.5		
25.	Coconut chicken curry	4	5.3	√	
26.	Meatball	3	3.9		√
27.	Hot spicy egg	3	3.9		
28.	*Teri* fish with chili sauce	3	3.9	√	
29.	Chicken stripes	3	3.9	√	
30.	martabak telur	3	3.9		
31.	Fried long-jawed mackerel	2	2.6	√	
32.	Egg stew	2	2.6		
33.	Sardines	2	2.6		
34.	Indonesian yellow chicken soup	2	2.6	√	
35.	Hot squid	2	2.6	√	
36.	Hot *Cue* fish	2	2.6	√	
37.	Fried salty fish	2	2.6	√	
38.	Fried duck	2	2.6		

No.	Food	n	%	F	B
39.	Hot fried liver	1	1.3		
40.	Chicken with soy sauce	1	1.3	√	
41.	Coconut egg curry	1	1.3		
42.	Chicken *rendang*	1	1.3	√	
43.	Chicken stew	1	1.3	√	
44.	Fried eel	1	1.3		
45.	Coconut liver and gizzard curry	1	1.3		
46.	Chicken leg soup	1	1.3	√	
47.	Chicken curry	1	1.3	√	
48.	Fried carp	1	1.3		
49.	Fried bandeng	1	1.3	√	
50.	*Teri* fish with coconut	1	1.3	√	
51.	Coconut duck curry	1	1.3		
52.	Fried chicken liver	1	1.3		
53.	Fried *Cue* fish	1	1.3	√	
54.	Fried *Bawal* fish	1	1.3	√	
55.	Hot chicken	1	1.3	√	
56.	Fried shrimp with flour	1	1.3	√	
57.	Fried *Gabus* fish	1	1.3	√	
	Nuts and other seeds (plant protein source)				
58.	Fried tempeh	12	15.8		
59.	Fried tempeh with flour	7	9.2		
60.	Fried tofu	5	6.6	√	
61.	Sweetened tempeh stripes	2	2.6		
62.	Fried tofu with flour	2	2.6	√	
63.	Stir-fried long bean	2	2.6		
64.	Fried tofu filled with vegetables	1	1.3	√	
65.	Tofu stew	1	1.3	√	
66.	Stir-fried bean sprouts	1	1.3		
67.	Boiled tofu	1	1.3	√	
68.	Hot tofu and tempeh	1	1.3	√	
	Vegetables				
69.	Spinach soup	16	21.1		
70.	Mix vegetables soup	16	21.1		
71.	Sauteed water spinach	9	11.8		
72.	Vegetable sour soup	8	10.5		
73.	Sauteed *sawi*	4	5.3		
74.	*Katuk* plain soup	1	1.3		
75.	Sauteed mix vegetables	1	1.3		
76.	Sauteed baby pokcoy	1	1.3		
77.	Vegetable coconut soup	1	1.3		

No.	Food	n	%	F	B
78.	Sauteed mushrooms	1	1.3		
79.	Sauteed *pare*	1	1.3		
80.	Steamed cassava leaves	1	1.3		
	Beverages				
81.	Sweetened tea	6	7.9		
	Others				
82.	*Pempek*	2	2.6		
83.	*Bakwan*	2	2.6		
84.	*Krecek krupuk kulit*	1	1.3		
85.	Tofu omelette	1	1.3	√	

n =76, F=formaldehyde, B=borax

4.4 Contaminant Level of Street Food and Non-street Food

The contaminant analysis of street food is presented in Table 4.4. Formaldehyde level in street food ranged between 0.29–75.75 mg/kg. The highest level of formaldehyde was found in wet noodle of chicken noodle (75.75 mg/kg). Range of cyclamate level was between 277.64–1207.80 mg/L. The highest cyclamate level was found in cup tea. Borax and rhodamine-B were not found in the suspected foods, while lead level was low in the suspected food (below 0.1 mg/kg).

Formaldehyde was not only found in street food, but also in non-street food (Table 4.5). Formaldehyde was found in dishes made of tofu, chicken and squid. Formaldehyde level in tofu based dishes ranged between 6.89–192.12 mg/kg. In chicken based dishes, it ranged between 0.53–1.61 mg/kg. The highest level was found in fried tofu. Borax was not found in non-street food.

Table 4.4 Contaminant analysis of street food

No.	Street Food	F (mg/kg)	B	RB	C (mg/L)	Pb (mg/kg)
1.	Cupped tea	NA	NA	NA	1207.80	NA
2.	Sweetened ice tea	NA	NA	NA	858.65	NA
3.	Coconut ice	NA	NA	NA	277.64	NA
4.	Ice chocolate milk	NA	NA	NA	Nil	NA
5.	Jelly	NA	NA	Negative	Nil	NA
6.	Ice syrup	NA	NA	Negative	Nil	NA
7.	Red sauce	NA	NA	Negative	NA	NA
8.	Wet noodle (from chicken noodle)	75.75	NA	NA	NA	Below 0.1
9.	White tofu meatball	15.03	NA	NA	NA	NA
10.	Brown tofu meatball	6.70	NA	NA	NA	NA
11.	Fried tofu	5.79	NA	NA	NA	Below 0.1
12.	Chicken (from chicken noodle)	1.12	NA	NA	NA	Below 0.1
13.	Fried tofu filled with vegetables	0.29	NA	NA	NA	Below 0.1
14.	Round tofu	Negative	NA	NA	NA	Below 0.1
15.	*Batagor*	NA	Negative	NA	NA	Below 0.1
16.	Meatball	NA	Negative	NA	NA	Below 0.1
17.	*Cireng*	NA	Negative	NA	NA	Below 0.1
18.	*Pempek*	NA	Negative	NA	NA	Below 0.1
19.	Nugget	NA	Negative	NA	NA	Below 0.1
20.	*Otak-otak*	NA	Negative	NA	NA	Below 0.1
21.	Rice cake	NA	Negative	NA	NA	NA

Note: NA=not analyzed, F=formaldehyde, B=borax, RB=rhodamine B, C=cyclamate, Pb=lead

Table 4.5 Contaminant Analysis of Non-street Food

Non-street Food	Formaldehyde (mg/kg)	Borax (mg/kg)
Tofu based dishes		
Fried tofu	192.12	NA
Fried tofu with flour	158.82	NA
Boiled tofu	61.80	NA
Tofu omelette	54.96	NA
Tofu stew	18.60	NA
Hot tofu and tempeh	6.89	NA
Fried tofu filled with vegetables	Not detected	NA
Chicken based dishes		
Coconut chicken curry	1.61	NA
Chicken stew	1.20	NA
Fried chicken	0.90	NA
Chicken leg soup	0.53	NA
Chicken stripes	Not detected	NA
Indonesian yellow chicken soup	Not detected	NA
Chicken with soy sauce	Not detected	NA
Chicken *rendang*	Not detected	NA
Chicken curry	Not detected	NA
Hot chicken	Not detected	NA
Seafood and fresh water fish based dishes		
Hot squid	5.20	NA
Hot tuna	Not detected	NA
Fried long–jawed mackerel	Not detected	NA
Hot *Cue* fish	Not detected	NA
Fried salty fish	Not detected	NA
Fried *Bandeng* fish	Not detected	NA
Teri fish with coconut	Not detected	NA
Fried *Cue* fish	Not detected	NA
Fried *Bawal* fish	Not detected	NA
Fried shrimp with flour	Not detected	NA
Teri fish with chili sauce	Not detected	NA
Fried *Gabus* fish	Not detected	NA
Processed food		
Fried sausage	NA	Negative
Meatball	NA	Negative
Nugget	NA	Negative

Note: NA= not analyzed

Based on Table 4.4, street food containing suspected contaminant were taken to calculate the contaminant level per portion. Contaminant level in a portion of street food is shown in Table 4.6. Formaldehyde level in a portion of

street food ranged between 0.01–5.30 mg/portion. Using WHO cutoff, it is shown that consumption of one portion of wet noodle exceeded the safety level of formaldehyde in the subject, while using NADFC cutoff all food containing formaldehyde exceeded the safety level.

Table 4.6 Contaminant Level of Street Food per Portion

No.	Street Food	Portion	Formaldehyde (mg/portion)	Cyclamate (mg/portion)	Safety level (mg)[1]
1.	Cupped tea	240 mL	NA	289.87	341
2.	Sweetened ice tea	230 mL	NA	197.49	341
3.	Coconut ice	400 mL	NA	111.06	341
4.	Wet noodle (from chicken noodle)	70 gram	5.30	NA	4.65
5.	White tofu meatball	58 gram	0.87	NA	4.65
6.	Brown tofu meatball	48 gram	0.32	NA	4.65
7.	Fried tofu	45 gram	0.26	NA	4.65
8.	Chicken (from chicken noodle)	50 gram	0.06	NA	4.65
9.	Fried tofu filled with vegetables	50 gram	0.01	NA	4.65

1 Safety level was calculated from the safety amount of contaminant per kg body weight multiplied with subjects' average body weight (31 kg) (WHO, 2011)
NA= not analyzed

Table 4.7 Contaminant Level of Non-street Food per Portion

No.	Non-street Food	Portion	Formaldehyde (mg/portion)
1.	Fried tofu	45 gram	8.65
2,	Fried tofu with flour	25 gram	3.97
3.	Boiled tofu	45 gram	2.78
4.	Tofu omelette	20 gram	1.10
5.	Tofu stew	45 gram	0.84
6.	Tahu tempe balado	60 gram	0.41
7.	Spicy squid	30 gram	0.16
8.	Chicken with coconut milk	30 gram	0.05
9.	Chicken stew	30 gram	0.04
10.	Fried chicken	30 gram	0.03
11.	Chicken leg soup	20 gram	0.01

Table 4.7 shows contaminant level of non-street food per portion based non-street food containing suspected contaminant in Table 4.5. Range of formaldehyde level in a portion of non-street food was 0.01–8.65 mg/portion.

Level of formaldehyde in a portion of fried tofu exceeded the safety level of formaldehyde (4.65 mg, WHO cutoff) based on subject's average body weight (31 kg).

4.5 Nutrient Intake from Street Food and Non-street Food

Table 4.8 shows the average intake of subjects compared to dietary reference intakes (DRI) values. Energy intake was less than estimated energy requirement (EER). Carbohyrate and protein intake were more than estimated average requirement (EAR). Almost all micronutrients intake, except vitamin B12 were less than EAR.

Table 4.8 Average Intake of School Children Grade 4-5 in Senen Subdistrict

Nutrient	Average Intake[1] n=76	Boys n=33		Girls n=43	
		Intake[1]	EAR[2]	Intake[1]	EAR[2]
Energy (kcal/day)	1707.3 ± 448.1	1897.9 ± 468.0	1928	1561.1 ± 375.8	1837
Carbohydrate (g/day)[2]	207.9 ± 63.2	229.1 ± 64.1	100	191.6 ± 58.0	100
Protein (g/day)	42.8 ± 13.0	46.8 ± 13.3	26.6	39.7 ± 12.2	28.1
Fat (g/day)	58.3 ± 20.5	64.1 ± 22.5	ND	53.8 ± 17.9	ND
Calcium (mg/day)	245.3 ± 138.2	276.9 ± 155.8	833.3	221.1 ± 119.3	833.3
Iron (mg/day)	5.9 ± 2.2	6.8 ± 2.6	9.3	5.3 ± 1.6	12.5
Zinc (mg/day)	5.4 ± 1.7	5.9 ± 1.9	11.7	5.1 ± 1.5	10.5
Vitamin B1 (mg/day)	0.6 ± 0.2	0.6 ± 0.2	0.8	0.5 ± 0.2	0.8
Vitamin B2 (mg/day)	0.7 ± 0.2	0.7 ± 0.2	0.8	0.6 ± 0.2	0.9
Vitamin B3 (mg/day)	8.3 ± 2.8	9.2 ± 2.9	9.2	7.6 ± 2.6	9.2
Vitamin B12 (µg/day)[3]	1.9 ± 0.2	1.9 ± 0.1	1.5	1.9 ± 0.2	1.5
Vitamin C (mg/day)[3]	9.9 ± 3.1	10.6 ± 2.7	41.7	9.4 ± 3.5	41.7

1 mean ± SD, average intake was the average of 3 days 24 hour recalls (2 weekdays + 1 weekend)
2 Dietary Reference Intakes (DRI) used in this table were EER (estimated energy requirement) for energy and EAR (estimated average requirement) for macronutrients and micronutrients. EER was calculated from total energy expenditure added by energy deposition (25 kcal). EAR for carbohydrate was extrapolated from adult data, EAR for protein was calculated from the amount needed per kg body weight (0.76 g/kgbw/day) multiplied by the reference weight (boys=35 kg, girls=37 kg) (Food and Nutrition Board, Institute of Medicine, 2005), EAR for micronutrient was calculated from Indonesian RDA using conversion factors (Food and Nutrition Board, Institute of Medicine, 2003). 3 Data was transformed with squareroot to have a normal distribution. ND = not determined

Prevalence of inadequate intakes of calcium, iron, zinc, vitamin B1, B2, B3 and C is shown in Table 4.9. Girls had higher prevalence of inadequate intakes than boys. All girls had inadequate intakes of calcium, iron and zinc.

Table 4.9 Prevalence of Inadequate Intakes of Micronutrients among School children Grade 4-5 in Senen Subdistrict

Nutrient	Boys (%) n=33	Girls (%) n=43
Calcium	99.7	100.0
Iron	87.4	100.0
Zinc	99.8	100.0
Vitamin B1	84.3	99.8
Vitamin B2	73.9	94.1
Vitamin B3	52.3	85.9
Vitamin C	97.7	96.2

Table 4.10, 4.11 and 4.12 present proportion of energy and nutrient intakes from street food and non-street food. Approximately, around one fifth to one third of energy and nutrient intakes were from street food.

Table 4.10 Proportion of Energy and Macronutrients Intake from Street Food and Non-street Food

	Energy (kcal) [1]	%	Carbohydrate (gram) [1]	%	Protein (gram) [1]	%	Fat (gram) [1]	%
Street food	598.4 ± 334.1	35.0	74.6 ± 42.8	35.9	16.1 ± 10.7	37.6	26.2 ± 16.3	44.9
Non street food	1108.9 ± 373.5	65.0	133.3 ± 53.5	64.1	26.7 ± 11.5	62.4	32.1 ± 16.0	55.1
Total	**1707.3 ± 448.1**	**100**	**207.9 ± 63.2**	**100**	**42.8 ± 13.0**	**100**	**58.3 ± 20.5**	**100**

1 mean ± SD

Table 4.11 Proportion of Calcium, Zinc and Iron Intake from Street Food and Non-street Food

	Calcium (mg) [1]	%	Zinc (mg) [1]	%	Iron (mg) [1]	%
Street food	34.3 ± 2.5 [2]	20.7	1.7 ± 1.22	31.5	2.1± 1.6	35.6
Non street food	194.6 ± 137.9	79.3	3.7 ± 1.6	68.5	3.8 ± 2.0	64.4
Total	**245.3 ± 138.2**	**100**	**5.4 ± 1.7**	**100**	**5.9 ± 2.2**	**100**

1 mean ± SD

2 Data was transformed by log10 to have a normal distribution

Table 4.12 Proportion of Vitamin B1, B2, B3, B12 and C from Street Food and Non-street Food

	Vitamin B1 (mg) [1]	%	Vitamin B2 (mg) [1]	%	Vitamin B3 (mg) [1]	%	Vitamin B12 (µg) [1,2]	Vitamin C (mg) [1,2]
Street food	0.2 ± 0.1	33.3	0.2 ± 0.1	28.6	2.6 ± 1.8	31.3	0.5 ± 0.1	2.0 ± 1.0
Non street food	0.4 ± 0.2	66.7	0.5 ± 0.2	71.4	5.7 ± 2.6	68.7	1.2 ± 0.2	6.5 ± 3.5
Total	0.6 ± 0.2	**100**	0.7 ± 0.2	**100**	8.3 ± 2.8	**100**	1.9 ± 0.2	9.9 ± 3.1

1 mean ± SD
2 Data was transformed by squareroot to have a normal distribution

4.6 Contaminant Exposure from Street Food and Non-street Food

The median formaldehyde exposure from street food, non-street food and in total didn't exceed the safety level for average body weight of 31 kg (4.65 mg). The mean exposure of cyclamate from street food also didn't exceed the safety level for average body weight (341 mg). (Table 4.13)

Table 4.13 Contaminant Exposure from Street Food and Non-street Food

	Formaldehyde (mg)[1]	Cyclamate (mg) [2]
Street food	0.0 (0.0, 6.29)	153.5 ± 145.1
Non street food	0.01 (0.0; 8.46)	NA
Total	0.04 (0.0, 8.46)	153.5 ± 145.1

1 median (min, max)
2 mean ± SD
NA= not analyzed

Approximately, using WHO cutoff, two thirds of subjects were exposed to formaldehyde (68.4%) and cyclamate (65.8%) below their individual safety level (calculated from the safety amount of contaminant per kg body weight multiplied with individual body weight). However, there were still some subjects exposed to formaldehyde (9.2%) and cyclamate (11.8%) above their individual safety level (Table 4.14). On the other hand, using NADFC cutoff for formaldehyde, subjects who were exposed to formaldehyde above their individual safety level increase to 77.6%.

Table 4.14 Prevalence of School Children Grade 4-5 Exposed to Contaminant Based on Safety Level in Senen Subdistrict

Child Group	Formaldehyde[1]		Cyclamate[1]
	WHO cutoff (0.15 mg/kg bw)	NADFC cutoff (no TDI)	
Not exposed	17 (22.4)	17 (22.4)	17 (22.4)
Exposed below the safety level	52 (68.4)	-	50 (65.8)
Exposed above the safety level	7 (9.2)	59 (77.6)	9 (11.8)

1 n (%), n=76

4.7 Food Preference

More than half of the subjects stated that the reason to buy street food was because of its delicious taste (57.9%). Some of them also stated hungry as one of the reason (17.1%). Others stated they chose spesific foods because it was cheap, nutritious, and the place to buy the food was near. A few said they bought street food just for snacking.

Subjects had more tendency to choose animal protein source of food, as it had the highest score from the food acceptance questionnaire. On the other hand, they had less tendency to choose vegetables, as it had the lowest score (Table 4.15).

Table 4.15 Food Acceptance Questionnaire Score

Type of Food	Score[1] (0-12)
Carbohydrate source	6.6 ± 1.6
Fruits	6.4 ± 2.0
Vegetables	4.3 ± 2.6
Plant Protein Source	4.7 ± 2.1
Animal Protein Source	7.0 ± 2.2
Beverages	6.9 ± 1.9
Street food and snacks	6.1 ± 2.4

1 mean ± SD

4.8 Food Safety Promotion at School

From the teacher self administered questionnaire about promotion of food safety at school, teachers rarely taught the student about food safety. There were only a few teachers who taught about food safety, including food hygiene, how to choose safe food based on sense of sight and taste. In general, most teachers taught about nutritious food with the obsolete tagline “4 sehat 5 sempurna”. They usually insert these topics in Science and Education on Jakarta Environment and Culture (*Pendidikan Lingkungan dan Budaya Jakarta*/PLBJ). Only one school had been visited by NADFC to promote safe street food, free from chemical additives such as preservatives and colouring.

CHAPTER 5
DISCUSSION

5.1 Nutritional Status and Nutrient Intake

According to RISKESDAS 2007, prevalence of wasting in boys in this study (9.1%) was lower than Jakarta (14.9%) and national prevalence (13.3%), while prevalence of wasting in girls (11.6%) was higher than Jakarta (10.6%) and national prevalence (10.9%). Prevalence of obesity in boys and girls (6.1% and 4.7% respectively) in this study was lower than Jakarta (12.0% and 8.4% respectively) and national prevalence (9.5% and 6.4% respectively).

Overall, the average energy and nutrient intake of subjects in this study were less than the dietary reference intakes (DRI) values, except for macronutrients and vitamin B12. This indicated that there were still many subjects who were at risk of energy and micronutrients deficiency. Micronutrients intake less than estimated average requirement (EAR) were calcium, iron, zinc, vitamin B1, vitamin B2 and vitamin C in boys and girls, and vitamin B3 only in girls (Table 4.8). Prevalence of inadequate intakes of these micronutrients among subjects were high (Table 4.9). Deficiency of these micronutrients in school children could affect their growth and development.

Lack of calcium sufficiency will cause detrimental effect to development of bone mass. In the long run, it will cause fractures and osteoporosis (Gallagher M.L., 2008). Iron deficiency with or without anemia affect cognitive achievement in school children (Gallagher M.L., 2008 and Halterman et al., 2001). Zinc is important for growth and immune system. Zinc deficiency at early age of life can lead to short stature (Gallagher M.L., 2008). In this study, the prevalence of stunting among subjects is medium.

B complex vitamins are essential to metabolize the macronutrients into energy. Besides, these vitamins are also important for the nervous system, skin, hair, eyes and liver. Deficiency of these vitamins may cause several diseases. Vitamin B1 (thiamin) deficiency may cause a disease known as beriberi. Lack of vitamin B2 (riboflavin) cause cheilosis and angular stomatitis. Severe deficiency of vitamin B3 (niacin) will lead to pellagra (Gallagher M.L., 2008). Vitamin C

(ascorbic acid) has a role as antioxidant and in promoting resistance to infection. Vitamin C deficiency leads to scurvy. Lack of vitamin C sufficiency also can cause the individual become susceptible to infection (Gallagher M.L., 2008).

Calcium rich foods are dairy products and dark green leafy vegetables. Tofu is a good source of calcium in these population; however the chemical analyses of the tofu sold in the market and cooked by the mothers suggested that effort to reduce contaminant level (formaldehyde) is a must prior to promoting intake of such nutrient-dense food.

Best source of iron and zinc are from animal source. Despite children's preference on animal food, their actual intake of animal foods was low.

Vitamin B1, B2 and B3 are found in many food. The important source of vitamin B1 is cereal grains, vitamin B2 is green leafy vegetables, meats and dairy product, and vitamin B3 is lean meats, poultry and fish. Vitamin C is rich in fruits (Gallagher ML, 2008). Of all the food groups, subjects in this study were lack in vegetables and fruits as they were less consumed and less preferred (Table 4.2, Table 4.3 and Table 4.15). Although fruits were more preferred than vegetables (Table 4.15), they were also less consumed. It might be because fruits were expensive and subjects couldn't afford to buy it as they had little amount of pocket money (Table 4.1).

On the other hand, macronutrients intake was good. Carbohydrate and protein average intakes were more than EAR (Table 4.8). These results were consistent with subjects' food pattern and preference. Subjects' consumed more carbohydrate source (cerealia, bread, tubers and sweetened beverages) and animal protein source (egg, poultry and fish). Subjects had more tendency to choose animal protein source, beverages and carbohydrate source as these type of food were the top three from the food acceptance questionnaire (Table 4.15).

Concerning carbohydrate source typically consumed by subjects, they liked to consume refined carbohydrates, such as white rice, white bread, instant noodle and beverages with sweeteners which were derived from polished grains. They were unlikely to consume dietary fibers, whole grain and cereals.

Refined carbohydrate consumption has been increasing. One of the reason is it has become a replacement of saturated fat in dietary prescription to reduce

CVD risk (Hu, 2010 and Siri-Tarino et. al., 2010). Further research found that increased intake of refined carbohydrate was related to increased risk of type 2 DM and CHD (Liu, 2002).

Refined carbohydrates has higher glycemic index (GI) than whole grains, contributing to higher postprandial blood glucose that leads to higher demand of insulin and in long term would increase type 2 DM risk (Liu, 2002).

High intake of refined carbohydrates also influence lipid profile. It induces hypertriglyceridemia and reduces HDL level in healthy people. In conjunction with hyperglycemia and hyperinsulinemia that lead to hypertension, impaired fibrinolysis and inflammatory responses of endothelial cells, all plays a role in increase risk of CHD (Liu, 2002).

Looking to the food pattern and preference of subjects in this study, they might be at risk in developing type 2 DM and CHD during adulthood as long term effect of refined carbohydrate consumption and lack of vegetables and fruits. Therefore, introducing complex carbohydrate sources (unpolished or whole grains), beans and nuts are needed.

5.2 Contaminant Exposure

Contaminants found in this study were formaldehyde and cyclamate. According to Indonesian Minister for Health Regulation (*Peraturan Menteri Kesehatan RI/PERMENKES RI*) No. 722/MEN.KES/PER/IX/88 about Food Additives, formaldehyde was banned to be used in food. In this study, formaldehyde was found in street food and non-street food, most commonly in tofu based dishes. The highest level of formaldehyde per portion street food was found in wet noodle of chicken noodle. As this street food was frequently consumed by the subjects (Table 4.2), subjects were at risk of formaldehyde exposure above their safety level. We found that consumption of one portion of wet noodle already exceeded the safety level of formaldehyde in the subject and in few children they consumed wet noodle as often as 2 times/week, even one child consumed wet noodle 4 times/week.

This study only measure formaldehyde exposure through ingestion. Actually, the highest exposure may come from inhalation. Formaldehyde

inhalation can come from outdoor and indoor environment. Formaldehyde in outdoor environment is from combustion of fossil fuel. In indoor environment, formaldehyde is in plywood, particle board product and paper product. Therefore, eliminating formaldehyde exposure from food, may not be significant to health if exposure through inhalation is still high (North Carolina Department of Labor Occupational Safety and Health Program, 2009 and Tang et. al., 2009).

Formaldehyde also occured naturally in living creature as a side product of metabolism. Several fruit, vegetables, meat, dairy products, seafood and beverages may contain formaldehyde naturally at various level (Center for Food Safety Hong Kong, 2009).

In very sensitive people, ingestion of formaldehyde may result in acute symptoms, such as intense pain in the mouth and pharynx, abdominal pains with nausea, vomiting and possible loss of consciousness. Long term effect may leads to degenerative changes in liver, kidneys, heart and brain (Keith L.H., 2002).

According to WHO, there was no definitive evidence that formaldehyde exposure through ingestion cause cancer (Center for Food Safety Hong Kong, 2009). Nevertheless, formaldehyde exposure through ingestion, even in small amount, should be considered as health hazard although no appreciable health effect had been found yet.

Cyclamate was considered by JECFA for human consumption, though some studies showed it can cause bladder tumor in rats. However, Canada and USA don't approve the use of cyclamate as food additives. In Indonesia, cyclamate is permitted with ADI 11.0 mg/kgbw. The maximum use of cyclamate in food products should be between 10–2000 mg/kg product (Martins et al., 2005 and NADFC, 2008). There were no beverages analyzed in this study exceeded the maximum level permitted (Table 4.4). The highest level of cyclamate was found in cup tea. Compared to subjects' safety level, if cup tea was consumed more than once a day, the subject could be exposed to cyclamate above the safety level. In average, subjects consumed cup tea 1 – 2 times/week and we found 9 subjects who consumed more than 1 cup tea within the 24-hour periods.

In contrast to study done by Maskar (2004), in this study we didn't found borax and rhodamine B in the street foods. From the interview with street food

vendors, they said that NADFC oftenly inspects their foods, making them careful not to add any illegal additives.

The limitation of this study is that we cannot conclude how much the real exposure of formaldehyde and cyclamate to the subjects due to limited number of analyzed food consumed by the subjects and days of food recalls and so the reported intake of contaminant may be lower than the actual one. However, despite the limited foods analyzed for the contaminants we show with our results that in few subjects the level already exceed the safety limit. Besides safety issue amongst both street foods and non-street foods consumed by these elementary school children their overall diet suggested that the micronutrient intakes (especially iron, zinc and calcium) were inadequate for important nutrients important for their optimal growth and development.

Since contaminants were found in street food and non-street food, education need to be done to teachers, parents, school children, street vendor and home industry. Teachers and parents need to be educated on how to choose safe and healthy food. Therefore, teachers can teach their students about choosing safe and healthy street food and parents can provide safe and healthy food at home.

Subjects in this study had less tendency to consume fruits and vegetables, and preferred high calorie food (animal source and beverages). Therefore, besides knowing how to choose safe and healthy street food, school children also need to be educated on balance diet and eating various kind of food groups.

Street vendors as the food handler have to be educated on how to make safe and healthy food starting from choosing the raw materials, food processing until how to serve it to the buyer. It has to be emphasized that they are not permitted to add any illegal additives to the food.

Home industry as the producer of raw materials sold in the traditional market have to be educated on food processing, stressing on no illegal additives, especially formaldehyde, were permitted as preservatives. They also have to be taught about alternative additives that could be used as preservatives.

More comprehensive study (total diet study) to assess both nutrient intakes and contaminant exposures is necessary to provide more actual pictures of the situation for further program and policy considerations.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

a. Street food mostly consumed by the school children were beverages and carbohydrate source of food, while non-street food mostly consumed were carbohydrate source and animal source. Fruits and vegetables were less consumed.
b. Contaminants found in this study were formaldehyde and cyclamate. Formaldehyde was found in street food and non-street food. Cyclamate was found in street food, as it was not analyzed in non-street food.
c. Macronutrients intake of subjects are good, but energy and micronutrients intake are still less than EAR. Street food contributed about one fifth to one third to nutrient intake.
d. In general, using WHO cutoff, contaminant exposure of formaldehyde and cyclamate were below the safety level based on subjects average body weight. However, some subjects were exposed to formaldehyde (77.6% bNADFC cutoff and 9.2% by WHO cutoff) and cyclamate (11.8%) above their individual safety level.

6.2 Recommendations

a. Improve parents especially mothers knowledge on how to choose safe and healthy food, specifically food rich in iron, calcium and zinc. Knowledge about how to recognize raw food that contain contaminants in the market also needs to be taught. These could be achieved through education, such as campaign during teacher parents meeting.
b. Improve teachers knowledge on how to choose safe and healthy food, balance diet for children and eating various kind of food groups, emphasizing on unrefined carbohydrates, fruits and vegetables. By improving the teachers knowledge, they can teach these topics to their students, thus improving school children knowledge. These topics can be taught during Science class or PLBJ.

c. It is necessary to provide education to street vendors on making safe and healthy food starting from choosing the raw materials, food processing until how to serve it to the buyer, emphasizing on prohibition to add any illegal additives to the food.
d. It is also important to provide food processing education to home industry as the producer of raw materials sold in the traditional market, stressing on prohibition of illegal additives use and alternative additives that could be used as preservatives.
e. Government, especially Ministry of Health and NADFC should re-consider again the TDI/ADI of contaminants found in this study in regards to health effect in children and be more strict in giving sanction to street vendors.
f. Further research on Total Diet Study should be conducted by the government so the population intakes of various contaminants and nutrients in foods can be estimated.
g. Cohort study to assess the long-term effect on contaminant exposure from the food and non-food source need to be done to assess if health consequence already manifest at intake below the safety level.
h. Effort to develop recipes with nutrient-dense foods, especially foods rich in iron, zinc and calcium needs to be done. This nutrient-dense foods could be delivered to the school children by School Children Feeding Program (PMT-AS).

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APPENDICES

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CONTRIBUTION OF STREET FOODS TO NUTRIENT INTAKE AND CONTAMINANT EXPOSURE AMONG ELEMENTARY SCHOOL CHILDREN IN SENEN SUBDISTRICT, CENTRAL JAKARTA

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Running title: street food contribution to school children

Keywords: street food, school children, nutrient intake, chemical contaminants

ABSTRACT

Objective: This study was aimed to assess the contribution of street food to nutrient intake and contaminant exposure among school children in Senen subdistrict.

Design: Cross sectional study. Several methods were used, including structured interview, food checklist, repeated 24 hour recalls, anthropometric measurement and chemical analysis of contaminants.

Setting: Public elementary schools in Senen Subdistrict, Central Jakarta

Subjects: A total of 76 students from grade four to five in four public elementary schools in Senen Subdistrict, Central Jakarta.

Result: Energy intake was less than estimated energy requirement (EER). Carbohyrate and protein intake were more than estimated average requirement (EAR). Almost all micronutrients intake, except vitamin B12 were less than EAR. Street food contribution to nutrient intake ranged between 20.7–44.9%. The median formaldehyde exposure from street food was 0.0 (0.0, 6.29) mg/day, non-street food was 0.01 (0.0; 8.46) mg/day, and in total was 0.04 (0.0, 8.46) mg/day. The mean exposure of cyclamate from street food was 153.5 $\pm$ 145.1 mg/day. Approximately, two thirds of subjects were exposed to formaldehyde (68.4%) and cyclamate (65.8%) below their individual safety level. However, there were still some subjects exposed to formaldehyde (9.2%) and cyclamate (11.8%) above their individual safety level.

Conclusions: Overall macronutrient intake was adequate but micronutrient intake was inadequate particularly for iron, zinc and calcium. Street food contributed about one fifth to one third to nutrient intake. Contaminants found in this study were formaldehyde, cyclamate and lead and formaldehyde was found in both street foods and non-street food. Some subjects were exposed to formaldehyde and cyclamate above their individual safety level. Education on how to choose safe foods and balanced diet is suggested for parents, teachers and students and on food safety for street food sellers and home industry selling foods in the market need to be educated. More comprehensive assessment of both nutrient intake and contaminant exposure should be the next agenda to provide more comprehensive picture of the situation.

Keywords: contaminant exposure, nutrient intake, school children, street foods

INTRODUCTION

School children is the future generation of a nation, therefore they have to be healthy. They are still in growth and development period and vulnerable to any diseases. In Jakarta, the prevalence of wasting was 14.9% in boys and 10.6% in girls. The prevalence of overweight in Jakarta was 12.0% in boys and 8.4% in girls which was higher than the national prevalence. Micronutrient status of the school children was not optimal as suggested by anemia prevalence (9.4%) …etc

School children spent most of their daily activity at school. They study, exercise and play with their friends at school. These activities require a lot of energy. Besides, they also have high nutritional requirements to provide growth and body maintenance.[2] Therefore they need to eat safe and nutritious food.

According to Indonesian RDA, the energy requirement of school children aged 7-9 years old is 1600 kcal/day and 10-12 years old is 2050 kcal/day.[3] At least, one third of this requirement is obtained from food they consume at school. Some of them bring food from home but some others like to buy food from school canteen or street food vendor around school. Thus, food sold by school canteen and street food vendor around school must meet certain nutrient and energy value.

Beside the nutrient content, safety of food in school canteen and street food vendor still remain an issue. School children are in growth and development period and as frequent consumers of street foods are thus vulnerable to any harmful substances in the street foods. Street food may be unsafe if the preparation and serving are not hygienic or they contain dangerous chemical substance. Badan POM (National Agency of Drug and Food Control) has found that 218 out of 575 food samples didn't meet food safety requirement. They didn't meet the safety requirement because they use artificial sweetener (saccharin, cyclamate) not for low calorie food, contain benzoic preservatives more than safety cut off, contain prohibited substance such as rhodamine B, borax and formaline, or have microbe contaminants more than safety cut off.[4,5]

Chemical contaminant not only come from food additives, it can come from all stage in the food chain, e.g from environment. Contaminants from environment may come from pesticides, air, water and ground pollution. Some of contaminants from environment are heavy metals such as lead (Pb), mercury (Hg), cadmium (Cd), and arsenic (As).

Chemical contaminant can cause several health problems. Formaldehyde is an irritant, thus may cause acute symptoms such as abdominal pain and vomitting if ingested, . In longer term effect, it may cause degenerative changes in liver, kidney, heart and brain, even death due to respiratory failure.[6,7] Borax can be accumulated in the brain, kidney, liver and fat cells and cause damage to those cells.[8] On the other hand, cyclamate is known to be safe for human consumption but only permitted to be used in low calorie food product. Some studies show cyclamate can cause bladder

tumor in rats.[9] Other contaminants from the environment, such as lead can inhibit learning abilities in children, thus affect their achievement in school. It also has carcinogenic effect.[10,11]

Besides street food, NADFC also has found several raw materials sold in the market contains formaldehyde and borax. Formaldehyde was found in seafood, freshwater fish, salty fish, tofu and chicken. Borax was found in processed food such as meatball, sausage and nugget.

Many studies only focuses on nutrient content.[12] Others only on food safety especially microbial contaminants, hygiene and sanitation of street food in general.[13,14] A few focuses on chemical additives that may influence health.[15,16,17] Study that assess both aspects, nutrient content and safety of street food sold around school was rarely done.

It is difficult to assess nutrient content of street food because of wide variety and type of preparation and serving. On the other hand, safety of street food is doubtful due to findings of several cases of illegal additives in street food. Furthermore, illegal additives were not only found in street food but also raw materials sold in the market. This raw materials may be bought by mothers, made into dishes at home and served to the children. Thus, it is important to assess the contribution of street food and non-street food to nutrient intake and contaminant exposure among school children to provide information on school food environment.

General objective of this study is to assess the contribution of street food to nutrient intake and contaminant exposure among school children in Senen subdistrict.

METHODOLOGY

This survey was a cross sectional study and designed as baseline survey for Senen sub-district, Central Jakarta, DKI Jakarta province. It was conducted from March to April 2012 at public elementary schools in Senen sub-district, Central Jakarta, DKI Jakarta province. Senen subdistrict is one of the urban slum area in Central Jakarta. With an area of 422 ha, it has population density 24,230 people/km^2. [18]Population of this study was school children grade 4-5 who study at public elementary schools in Senen subdistrict, Central Jakarta.

Sample size was calculated using formula for estimating a population proportion with specified absolute precision. Population proportion was 25%, which was the proportion of school children eating food containing formaldehyde (fried tofu) in regular school.[15] The absolute precision was 0.1. Minimal sample size calculated using the formula was 73 subjects. Subjects was chosen equally from four public elementary schools. Four public elementary schools were chosen purposively. Each school was selected from different village in Senen subdistrict according to the following criteria: 1) It had canteen, 2) There were street food vendors around the school, 3) Students were allowed to buy food from street food vendor around school during breaktime and 4) There were at least five types of street food sold in the school surrounding.

There were 41 public elementary schools in Senen subdistrict. Three schools were solitary, while the rest were clustered in 11 area. Each school clusters consist of 2 – 6 schools. Eight school clusters met the purposive sampling criteria. From these eight school clusters, four school clusters were selected randomly then one school from each selected school clusters was also selected randomly.

Simple random sampling was used to chose school student who will be interviewed and measured. The inclusion criteria for the school student were grade 4-5, apparently healthy and frequently consumed food from school canteen and/or food vendor around school (at least equal or more than three times a week).

Food sampling was done purposively. Type of street food and non-street food which were analyzed further were typical food that had been reported containing suspected contaminants previously by NADFC or in the mass media. Street food was taken from at least two schools, then combined before chemical analysis. For non-street food, raw materials were bought from three local markets near the schools, cooked by three subjects' mothers then combined prior to chemical analysis.

Data collection procedure

Structured interview was done to school children and street food seller. School children were asked about demographic data, such as age and sex, pocket money, parent's occupation and education, and food choice and preference. Questionnaire was pre-tested before data collection. Street food seller in the school environment was interviewed if their food was consumed by the school children. They were asked about ingredients, preparation method and any additives used to make the food they sold.

School children were interviewed with a set of food checklist in a week. The food checklist contains list of street food sold at school and some rows to be fulfilled by list of street food they bought outside school hour. The interviewer gave check mark (√) in the cells if they eat certain street food during that day.

Repeated 24 hour recalls was done to all subjects using multiple-pass interviewing technique.[19] This technique has four stage as follows:

- First pass: Obtaining a complete list of all food and beverage consumed on the previous day.
- Second pass: Description of each food and beverage consumed in detail, including cooking methods and brand names (if possible).
- Third pass: Estimation of each food and beverage consumed in household measures. Food models can be used to help the estimation. Information on the ingredients of mixed dishes also be obtained.

- Fourth pass: Reviewing the recall to ensure that all items have been recorded correctly.

The 24 hour recall was repeated three times, in two weekdays and one weekend.

Food acceptance questionnaire is a food preference inventory with list of food in colourful pictures. It was used to measure preference for fruit and vegetables, more rich-protein food and healthful snacks. The list of food were grouped into carbohydrate source, plant protein source, animal protein source, fruits, vegetables, beverages and snacks. The highest score for each group was 12.[20]

Anthropometric measurement was done by measuring body weight and height of school children. Body weight of school children was measured by using SECA electric weight scale to the nearest 0.1 kg.. Body height of school children was measured by using microtoise Both weight and height measurements were done twice for every children and the end result was the average of two measurements.to the nearest milimeter.

Chemical analysis was performed to assess the level of contaminants in street food. Contaminants analyzed were borax, formaldehyde, rhodamine-B, cyclamate and lead. All contaminants were analyzed quantitatively (Table 3.1). Chemical analysis was conducted in Sucofindo Laboratory, Cibitung which was an accredited laboratory by National Accreditory Committee.

Data and statistical analysis

Data entry and statistical analysis was done with SPSS for Windows version 16.0. Descriptive statistic was used to determine frequency, central tendency, standard deviation and range value. Nutrient content of the street food was analyzed using Nutrisurvey 2004 portions with recipe approach. It also was used to assess nutrient intake of the school children from repeated 24 hours recall.

Z-score of height for age, and BMI for age were calculated by using WHO Anthro Plus 2005. Contaminant exposure from street food and non-street food was presented descriptively. Safety level (Tolerable Daily Intake/TDI and Acceptable Daily Intake/ADI) of each contaminants is presented in Table 3.2 below.

Contaminant level in a portion of street food/ non-street food was calculated by multiplying contaminant level in ppm (from chemical analysis) with normal portion (in gram or mL), then divided by 1000. Contaminant exposure was the average exposure from three days repeated 24 hours recalls. Contaminant exposure of each subject was compared to their individual safety level which was calculated by multiplying the safety level of contaminant per kg body weight with individual body weight

The ethical clearance was obtained from the ethical committee of Faculty of Medicine, University of Indonesia. Permission from the local government and school was obtained before data collection started.

The involvement of the school children in this survey is voluntary and with permission from their parents or guardians. They received an explanation letter and permission form to be signed if they allowed their child to participate in the study. All subjects may withdraw from the study anytime they wanted without any sanction. All data obtained was treated confidentially and used only for the purpose of this study.

RESULT

Subject Characteristics

There were 84 school children from four elementary school in Senen subdistrict enrolled in this study. Eight children were excluded, seven due to incomplete food recall, one because of calorie report from food recall was too high which was more than 160% of the subject's predicted total energy expenditure (pTEE). Therefore, only 76 subjects were analyzed, consisted of 43.4% boys and 56.6% girls aged between 9-13 years old. They were from grade 4 (48.7%) and grade 5 (51.3%).

Most subjects came from middle education family, as nearly two thirds of fathers (64.5%) and more than half of mothers (57.9%) finished senior high school (10-12 years of schooling). Nearly two thirds of mothers were housewife (65.8%), while some fathers were labor (25.0%) and private employee (19.7%). The median pocket money used to buy street food was IDR 5,000 or equivalent to USD 50 cents per day.

Nutritional Status

Based on height-for-age z score (HAZ), one fifth of subjects (21.0%) were stunted. Prevalence of stunting were higher in girls (23.3%) than boys (18.2%) (Figure 1). Based on BMI-for-age z score (BAZ), almost one fifth of subjects were overweight and obese (19.8%). Prevalence of overweight and obesity were higher in girls (23.3%), as compared to boys (15.2%). Meanwhile, there were some subjects (10.5%) who were thin (Figure 2).

Food Pattern

Concerning street food, subjects mostly consumed tea beverage whether sweetened ice tea or cup tea that was suspected to contain cyclamate. Carbohydrate source of food mostly consumed were fried rice and rice with coconut milk. Processed food such as sausage, nugget and meatball were the most consumed foods from animal protein source group. Among the plant protein source

of food, tempeh and tofu were commonly consumed. From the fruit group, fried banana was consumed the most. Other type of food were mix dishes, such as fried tofu-fish-flour mix (*batagor)*, fried vegetable-flour mix (*bakwan)*, chicken noodle, meatball noodle and steamed fish-flour mix (*siomay)*.

Concerning non-street food, almost all subjects consumed rice (96.1%). The second most consumed food was instant noodle (67.1%). Both were from carbohydrate source group. In animal protein source group, the most consumed were omelette (39.5%) and fried chicken (35.5%). Other food groups such as plant protein, vegetables and fruits were less consumed by the subjects.

Contaminant Level of Street Food and Non-street Food

The contaminant analysis of street food is presented in Table 1. Formaldehyde level in street food ranged between 0.29–75.75 mg/kg. The highest level of formaldehyde was found in wet noodle of chicken noodle (75.75 mg/kg). Range of cyclamate level was between 277.64–1207.80 mg/L. The highest cyclamate level was found in cup tea. Borax and rhodamine-B were not found in the suspected foods, while lead level was low in the suspected food (below 0.1 mg/kg).

Formaldehyde was not only found in street food, but also in non-street food (Table 2). Formaldehyde was found in dishes made of tofu, chicken and squid. Formaldehyde level in tofu based dishes ranged between 6.89–192.12 mg/kg. In chicken based dishes, it ranged between 0.53–1.61 mg/kg. The highest level was found in fried tofu. Borax was not found in non-street food.

Based on Table 1, street food containing suspected contaminant were taken to calculate the contaminant level per portion. Contaminant level in a portion of street food is shown in Table 3. Formaldehyde level in a portion of street food ranged between 0.01–5.30 mg/portion. It is shown that consumption of one portion of wet noodle exceeded the safety level of formaldehyde in the subject.

Table 4 shows contaminant level of non-street food per portion based on non-street food containing suspected contaminant in Table 2. Range of formaldehyde level in a portion of non-street food was 0.01–8.65 mg/portion. Level of formaldehyde in a portion of fried tofu exceeded the safety level of formaldehyde (4.65 mg) based on subject's average body weight (31 kg),

Nutrient Intake from Street Food and Non-street Food

Table 5 shows the average intake of subjects compared to dietary reference intakes (DRI) values. Energy intake was less than estimated energy requirement (EER). Carbohydrate and protein intake were more than estimated average requirement (EAR). Almost all micronutrients intake, except vitamin B12 were less than EAR. Table 6 presents the proportion of energy and nutrient intakes from street food and non-street food. Approximately, around one fifth to one third of energy

and nutrient intakes were from street food. Prevalence of inadequate intakes of micronutrients was higher in girls than boys. All girls had average intake of iron, zinc and calcium below the EAR, while most boys also had average intake of iron, zinc and calcium below the EAR (87.4%, 99.8% and 99.7% respectively).

Contaminant Exposure from Street Food and Non-street Food

The median formaldehyde exposure from street food, non-street food and in total didn't exceed the safety level for average body weight of 31 kg (4.65 mg). The mean exposure of cyclamate from street food also didn't exceed the safety level for average body weight (341 mg). (Table 7)

Approximately, two thirds of subjects were exposed to formaldehyde (68.4%) and cyclamate (65.8%) below their individual safety level. However, there were still some subjects exposed to formaldehyde (9.2%) and cyclamate (11.8%) above their individual safety level (Table 8).

Food Preference

Half of the subjects stated that the reason to buy street food was because of its delicious taste (51.3%), while some also stated because of hungry (17.1%). The rest stated they chose specific foods because it was cheap, nutritious, for snacking and the place to buy the food was near.

Subjects had more tendency to choose animal protein source of food, as it had the highest score from the food acceptance questionnaire (7.0 $\pm$ 2.2). On the other hand, they had less tendency to choose vegetables, as it had the lowest score (4.3 $\pm$ 2.6).

Food Safety Promotion at School

From the teacher self administered questionnaire about promotion of food safety at school, teachers rarely taught the student about food safety. There were only a few teachers who taught about food safety, including food hygiene, how to choose safe food based on sense of sight and taste. They usually insert these topics in Science and Education on Jakarta Environment and Culture (*Pendidikan Lingkungan dan Budaya Jakarta*/PLBJ). Only one school had been visited by NADFC to promote safe street food, free from chemical additives such as preservatives and colouring.

DISCUSSION

Overall, the average energy and nutrient intake of subjects in this study were less than the dietary reference intakes (DRI) values, except for macronutrients and vitamin B12. This indicated that there were still many subjects who were at risk of energy and micronutrients deficiency. Micronutrients intake less than estimated average requirement (EAR) were calcium, iron, zinc,

vitamin B1, vitamin B2 and vitamin C in boys and girls, and vitamin B3 only in girls (Table 5). Deficiency of these micronutrients in school children could affect their growth and development.

Lack of calcium sufficiency will cause detrimental effect to development of bone mass. In the long run, it will cause fractures and osteoporosis.[21] Iron deficiency with or without anemia affect cognitive achievement in school children.[21,22] Zinc is important for growth and immune system. Zinc deficiency at early age of life can lead to short stature.[21] In this study, the prevalence of stunting among subjects is medium.

B complex vitamins are essential to metabolize the macronutrients into energy. Besides, these vitamins are also important for the nervous system, skin, hair, eyes and liver. Deficiency of these vitamins may cause several diseases. Thiamin deficiency may cause a disease known as beriberi. Lack of riboflavin cause cheilosis and angular stomatitis. Severe deficiency of niacin will lead to pellagra. Vitamin C (ascorbic acid) has a role as antioxidant and in promoting resistance to infection. Vitamin C deficiency leads to scurvy. Lack of vitamin C sufficiency also can cause the individual become susceptible to infection .[21]

Calcium rich foods are dairy products and dark green leafy vegetables. Tofu is a good source of calcium in these population; however the chemical analyses of the tofu sold in the market and cooked by the mothers suggested that effort to reduce contaminant level (formaldehyde) is a must prior to promoting intake of such nutrient-dense food. Best source of iron and zinc are from animal source. Vitamin B1, B2 and B3 are found in many food. The important source of vitamin B1 is cereal grains, vitamin B2 is green leafy vegetables, meats and dairy product, and vitamin B3 is lean meats, poultry and fish. Vitamin C is rich in fruits.[21] Despite children's preference on animal food, their actual intake of animal foods was low. Of all the food groups, subjects in this study were lack in vegetables and fruits as they were less consumed and less preferred.

Contaminants found in this study were formaldehyde and cyclamate. According to Indonesian Minister for Health Regulation (*Peraturan Menteri Kesehatan RI/PERMENKES RI*) No. 722/MEN.KES/PER/IX/88 about Food Additives, formaldehyde was banned to be used in food.[23] In this study, formaldehyde was found in street food and non-street food, most commonly in tofu based dishes. The highest level of formaldehyde per portion street food was found in wet noodle of chicken noodle. As this street food was frequently consumed by the subjects, subjects were at risk of formaldehyde exposure above their safety level. We found that consumption of one portion of wet noodle already exceeded the safety level of formaldehyde in the subject and in few children they consumed wet noodle as often as 2 times/week. We also found one subject who consumed more than 1 portion of wet noddle within the 24-hour periods.

Furthermore, in very sensitive people, ingestion of formaldehyde may result in acute symptoms, such as intense pain in the mouth and pharynx, abdominal pains with nausea, vomiting

and possible loss of consciousness. Long term effect may leadto degenerative changes in liver, kidneys, heart and brain.[6]

Cyclamate was considered by JECFA for human consumption, though some studies showed it can cause bladder tumor in rats. Canada and USA don't approve the use of cyclamate as food additives. In Indonesia, cyclamate is permitted with ADI 11.0 mg/kgbw. The maximum use of cyclamate in food products should be between 10–2000 mg/kg product.[24,25] There were no beverage analyzed in this study exceeded the maximum level permitted (Table 1). The highest level of cyclamate was found in cup tea. Compared to subjects' safety level, if cup tea was consumed more than once a day, the subject could be exposed to cyclamate above the safety level. In average, subjects consumed cup tea 1 – 2 times/week and we found 9 subjects who consumed more than 1 cup tea within the 24-hour periods.

The limitation of this study is that we cannot conclude how much the real exposure of formaldehyde and cyclamate to the subjects due to limited number of analyzed food consumed by the subjects and days of food recalls and so the reported intake of contaminant may be lower than the actual one. However, despite the limited foods analyzed for the contaminants we show with our results that in few subjects the level already exceed the safety limit. Besides safety issue amongst both street foods and non-street foods consumed by these elementary school children their overall diet suggested that the micronutrient intakes (especially iron, zinc and calcium) were inadequate for important nutrients important for their optimal growth and development.

Since contaminants were found in street food and non-street food, education need to be done to teachers, parents, school children, street vendor and home industry. Teachers and parents need to be educated on how to choose safe and healthy food. Therefore, teachers can teach their students about choosing safe and healthy street food and parents can provide safe and healthy food at home.

Subjects in this study had less tendency to consume fruits and vegetables, and preferred high calorie food (animal source and beverages). Therefore, besides knowing how to choose safe and healthy street food, school children also need to be educated on balance diet and eating various kind of food groups. These topics could be inserted in Science class or PLBJ.

Street vendors as the food handler have to be educated on how to make safe and healthy food starting from choosing the raw materials, food processing until how to serve it to the buyer. It has to be emphasized that they are not permitted to add any illegal additives to the food.

Home industry as the producer of raw materials sold in the traditional market have to be educated on food processing, stressing on no illegal additives, especially formaldehyde, were permitted as preservatives. They also have to be taught about alternative additives that could be used as preservatives.

More comprehensive study (total diet study) to assess both nutrient intakes and contaminant exposures is necessary to provide more actual pictures of the situation for further program and policy considerations.

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FIGURES AND TABLES OF MANUSCRIPT

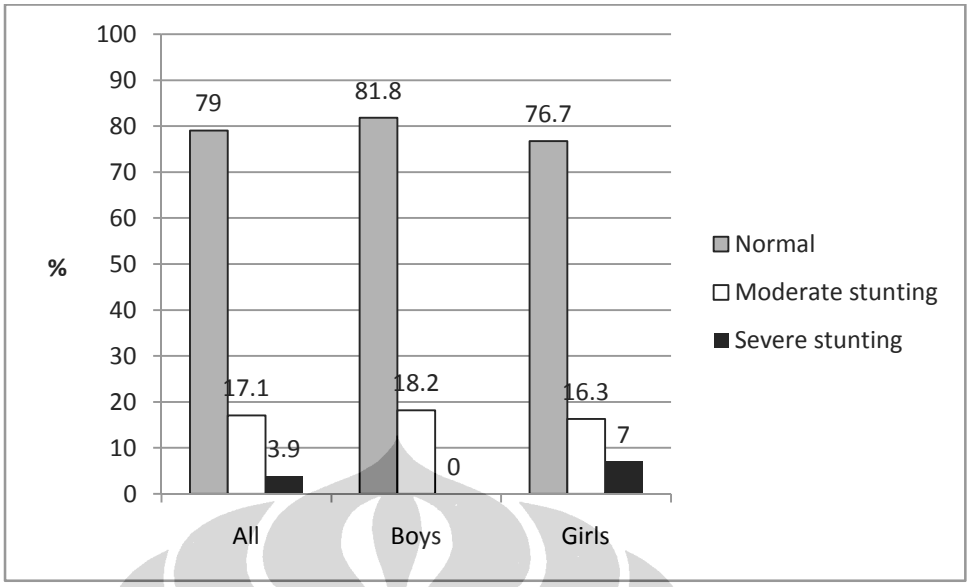

Figure 1. Prevalence of Stunted School Children Grade 4-5 in Senen Subdistrict, Jakarta, Indonesia

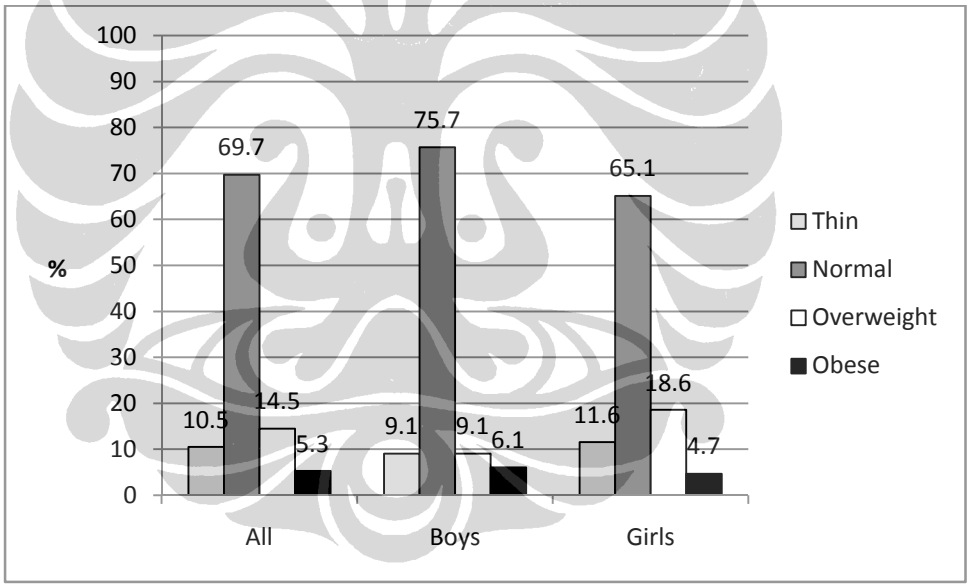

Figure 2. Prevalence of Thin, Overweight and Obese School Children Grade 4-5 in Senen Subdistrict, Jakarta, Indonesia

Table 1. Contaminant analysis of street food

No.	Street Food	F (mg/kg)	B	RB	C (mg/L)	Pb (mg/kg)
1.	Cupped tea	NA	NA	NA	1207.80	NA
2.	Sweetened ice tea	NA	NA	NA	858.65	NA
3.	Coconut ice	NA	NA	NA	277.64	NA
4.	Ice chocolate milk	NA	NA	NA	Nil	NA
5.	Jelly	NA	NA	Negative	Nil	NA
6.	Ice syrup	NA	NA	Negative	Nil	NA
7.	Red sauce	NA	NA	Negative	NA	NA
8.	Wet noodle (from chicken noodle)	75.75	NA	NA	NA	Below 0.1
9.	White tofu meatball	15.03	NA	NA	NA	NA
10.	Brown tofu meatball	6.70	NA	NA	NA	NA
11.	Fried tofu	5.79	NA	NA	NA	Below 0.1
12.	Chicken (from chicken noodle)	1.12	NA	NA	NA	Below 0.1
13.	Fried tofu filled with vegetables	0.29	NA	NA	NA	Below 0.1
14.	Round tofu	Negative	NA	NA	NA	Below 0.1
15.	*Batagor*	NA	Negative	NA	NA	Below 0.1
16.	Meatball	NA	Negative	NA	NA	Below 0.1
17.	*Cireng*	NA	Negative	NA	NA	Below 0.1
18.	*Pempek*	NA	Negative	NA	NA	Below 0.1
19.	Nugget	NA	Negative	NA	NA	Below 0.1
20.	*Otak-otak*	NA	Negative	NA	NA	Below 0.1
21.	Rice cake	NA	Negative	NA	NA	NA

Note: NA=not analyzed, F=formaldehyde, B=borax, RB=rhodamine B, C=cyclamate, Pb=lead

Table 2. Contaminant Analysis of Non-street Food

Non-street Food	Formaldehyde (mg/kg)	Borax (mg/kg)
Tofu based dishes		
Fried tofu	192.12	NA
Fried tofu with flour	158.82	NA
Boiled tofu	61.80	NA
Tofu omelette	54.96	NA
Tofu stew	18.60	NA
Hot tofu and tempeh	6.89	NA
Fried tofu filled with vegetables	Not detected	NA
Chicken based dishes		
Coconut chicken curry	1.61	NA
Chicken stew	1.20	NA
Fried chicken	0.90	NA
Chicken leg soup	0.53	NA
Chicken stripes	Not detected	NA
Indonesian yellow chicken soup	Not detected	NA
Chicken with soy sauce	Not detected	NA
Chicken *rendang*	Not detected	NA
Chicken curry	Not detected	NA
Hot chicken	Not detected	NA
Seafood and fresh water fish based dishes		
Hot squid	5.20	NA
Hot tuna	Not detected	NA
Fried long–jawed mackerel	Not detected	NA
Hot *Cue* fish	Not detected	NA
Fried salty fish	Not detected	NA
Fried *Bandeng* fish	Not detected	NA
Teri fish with coconut	Not detected	NA
Fried *Cue* fish	Not detected	NA
Fried *Bawal* fish	Not detected	NA
Fried shrimp with flour	Not detected	NA
Teri fish with chili sauce	Not detected	NA
Fried *Gabus* fish	Not detected	NA
Processed food		
Fried sausage	NA	Negative
Meatball	NA	Negative
Nugget	NA	Negative

Note: NA= not analyzed

Table 3. Contaminant Level of Street Food per Portion

No.	Street Food	Portion	Formaldehyde (mg/portion)	Cyclamate (mg/portion)	Safety level (mg)[1]
1.	Cupped tea	240 mL	NA	289.87	341
2.	Sweetened ice tea	230 mL	NA	197.49	341
3.	Coconut ice	400 mL	NA	111.06	341
4.	Wet noodle (from chicken noodle)	70 gram	5.30	NA	4.65
5.	White tofu meatball	58 gram	0.87	NA	4.65
6.	Brown tofu meatball	48 gram	0.32	NA	4.65
7.	Fried tofu	45 gram	0.26	NA	4.65
8.	Chicken (from chicken noodle)	50 gram	0.06	NA	4.65
9.	Fried tofu filled with vegetables	50 gram	0.01	NA	4.65

1 Safety level was calculated from the safety amount of contaminant per kg body weight multiplied with subjects' average body weight (31 kg) (WHO, 2011)
NA= not analyzed

Table 4. Contaminant Level of Non-street Food per Portion

No.	Non-street Food	Portion	Formaldehyde (mg/portion)
1.	Fried tofu	45 gram	8.65
2,	Fried tofu with flour	25 gram	3.97
3.	Boiled tofu	45 gram	2.78
4.	Tofu omelette	20 gram	1.10
5.	Tofu stew	45 gram	0.84
6.	Tahu tempe balado	60 gram	0.41
7.	Spicy squid	30 gram	0.16
8.	Chicken with coconut milk	30 gram	0.05
9.	Chicken stew	30 gram	0.04
10.	Fried chicken	30 gram	0.03
11.	Chicken leg soup	20 gram	0.01

Table 5. Average Intake of School Children Grade 4-5 in Senen Subdistrict

Nutrient	Average Intake[1] n=76	Boys n=33		Girls n=43	
		Intake[1]	EAR[2]	Intake[1]	EAR[2]
Energy (kcal/day)	1707.3 ± 448.1	1897.9 ± 468.0	1928	1561.1 ± 375.8	1837
Carbohydrate (g/day)[2]	207.9 ± 63.2	229.1 ± 64.1	100	191.6 ± 58.0	100
Protein (g/day)	42.8 ± 13.0	46.8 ± 13.3	26.6	39.7 ± 12.2	28.1
Fat (g/day)	58.3 ± 20.5	64.1 ± 22.5	ND	53.8 ± 17.9	ND
Calcium (mg/day)	245.3 ± 138.2	276.9 ± 155.8	833.3	221.1 ± 119.3	833.3
Iron (mg/day)	5.9 ± 2.2	6.8 ± 2.6	9.3	5.3 ± 1.6	12.5
Zinc (mg/day)	5.4 ± 1.7	5.9 ± 1.9	11.7	5.1 ± 1.5	10.5
Vitamin B1 (mg/day)	0.6 ± 0.2	0.6 ± 0.2	0.8	0.5 ± 0.2	0.8
Vitamin B2 (mg/day)	0.7 ± 0.2	0.7 ± 0.2	0.8	0.6 ± 0.2	0.9
Vitamin B3 (mg/day)	8.3 ± 2.8	9.2 ± 2.9	9.2	7.6 ± 2.6	9.2
Vitamin B12 (µg/day)[3]	1.9 ± 0.2	1.9 ± 0.1	1.5	1.9 ± 0.2	1.5
Vitamin C (mg/day)[3]	9.9 ± 3.1	10.6 ± 2.7	41.7	9.4 ± 3.5	41.7

1 mean ± SD, average intake was the average of 3 days 24 hour recalls (2 weekdays + 1 weekend)
2 Dietary Reference Intakes (DRI) used in this table were EER (estimated energy requirement) for energy and EAR (estimated average requirement) for macronutrients and micronutrients. EER was calculated from total energy expenditure added by energy deposition (25 kcal). EAR for carbohydrate was extrapolated from adult data, EAR for protein was calculated from the amount needed per kg body weight (0.76 g/kgbw/day) multiplied by the reference weight (boys=35 kg, girls=37 kg) (Food and Nutrition Board, Institute of Medicine, 2005), EAR for micronutrient was calculated from Indonesian RDA using conversion factors (Food and Nutrition Board, Institute of Medicine, 2003). 3 Data was transformed with squareroot to have a normal distribution. ND = not determined

Table 6. Proportion of Energy, Macronutrients and Micronutrients from Street Food and Non-street Food

	Street food			Non-street food			Total	
	Mean	SD	%	Mean	SD	%	Mean	SD
Energy (kcal)	598.4	334.1	35.0	1108.9	373.5	65.0	1707.3	448.1
Carbohydrate (gram)	74.6	42.8	35.9	133.3	53.5	64.1	207.9	63.2
Protein (gram)	16.1	10.7	37.6	26.7	11.5	62.4	42.8	13.0
Fat (gram)	26.2	16.3	44.9	32.1	16.0	55.1	58.3	20.5
Calcium (mg)[1]	34.3	2.5	20.7	194.6	137.9	79.3	245.3	138.2
Zinc (mg)	1.7	1.2	31.5	3.7	1.6	68.5	5.9	2.2
Iron (mg)	2.1	1.6	35.6	3.8	2.0	64.4	5.4	1.7
Thiamin (mg)	0.2	0.1	33.3	0.4	0.2	66.7	0.6	0.2
Riboflavin (mg)	0.2	0.1	28.6	0.5	0.2	71.4	0.7	0.2
Niacin (mg)	2.6	1.8	31.3	5.7	2.6	68.7	8.3	2.8
Vitamin B12 (µg)[2]	0.5	0.1		1.2	0.2		1.9	0.2
Vitamin C (mg)[2]	2.0	1.0		6.5	3.5		9.9	3.1

1 Data of calcium from street food was transformed by log10 to have a normal distribution
2 Data was transformed by squareroot to have a normal distribution

Table 7. Contaminant Exposure from Street Food and Non-street Food

	Formaldehyde (mg)[1]	Cyclamate (mg)[2]
Street food	0.0 (0.0, 6.29)	153.5 ± 145.1
Non street food	0.01 (0.0; 8.46)	NA
Total	0.04 (0.0, 8.46)	153.5 ± 145.1

1 median (min, max)
2 mean ± SD
NA= not analyzed

Table 8. Prevalence of School Children Grade 4-5 Exposed to Contaminant Based on Safety Level in Senen Subdistrict

Child Group	Formaldehyde[1]	Cyclamate[1]
Not exposed	17 (22.4)	17 (22.4)
Exposed below the safety level	52 (68.4)	50 (65.8)
Exposed above the safety level	7 (9.2)	9 (11.8)

1 n (%), n=76

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Mathematical modelling of nutritional processes. Papers in which mathematical modelling of nutritional processes forms the principal element will be considered for publication provided: (a) they are based on sound biological and mathematical principles; (b) they advance nutritional concepts or identify new avenues likely to lead to such advances; (c) assumptions used in their construction are fully described and supported by appropriate argument; (d) they are described in such a way that the nutritional purpose is clearly apparent; (e) the contribution of the model to the design of future experimentation is clearly defined.

Units. Results should be presented in metric units according to the International System of Units (see Quantities, Units and Symbols in Physical Chemistry, 3rd ed. (2007) Cambridge: RSC Publishing), and Metric Units, Conversion Factors and Nomenclature in Nutritional and Food Sciences (1972) London: The Royal Society – as reproduced in *Proceedings of the Nutrition Society* (1972) **31**, 239–247). SI units should be used throughout the paper. The author will be asked to convert any values that are given in any other form. The only exception is where there is a unique way of expressing a particular variable that is in widespread use. Energy values must be given in Joules (MJ or kJ) using the conversion factor 1 kcal = 4·184 kJ. If required by the author, the value in kcal can be given afterwards in parentheses. Temperature is given in degrees Celsius (ºC). Vitamins should be given as mg or µg, not as IU.

For substances of known molecular mass (Da) or relative molecular mass, e.g. glucose, urea, Ca, Na, Fe, K, P, values should be expressed as mol/l; for substances of indeterminate molecular mass (Da) or relative molecular mass, e.g. phospholipids, proteins, and for trace elements, e.g. Cu, Zn, then g/l should be used.

Time. The 24 h clock should be used, e.g. 15.00 hours.

Units are: year, month, week, d, h, min, s, kg, g, mg, µg, litre, ml, µl, fl. To avoid misunderstandings, the word litre should be used in full, except in terms like g/l. Radioactivity should be given in becquerels (Bq or GBq) not in Ci. 1 MBq = 27·03 µCi (1Bq = 1 disintegration/s).

Statistical treatment of results. Data from individual replicates should not be given for large experiments, but may be given for small studies. The methods of statistical analysis used should be described, and references to statistical analysis packages included in the text, thus: Statistical Analysis Systems statistical software package version 6.11 (SAS Institute, Cary, NC, USA). Information such as analysis of variance tables should be given in the paper only if they are relevant to the discussion. A statement of the number of replicates, their average value and some appropriate measure of variability is usually sufficient.

Comparisons between means can be made by using either confidence intervals (CI) or significance tests. The most appropriate of such measures is usually the standard error of a difference between means (SED), or the standard errors of the means (SE or SEM) when these vary between means. The standard deviation (SD) is more useful only when there is specific interest in the variability of individual values. The degrees of freedom (df) associated with SED, SEM or SD should also be stated. The number of decimal places quoted should be sufficient but not excessive. Note that pH is an exponential number, as are the log(10) values often quoted for microbial numbers. Statistics should be carried out on the scalar rather than the exponential values.

If comparisons between means are made using CI, the format for presentation is, e.g. 'difference between means 0·73 (95 % CI 0·314, 1·36) g'. If significance tests are used, a statement that the difference between the means for two groups of values is (or is not) statistically significant should include the level of significance attained, preferably as an explicit *P* value (e.g. *P*=0·016 or *P*=0·32) rather than as a range (e.g. *P*<0·05 or *P*>0·05}. It should be stated whether the significance levels quoted are one-sided or two-sided. Where a multiple comparison procedure is used, a description or explicit reference should be given. Where appropriate, a superscript notation may be used in tables to denote levels of significance; similar superscripts should denote lack of a significant difference.

Where the method of analysis is unusual, or if the experimental design is at all complex, further details (e.g. experimental plan, raw data, confirmation of assumptions, analysis of variance tables, etc.) should be included.

Figures. Figures should not be incorporated into the article file and should be supplied as separate electronic files. Figure legends should be grouped in a section at the end of the text. Each figure should be clearly marked with its number and separate panels within figures should be clearly marked (a), (b), (c) etc. so that they are easily identifiable when the article and figure files are merged for review.

In curves presenting experimental results the determined points should be clearly shown, the symbols used being, in order of preference, ○, ●, Δ, ▲, □, ■-marks on the axes should be on the inner side of each axis and should extend beyond the last experimental point. Ensure that lines and symbols used in graphs and shading used in histograms are large enough to be easily identified when the figure is reduced to fit the printed page.

Figures and diagrams can be prepared using most applications but please do not use the following: cdx, chm, jnb or PDF. All figures should be numbered and legends should be provided. Each figure, with its legend, should be comprehensible without reference to the text and should include definitions of abbreviations. Latin names for unusual species should be included unless they have already been specified in the text. Each figure will be positioned near the point in the text at which it is first introduced unless instructed otherwise.

Refer to a recent copy of the journal for examples of figures.

Plates. The size of photomicrographs may have to be altered in printing; in order to avoid mistakes the magnification should be shown by scale on the photograph itself. The scale with the appropriate unit together with any lettering should be drawn by the author, preferably using appropriate software.

Tables. Tables should carry headings describing their content and should be comprehensible without reference to the text. Tables should not be subdivided by ruled lines. The dimensions of the values, e.g. mg/kg, should be given at the top of each column. Separate columns should be used for measures of variance (SD, SE etc.), the ± sign should not be used. The number of decimal places used should be standardized; for whole numbers 1·0, 2·0 etc. should be used. Shortened forms of the words weight (wt) height (ht) and experiment (Expt) may be used to save space in tables, but only Expt (when referring to a specified experiment, e.g. Expt 1) is acceptable in the heading.

Footnotes are given in the following order: (1) abbreviations, (2) superscript letters, (3) symbols. Abbreviations are given in the format: RS, resistant starch. Abbreviations appear in the footnote in the order that they appear in the table (reading from left to right across the table, then down each column). Abbreviations in tables must be defined in footnotes. Symbols for footnotes should be used in the sequence: *†‡§‖¶, then ** etc. (omit * or †, or both, from the sequence if they are used to indicate levels of significance).

For indicating statistical significance, superscript letters or symbols may be used. Superscript letters are useful where comparisons are within a row or column and the level of significance is uniform, e.g. '^{a,b,c}Mean values within a column with unlike superscript letters were significantly different (P<0·05)'. Symbols are useful for indicating significant differences between rows or columns, especially where different levels of significance are found, e.g. 'Mean values were significantly different from those of the control group: *P<0·05, **P<0·01, ***P<0·001'. The symbols used for P values in the tables must be consistent.

Tables should be placed at the end of the text. Each table will be positioned near the point in the text at which it is first introduced unless instructed otherwise.

Please refer to a recent copy of the journal for examples of tables.

Chemical formulas. These should be written as far as possible on a single horizontal line. With inorganic substances, formulas may be used from first mention. With salts, it must be stated whether or not the anhydrous material is used, e.g. anhydrous $CuSO_4$, or which of the different crystalline forms is meant, e.g. $CuSO_4.5H_2O$, $CuSO_4.H_2O$.

Descriptions of solutions, compositions and concentrations. Solutions of common acids, bases and salts should be defined in terms of molarity (M), e.g. 0·1 M-NaH_2PO_4. Compositions expressed as mass per unit mass (w/w) should have values expressed as ng, µg, mg or g per kg; similarly for concentrations expressed as mass per unit volume (w/v), the denominator being the litre. If concentrations or compositions are expressed as a percentage, the basis for the composition should be specified (e.g. % (w/w) or % (w/v) etc.). The common measurements used in nutritional studies, e.g. digestibility, biological value and net protein utilization, should be expressed as decimals rather than as percentages, so that amounts of available nutrients can be obtained from analytical results by direct multiplication. See *Metric Units, Conversion Factors and Nomenclature in Nutritional and Food Sciences*. London: The Royal Society, 1972 (para. 8).

Gene nomenclature and symbols. The use of symbols and nomenclature recommended by the HUGO Gene Nomenclature Committee (http://www.genenames.org/) is encouraged. Information on human genes is also available from Entrez Gene (http://www.ncbi.nlm.nih.gov/sites/entrez?db=gene).

Nomenclature of vitamins. Most of the names for vitamins and related compounds that are accepted by the Editors are those recommended by the IUNS Committee on Nomenclature. See *Nutrition Abstracts and Reviews* (1978) **48**A, 831–835.

Acceptable name	*Other names**
Vitamin A	
Retinol	Vitamin A_1
Retinaldehyde, retinal	Retinene
Retinoic acid (all-*trans* or 13-*cis*)	Vitamin A_1 acid
3-Dehydroretinol	Vitamin A_2
Vitamin D	
Ergocalciferol, ercalciol	Vitamin D_2 calciferol
Cholecalciferol, calciol	Vitamin D_3
Vitamin E	
-, - and γ-tocopherols plus tocotrienols	
Vitamin K	
Phylloquinone	Vitamin K_1
Menaquinone-n (MK-n)†	Vitamin K_2
Menadione	Vitamin K_3, menaquinone, menaphthone

Vitamin B_1	
Thiamin	Aneurin(e), thiamine
Vitamin B_2	
Riboflavin	Vitamin G, riboflavine, lactoflavin
Niacin	
Nicotinamide	Vitamin PP
Nicotinic acid	
Folic Acid	
Pteroyl(mono)glutamic acid	Folacin, vitamin B_c or M
Vitamin B_6	
Pyridoxine	Pyridoxol
Pyridoxal	
Pyridoxamine	
Vitamin B_{12}	
Cyanocobalamin	
Hydroxocobalamin	Vitamin B_{12a} or B_{12b}
Aquocobalamin	
Methylcobalamin	
Adenosylcobalamin	
Inositol	
Myo-inositol	*Meso*-inositol
Choline	
Pantothenic acid	
Biotin	Vitamin H
Vitamin C	
Ascorbic acid	
Dehydroascorbic acid	

*Including some names that are still in use elsewhere, but are not used by *Public Health Nutrition*.

†Details of the nomenclature for these and other naturally-occurring quinones should follow the Tentative Rules of the IUPAC-IUB Commission on Biochemical Nomenclature (see *European Journal of Biochemistry* (1975) **53**, 15–18).

Generic descriptors. The terms **vitamin A**, **vitamin C** and **vitamin D** may still be used where appropriate, for example in phrases such as 'vitamin A deficiency', 'vitamin D activity'.

Vitamin E. The term **vitamin E** should be used as the descriptor for all tocol and tocotrienol derivatives exhibiting qualitatively the biological activity of α-tocopherol. The term **tocopherols** should be used as the generic descriptor for all methyl tocols. Thus, the term **tocopherol** is not synonymous with the term **vitamin E**.

Vitamin K. The term **vitamin K** should be used as the generic descriptor for 2-methyl-1,4-naphthoquinone (menaphthone) and all derivatives exhibiting qualitatively the biological activity of phylloquinone (phytylmenaquinone).

Niacin. The term **niacin** should be used as the generic descriptor for pyridine 3-carboxylic acid and derivatives exhibiting qualitatively the biological activity of nicotinamide.

Vitamin B_6. The term **vitamin B_6** should be used as the generic descriptor for all 2-methylpyridine derivatives exhibiting qualitatively the biological activity of pyridoxine.

Folate. Due to the wide range of C-substituted, unsubstituted, oxidized, reduced and mono- or polyglutamyl side-chain derivatives of pteroylmonoglutamic acid that exist in nature, it is not possible to provide a complete list. Authors are encouraged to use either the generic name or the correct scientific name(s) of the derivative(s), as appropriate for each circumstance.

Vitamin B_{12}. The term **vitamin B_{12}** should be used as the generic descriptor for all corrinoids exhibiting qualitatively the biological activity of cyanocobalamin. The term **corrinoids** should be used as the generic descriptor for all compounds containing the corrin nucleus and thus chemically related to cyanocobalamin. The term **corrinoid** is not synonymous with the term **vitamin B_{12}**.

Vitamin C. The terms **ascorbic acid** and **dehydroascorbic acid** will normally be taken as referring to the naturally-occurring L-forms. If the subject matter includes other optical isomers, authors are encouraged to include the L- or D-prefixes, as appropriate. The same is true for all those vitamins which can exist in both natural and alternative isomeric forms.

Amounts of vitamins and summation. Weight units are acceptable for the amounts of vitamins in foods and diets. For concentrations in biological tissues, SI units should be used; however, the authors may, if they wish, also include other units, such as weights or international units, in parentheses.

See *Metric Units, Conversion Factors and Nomenclature in Nutritional and Food Sciences* (1972) paras 8 and 14–20. London: The Royal Society.

Nomenclature of fatty acids and lipids. In the description of results obtained for the analysis of fatty acids by conventional GLC, the shorthand designation proposed by Farquhar JW, Insull W, Rosen P, Stoffel W & Ahrens EH (*Nutrition Reviews*

(1959), **17**, Suppl.) for individual fatty acids should be used in the text, tables and figures. Thus, 18 : 1 should be used to represent a fatty acid with eighteen carbon atoms and one double bond; if the position and configuration of the double bond is unknown. The shorthand designation should also be used in the abstract. If the positions and configurations of the double bonds are known, and these are important to the discussion, then a fatty acid such as linoleic acid may be referred to as *cis*-9,*cis*-12-18 : 2 (positions of double bonds related to the carboxyl carbon atom 1). However, to illustrate the metabolic relationship between different unsaturated fatty acid families, it is sometimes more helpful to number the double bonds in relation to the terminal methyl carbon atom, *n*. The preferred nomenclature is then: 18 : 3*n*-3 and 18 : 3*n*-6 for α-linolenic and γ-linolenic acids respectively; 18 : 2*n*-6 and 20 : 4*n*-6 for linoleic and arachidonic acids respectively and 18 : 1*n*-9 for oleic acid. Positional isomers such as α- and γ-linolenic acid should always be clearly distinguished. It is assumed that the double bonds are methylene-interrupted and are of the *cis*-configuration (see Holman RT in *Progress in the Chemistry of Fats and Other Lipids* (1966) vol. 9, part 1, p. 3. Oxford: Pergamon Press). Groups of fatty acids that have a common chain length but vary in their double bond content or double bond position should be referred to, for example, as C_{20} fatty acids or C_{20} PUFA. The modern nomenclature for glycerol esters should be used, i.e. triacylglycerol, diacylglycerol, monoacylglycerol *not* triglyceride, diglyceride, monoglyceride. The form of fatty acids used in diets should be clearly stated, i.e. whether ethyl esters, natural or refined fats or oils. The composition of the fatty acids in the dietary fat and tissue fats should be stated clearly, expressed as mol/100 mol or g/100 g total fatty acids.

Nomenclature of micro-organisms. The correct name of the organism, conforming with international rules of nomenclature, should be used: if desired, synonyms may be added in parentheses when the name is first mentioned. Names of bacteria should conform to the current Bacteriological Code and the opinions issued by the International Committee on Systematic Bacteriology. Names of algae and fungi must conform to the current International Code of Botanical Nomenclature. Names of protozoa should conform to the current International Code of Zoological Nomenclature.

Nomenclature of plants. For plant species where a common name is used that may not be universally intelligible, the Latin name in italics should follow the first mention of the common name. The cultivar should be given where appropriate.

Other nomenclature, symbols and abbreviations. Authors should consult recent issues of *Public Health Nutrition* for guidance. The IUPAC rules on chemical nomenclature should be followed, and the recommendations of the Nomenclature Committee of IUBMB and the IUPAC-IUBMB Joint Commission on Biochemical Nomenclature and Nomenclature Commission of IUBMB in *Biochemical Nomenclature and Related Documents* (1992), 2nd ed., London: Portland Press (http://www.chem.qmul.ac.uk/iupac/bibliog/white.html). The symbols and abbreviations, other than units, are essentially those listed in *British Standard* 5775 (1979–1982), *Specifications for Quantities, Units and Symbols*, parts 0–13. Day should be abbreviated to d, for example 7 d, except for 'each day', '7th day' and 'day 1'.

Elements and simple chemicals (e.g. Fe and CO_2) can be referred to by their chemical symbol (with the exception of arsenic and iodine, which should be written in full) or formula from the first mention in the text; the title, text and table headings, and figure legends can be taken as exceptions,. Well-known abbreviations for chemical substances may be used without explanation, thus: RNA for ribonucleic acid and DNA for deoxyribonucleic acid. Other substances that are mentioned frequently (five or more times) may also be abbreviated, the abbreviation being placed in parentheses at the first mention, thus: lipoprotein lipase (LPL), after that, LPL, and an alphabetical list of abbreviations used should be included. Only accepted abbreviations may be used in the title and text headings. If an author's initials are mentioned in the text, they should be distinguished from other abbreviations by the use of stops, e.g. 'one of us (P. J. H.)…'. For UK counties the official names given in the *Concise Oxford Dictionary* (1995) should be used and for states of the USA two-letter abbreviations should be used, e.g. MA (not Mass.) and IL (not Ill.). Terms such as 'bioavailability' or 'available' may be used providing that the use of the term is adequately defined.

Spectrophotometric terms and symbols are those proposed in *IUPAC Manual of Symbols and Terminology for Physicochemical Quantities and Units* (1979) London: Butterworths. The attention of authors is particularly drawn to the following symbols: m (milli, 10), μ (micro, 10), n (nano, 10) and p (pico, 10). Note also that ml (millilitre) should be used instead of cc, μm (micrometre) instead of μ (micron) and μg (microgram) instead of γ.

Numbers. Numerals should be used with units, for example, 10 g, 7 d, 4 years (except when beginning a sentence, thus: 'Four years ago...'); otherwise, words (except when 100 or more), thus: one man, ten ewes, ninety-nine flasks, three times (but with decimal, 2·5 times), 100 patients, 120 cows, 136 samples.

Abbreviations. The following abbreviations are accepted without definition by *Public Health Nutrition:*

ADP (GDP)	adenosine (guanosine) 5'-disphosphate
AIDS	acquired immune deficiency syndrome
AMP (GMP)	adenosine (guanosine) 5'-monophosphate
ANCOVA	analysis of covariance
ANOVA	analysis of variance
apo	apolipoprotein
ATP (GTP)	adenosine (guanosine) 5'-triphosphate
AUC	area under the curve
BMI	body mass index
BMR	basal metabolic rate

bp	base pair
BSE	bovine spongiform encephalopathy
CHD	coronary heart disease
CI	confidence interval
CJD	Creutzfeldt-Jacob disease
CoA and acyl-CoA	co-enzyme A and its acyl derivatives
CV	coefficient of variation
CVD	cardiovascular disease
Df	degrees of freedom
DHA	docosahexaenoic acid
DM	dry matter
DNA	deoxyribonucleic acid
dpm	disintegrations per minute
EDTA	ethylenediaminetetra-acetic acid
ELISA	enzyme-linked immunosorbent assay
EPA	eicosapentaenoic acid
Expt	experiment (for specified experiment, e.g. Expt 1)
FAD	flavin-adenine dinucleotide
FAO	Food and Agriculture Organization (except when used as an author)
FFQ	food-frequency questionnaire
FMN	flavin mononucleotide
GC	gas chromatography
GLC	gas–liquid chromatography
GLUT	glucose transporter
GM	genetically modified
Hb	haemoglobin
HDL	high-density lipoprotein
HEPES	4-(2-hydroxyethyl)-1-piperazine-ethanesulfonic acid
HIV	human immunodeficiency virus
HPLC	high-performance liquid chromatography
Ig	immunoglobulin
IHD	ischaemic heart disease
IL	interleukin
IR	infra red
kb	kilobases
K_m	Michaelis constant
LDL	low-density lipoprotein
MHC	major histocompatibility complex
MRI	magnetic resonance imaging
MS	mass spectrometry
MUFA	monounsaturated fatty acids
NAD+, NADH	oxidized and reduced nicotinamide-adenine dinucleotide
NADP+, NADPH	oxidized and reduced nicotinamide-adenine dinucleotide phosphate
NEFA	non-esterified fatty acids
NF-κB	nuclear factor kappa B
NMR	nuclear magnetic resonance
NS	not significant
NSP	non-starch polysaccharide
OR	odds ratio
PAGE	polyacrylamide gel electrophoresis
PBS	phosphate-buffered saline
PCR	polymerase chain reaction
PG	prostaglandin
PPAR	peroxisome proliferator-activated receptor
PUFA	polyunsaturated fatty acids
RDA	recommended dietary allowance
RER	respiratory exchange ratio
RIA	radioimmunoassay
RMR	resting metabolic rate
RNA, mRNA etc.	ribonucleic acid, messenger RNA etc.
rpm	revolutions per minute
RT	reverse transcriptase
SCFA	short-chain fatty acids

SDS	sodium dodecyl sulphate
SED	standard error of the difference between means
SFA	saturated fatty acids
SNP	single nucleotide polymorphism
TAG	triacylglycerol
TCA	trichloroacetic acid
TLC	thin-layer chromatography
TNF	tumour necrosis factor
UN	United Nations (except when used as an author)
UNICEF	United Nations International Children's Emergency Fund
UV	ultra violet
VLDL	very-low-density lipoprotein
V_{O2}	O_2 consumption
V_{O2max}	maximum O_2 consumption
WHO	World Health Organization (except when used as an author)

Use of three-letter versions of amino acids in tables: Leu, His, etc.
CTP, UTP, GTP, ITP, as we already use ATP, AMP etc.

Disallowed words and phrases. The following are disallowed by *Public Health Nutrition*:
deuterium or tritium (use ^2H and ^3H)
c.a. or around (use approximately or about)
canola (use rapeseed)
ether (use diethyl ether)
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isocalorific/calorie (use isoenergetic/energy)
quantitate (use quantify)
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- For illustrations, preferred software packages are Adobe Illustrator, Adobe Photoshop, Aldus Freehand, Chemdraw or CorelDraw. Preferred formats are TIFF or JPEG, if a TIFF file is not possible save as an EPS or a windows metafile. Figures should be submitted as separate files, not as part of the main body of the manuscript.

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KETERANGAN LOLOS KAJI ETIK

ETHICAL APPROVAL

Komite Etik Penelitian Kesehatan Fakultas Kedokteran Universitas Indonesia dalam upaya melindungi hak asasi dan kesejahteraan subyek penelitian kedokteran, telah mengkaji dengan teliti protokol berjudul:

The Ethics Committee of the Faculty of Medicine, University of Indonesia, with regards of the Protection of human rights and welfare in medical research, has carefully reviewed the research protocol entitled:

"Contribution of Street Food to Nutrient Intake and Contaninat Exposure Among School Children in Senen Subdistrict, Central Jakarta (Kontribusi Makanan Jajanan Terhadap Asupan Gizi dan Pajanan Kontaminan Pada Anak Sekolah di Kecamatan Senen, Jakarta Pusat)".

P*eneliti Utama* : **dr. Karina Rahmadia Ekawidyani**
Principal Investigator

Nama Institusi : **Seameo-Recfon UI**
Name of the Institution

dan telah menyetujui protokol tersebut di atas.
And approved the above-mentioned protocol.

Jakarta, 16 JAN 2012
Ketua
Prof. Dr. dr. Rianto Setiabudy, SpFK

***Ethical approval berlaku satu tahun dari tanggal persetujuan**
****Peneliti berkewajiban**

1. Menjaga kerahasiaan identitas subyek penelitian
2. Memberitahukan status penelitian apabila
   a. Setelah masa berlakunya keterangan lolos kaji etik, penelitian masih belum selesai, dalam hal ini *ethical clearance* harus diperpanjang
   b. Penelitian berhenti di tengah jalan

SEAMEO RECFON (Regional Center for Food and Nutrition)
Pusat Gizi Regional, Universitas Indonesia
Jl. Salemba Raya No. 6 Jakarta 10430 Telp: 021 3914017, 31930205

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SURAT PERSETUJUAN
UNTUK BERPARTISIPASI DALAM PENELITIAN

"Kontribusi Makanan Jajanan terhadap Asupan Gizi dan Pajanan Kontaminan pada Anak Sekolah di Kecamatan Senen, Jakarta Pusat" ***(Contribution of Street Food to Nutrient Intake and Contaminant Exposure among School Children in Senen Subdistrict, Central Jakarta)***

(Lembar untuk Orang tua/Wali Siswa)

Setelah mendengar penjelasan mengenai tujuan penelitian, prosedur penelitian, resiko dan manfaat penelitian, dan semua pertanyaan-pertanyaan saya yang berkaitan dengan penelitian ini telah terjawab sepenuhnya,

Saya mengerti bahwa akan dilakukan terhadap anak saya:

1. Pengambilan data karakteristik anak dan keluarga, karakteristik sosial ekonomi, serta pemilihan makanan dan makanan yang disukai melalui wawancara menggunakan kuesioner.
2. Pengambilan data konsumsi anak melalui wawancara menggunakan kuesioner recall 24 jam sebanyak 3 kali di sekolah.
3. Pengukuran tinggi badan dan berat badan.

Maka dengan ini saya yang bertanda tangan dibawah ini:

Nama : _____
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Jenis kelamin : _____
Alamat : _____

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Umur : _____
Jenis kelamin : _____

Menyatakan setuju bahwa anak saya berpartisipasi sebagai subyek penelitian ini secara sukarela dan bebas tanpa ada paksaan, dengan catatan apabila suatu ketika merasa dirugikan dalam bentuk apapun berhak membatalkan persetujuan ini tanpa sanksi apapun.

Jakarta, tanggal ____/_____/2012

Pembuat pernyataan,

(_____)

Mengetahui,
Penanggung jawab penelitian,

(dr. Karina Rahmadia Ekawidyani)

SEAMEO RECFON (Regional Center for Food and Nutrition)
Pusat Gizi Regional, Universitas Indonesia
Jl. Salemba Raya No. 6 Jakarta 10430 Telp: 021 3914017, 31930205

==========

SURAT PERSETUJUAN
UNTUK BERPARTISIPASI DALAM PENELITIAN

"Kontribusi Makanan Jajanan terhadap Asupan Gizi dan Pajanan Kontaminan pada Anak Sekolah di Kecamatan Senen, Jakarta Pusat" ***(Contribution of Street Food to Nutrient Intake and Contaminant Exposure among School Children in Senen Subdistrict, Central Jakarta)***

(Lembar untuk Penjual Makanan Jajanan)

Setelah mendengar penjelasan mengenai tujuan penelitian, prosedur penelitian, resiko dan manfaat penelitian, dan semua pertanyaan-pertanyaan saya yang berkaitan dengan penelitian ini telah terjawab sepenuhnya,

Saya mengerti bahwa akan dilakukan terhadap saya:

- Pengambilan data makanan jajanan yang saya jual meliputi bahan-bahan pembuat, cara pembuatan, dan bahan tambahan pangan yang digunakan melalui wawancara menggunakan kuesioner.

Maka dengan ini saya yang bertanda tangan dibawah ini:

Nama : _____
Umur : _____ tahun
Jenis kelamin : _____
Alamat : _____

Menyatakan setuju bahwa saya akan berpartisipasi sebagai subyek penelitian ini secara sukarela dan bebas tanpa ada paksaan, dengan catatan apabila suatu ketika merasa dirugikan dalam bentuk apapun berhak membatalkan persetujuan ini tanpa sanksi apapun.

Jakarta, tanggal ____/_____/2012

	Mengetahui,
Pembuat pernyataan,	Penanggung jawab penelitian,
(_____)	(dr. Karina Rahmadia Ekawidyani)

SEAMEO RECFON (Regional Center for Food and Nutrition)
Pusat Gizi Regional, Universitas Indonesia
Jl. Salemba Raya No. 6 Jakarta 10430 Telp: 021 3914017, 31930205

==========

SURAT PERSETUJUAN
UNTUK BERPARTISIPASI DALAM PENELITIAN

"Kontribusi Makanan Jajanan terhadap Asupan Gizi dan Pajanan Kontaminan pada Anak Sekolah di Kecamatan Senen, Jakarta Pusat" ***(Contribution of Street Food to Nutrient Intake and Contaminant Exposure among School Children in Senen Subdistrict, Central Jakarta)***

(Lembar untuk Guru Sekolah)

Setelah mendengar penjelasan mengenai tujuan penelitian, prosedur penelitian, resiko dan manfaat penelitian, dan semua pertanyaan-pertanyaan saya yang berkaitan dengan penelitian ini telah terjawab sepenuhnya,

Saya mengerti bahwa akan dilakukan terhadap saya:

- Pengisian kuesioner mandiri tentang promosi keamanan pangan yang pernah dilakukan di sekolah tempat saya mengajar..

Maka dengan ini saya yang bertanda tangan dibawah ini:

Nama : _____
Umur : _____ tahun
Jenis kelamin : _____
Alamat : _____

Menyatakan setuju bahwa saya akan berpartisipasi sebagai subyek penelitian ini secara sukarela dan bebas tanpa ada paksaan, dengan catatan apabila suatu ketika merasa dirugikan dalam bentuk apapun berhak membatalkan persetujuan ini tanpa sanksi apapun.

Jakarta, tanggal ____/_____/2012

Pembuat pernyataan,

(_____)

Mengetahui,
Penanggung jawab penelitian,

(dr. Karina Rahmadia Ekawidyani)

KEMENTERIAN DALAM NEGERI
REPUBLIK INDONESIA
DIREKTORAT JENDERAL KESATUAN BANGSA DAN POLITIK
Jl. Medan Merdeka Utara No. 7 Telp. (021) 3450038, Fax (021) 3454270, Jakarta 10110

Jakarta, 17 Februari 2012

Nomor : 070/0536.DI
Lampiran : 1 (satu) berkas
Perihal : Rekomendasi Penelitian

Kepada
Yth. Gubernur DKI Jakarta.
Up. Kepala Badan Kesbangpol dan Linmas.

Dalam rangka memperlancar pelaksanaan kegiatan penelitian, bersama ini terlampir disampaikan Rekomendasi Penelitian Nomor: 070/0491 DI tanggal 15 Februari 2012, atas nama dr. Karina Rahmadia Ekawidyani, dkk dengan judul proposal Kontribusi Makanan Jajanan Terhadap Asupan Gizi dan Pajanan Kontaminan Pada Anak Sekolah di Kecamatan Senen Jakarta Pusat, untuk dapat ditindaklanjuti.

Demikian untuk menjadi maklum dan terimakasih.

a.n. DIREKTUR JENDERAL
KESATUAN BANGSA DAN POLITIK
SEKRETARIS DITJEN,

H. A. RACHMAN, M.Sc., M.Si.
Pembina Utama Madya (IV/d)
NIP. 19520918 198003 1 001

Tembusan Kepada Yth;
Bapak Dirjen Kesbangpol, sebagai laporan.

KEMENTERIAN DALAM NEGERI
REPUBLIK INDONESIA

REKOMENDASI PENELITIAN
NOMOR 070/ 0491.DI

a. Dasar : 1. Peraturan Menteri Dalam Negeri Nomor 41 Tahun 2010 tentang Organisasi dan Tata Kerja Kementerian Dalam Negeri (Berita Negara Republik Indonesia tahun 2010 Nomor 316), sebagaimana telah diubah dengan Peraturan Menteri Dalam Negeri Nomor 14 tahun 2011 tentang Perubahan Atas Peraturan Menteri Dalam Negeri Nomor 41 Tahun 2010 tentang Organisasi dan Tata Kerja Kementerian Dalam Negeri (Berita Negara Republik Indonesia Tahun 2011 Nomor 168);

2. Peraturan Menteri Dalam Negeri Nomor 64 Tahun 2011 tentang Pedoman Penerbitan Rekomendasi Penelitian.

b. Menimbang : Surat Deputi Direktur Program Southeast Asian Ministers Of Education Organization Regional Centre For Food And Nutrition (SEAMEO RECFON) Nomor 037A/SEAMEO-PROG/I/2012 Tanggal 10 Januari 2012 perihal Permohonan Ijin Penelitian.

MENTERI DALAM NEGERI, memberikan rekomendasi kepada:

a. Nama/Obyek : dr. Karina Rahmadia Ekawidyani, dkk.

b. Jabatan/Tempat/ Identitas : Peneliti / Jl. Salemba Raya No. 6 Jakarta 10430 Telp. (021) 31930205 No. KTP 320307 501286 05416.

c. Untuk :
1) Melakukan penelitian, dengan proposal berjudul Kontribusi Makanan Jajanan Terhadap Asupan Gizi dan Pajanan Kontaminan Pada Anak Sekolah di Kecamatan Senen, Jakarta Pusat;
2) Lokasi penelitian: Provinsi DKI Jakarta (1 provinsi);
3) Waktu/lama penelitian: Februari – April 2012 (3 bulan);
4) Anggota tim peneliti: Dr. Ir. Umi Fahmida, M. Sc dan Lina Rospita, S. Pi., M. Sc.

Demikian rekomendasi ini dibuat untuk digunakan seperlunya.

Jakarta, 15 Februari 2012

a.n. MENTERI DALAM NEGERI
DIREKTUR JENDERAL
KESATUAN BANGSA DAN POLITIK

A. TANRIBALI L.

KOTA ADMINISTRASI JAKARTA PUSAT

KEPUTUSAN WALIKOTA JAKARTA PUSAT

NOMOR 136 /2012

TENTANG

PEMBERIAN IZIN PENELITIAN KEPADA PENELITI ATAS NAMA
DR. KARINA RAHMADIA EKAWIDYANI

DENGAN RAHMAT TUHAN YANG MAHA ESA

WALIKOTA JAKARTA PUSAT

Menimbang : a. bahwa sehubungan dengan surat dari Pjs. Deputi Direktur Program Southeast Asian Ministers Of Education Organization Regional Centre For Food And Nutrition (SEAMEO RECFON) (d/h SEAMEO TROPMED RCCN UI) Nomor 037/SEAMEO-PROG/I/2012 tanggal 10 Januari 2012 hal Permohonan Izin Penelitian dan Rekomendasi Kepala Kantor Kesatuan Bangsa dan Politik Kota Administrasi Jakarta Pusat Nomor 23/1.851.85 tanggal 22 Pebruari 2012 hal Rekomendasi, untuk kegiatan dimaksud diperlukan izin;

b. bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf a, perlu menetapkan Keputusan Walikota Jakarta Pusat tentang Pemberian Izin Penelitian kepada Peneliti atas nama Dr. Karina Rahmadia Ekawidyani.

Mengingat : 1. Undang-undang Nomor 10 Tahun 2004 tentang Pembentukan Peraturan Perundang-undangan;

2. Undang-undang Nomor 32 Tahun 2004 tentang Pemerintahan Daerah sebagaimana telah diubah beberapa kali terakhir dengan Undang-undang Nomor 12 Tahun 2008;

3. Undang-undang Nomor 29 Tahun 2007 tentang Pemerintahan Provinsi Daerah Khusus Ibukota Jakarta sebagai Ibukota Negara Kesatuan Republik Indonesia;

4. Peraturan Daerah Provinsi Daerah Khusus Ibukota Jakarta Nomor 10 Tahun 2008 tentang Organisasi Perangkat Daerah;

5. Peraturan Gubernur Provinsi Daerah Khusus Ibukota Jakarta Nomor 47 Tahun 2011 tentang Pedoman Pelayanan Izin Penelitian;

6. Keputusan Gubernur Propinsi Daerah Khusus Ibukota Jakarta Nomor 69 Tahun 2004 tentang Prosedur Pelayanan pada Badan Kesatuan Bangsa Provinsi Daerah Khusus Ibukota Jakarta.

MEMUTUSKAN :

Menetapkan : KEPUTUSAN WALIKOTA JAKARTA PUSAT TENTANG PEMBERIAN IZIN PENELITIAN KEPADA PENELITI ATAS NAMA DR. KARINA RAHMADIA EKAWIDYANI

KESATU : Memberikan izin penelitian kepada Peneliti atas nama Dr. Karina Rahmadia Ekawidyani sebagai peneliti dari Universitas Indonesia

KEDUA : Izin sebagaimana dimaksud pada diktum KESATU adalah untuk kelengkapan penulisan skripsi dengan judul penelitian "Kontribusi makanan jajanan terhadap asupan gizi dan pajanan kontaminan pada anak sekolah di Kecamatan Senen, Jakarta Pusat" yang diberikan selama 2 (dua) bulan terhitung mulai tanggal 22 Februari s.d 22 Maret 2012 pada Kecamatan Senen Jakarta Pusat

KETIGA : Pemegang izin sebagaimana dimaksud pada diktum KESATU wajib menyampaikan laporan tertulis kepada Walikota Jakarta Pusat melalui Bagian Tata Pemerintahan Sekretariat Kota Administrasi Jakarta Pusat dengan tembusan kepada Kepala Kantor Kesatuan Bangsa dan Politik Kota Administrasi Jakarta Pusat tentang kegiatan yang telah dilaksanakan paling lama 2 (dua) bulan setelah habis masa berlakunya izin untuk mendapatkan rekomendasi publikasi.

KEEMPAT : Peneliti dapat melakukan publikasi hasil penelitian jika laporan sebagaimana dimaksud diktum KETIGA telah diterima dan mendapatkan rekomendasi publikasi.

KELIMA : Keputusan ini mulai berlaku pada tanggal ditetapkan.

Ditetapkan di Jakarta
pada tanggal 29 Februari 2012
a.n. WALIKOTA JAKARTA PUSAT
SEKRETARIS KOTA JAKARTA PUSAT,

BAMBANG M.
NIP 19580928198703 1003

Tembusan :
1. Wakil Gubernur Provinsi DKI Jakarta
2. Sekretaris Daerah Provinsi DKI Jakarta
3. Asisten Pemerintahan Sekda Provinsi DKI Jakarta
4. Ka. Biro Tata Pemerintahan Setda Provinsi DKI Jakarta
5. Ka. Kantor Kesbang & Politik Kota Administrasi Jakarta Pusat
6. Ka. Bagian Umum & Protokol Setko Administrasi Jakarta Pusat
7. Camat Senen Jakarta Pusat

Pewawancara - Sekolah – No. Sampel ☐ ☐ ☐☐☐

KONTRIBUSI MAKANAN JAJANAN TERHADAP ASUPAN GIZI DAN PAJANAN KONTAMINAN PADA ANAK SEKOLAH DI KECAMATAN SENEN, JAKARTA PUSAT

South East Asian Ministers of Education Organization (SEAMEO)
Regional Center for Food and Nutrition (RECFON) - Universitas Indonesia (UI)
Jl. Salemba Raya 6 Jakarta Pusat
Telp. : (021) 31930205, Fax : (021) 3913933

KUESIONER: ANAK SEKOLAH

Kriteria inklusi:

Apakah kamu sering membeli makanan dan minuman jajanan dari kantin sekolah atau pedagang di sekitar sekolah?

1. Ya 2. Tidak

Berapa kali dalam seminggu kamu membeli makanan dan minuman jajanan dari kantin sekolah atau pedagang di sekitar sekolah?

1. Setiap hari
2. ≥ 3 hari
3. < 3 hari

Tanggal wawancara: ...../...../2012 (dd/mm/yyyy)					**[DOI]**
Mulai pukul :					
Pewawancara					
1. Karina	2. Maysita	3. Aisha	4. Fadlah	5. Dhila	[ ]

A. IDENTITAS RESPONDEN	
I. Nama Sekolah	[ ]
1. SDN Paseban 02 Pagi 2. SDN Paseban 18 Pagi 3. SDN Kenari 01 Pagi 4. SDN Bungur 03 Pagi	[ ]
II. Kelas	[ ]
III. No. Sampel	[ ][ ][ ]
Nama siswa: **[NAME_STU]** _____	
Jenis kelamin: 1. Laki-laki 2. Perempuan **[SEX_STU]** Tanggal lahir: (dd/mm/yyyy) **[DOB]**	[ ] ___/___/___

B. DATA DEMOGRAFI				
B.1	Pendidikan Ibu **[EDU_MO]**	1. Tidak sekolah 2. Sekolah Dasar 3. SMP 4. SMA 5. Diploma/Universitas		[ ]
B.2	Pendidikan Ayah **[EDU_FA]**			[ ]
B.3	Pekerjaan ibu **[WORK_MO]**	1. PNS 2. Pegawai Swasta 3. Buruh 4. Wiraswastawan 5. Ibu rumah tangga 77. Lain-lain		[ ][ ]
B.4	Pekerjaan ayah **[WORK_FA]**			[ ][ ]
B.5	Uang saku responden **[PCT_MNY]**			Rp _____
B.6	Berapa banyak uang saku yang kamu habiskan dalam sehari untuk jajan? **[PCT_MNY_SF]**			Rp _____

Pewawancara - ☐ Sekolah ☐ – No. Sampel ☐☐☐

C. FOOD CHECKLIST

No.	Jenis Makanan Jajanan	Senin	Selasa	Rabu	Kamis	Jumat	Sabtu	Minggu
1.	Siomay							
2.	Batagor							
3.	Mie bakso							
4.	Bakso kuah							
5.	Mie ayam							
6.	Cilok							
7.	Pempek							
8.	Tahu goreng							
9.	Tahu bulat							
10.	Pisang goreng							
11.	Bakwan							
12.	Tempe goreng							
13.	Risoles							
14.	Cireng							
15.	Mie raut							
16.	Sosis bakar							
17.	Sosis goreng							
18.	Kentang goreng							
19.	Roti bakar							
20.	Cakwe							
21.	Nasi goreng							
22.	Nasi uduk							
23.	Kerak telur							
24.	Nugget							
25.	Agar-agar							
26.	Es sirup							
27.	Es teh manis							
28.	Es semesta							
29.	Es kelapa							
30.	Es buah							
31.	Es krim							
32.								
33.								
34.								
35.								
36.								

D. PEMILIHAN MAKANAN

Apakah alasan utama kamu dalam membeli makanan dan minuman jajanan? **[FOOD_CP]** [ ]

1. Enak
2. Bentuknya menarik
3. Warnanya menarik
4. Bersih
5. Bergizi
6. Murah
7. Tempat membelinya dekat
77. Lain-lain_____

E. DATA ANTROPOMETRI

Berat badan	**[W_STU]**	[ ] [ ].[ ]	[ ] [ ].[ ]
Tinggi badan	**[H_STU]**	[ ] [ ] [ ].[ ]	[ ] [ ] [ ].[ ]

Pewawancara - Sekolah – No. Sampel

☐ ☐ ☐☐☐

F. REPEATED 24 HOUR RECALL

Nama :

Tanggal wawancara :

Hari ke- : 1 2 3 (lingkari hari yang dimaksud)

Waktu makan	Menu	Bahan makanan	URT	Berat (gram)

Pertanyaan tambahan:

1. Adakah diantara makanan di atas yang tidak biasa dimakan sehari-hari?
2. Jika ya, pada kondisi apa biasanya makanan tersebut dimakan?
3. Apakah kamu mengonsumsi vitamin atau suplemen makanan? Jika ya, sebutkan!

Akhir wawancara pukul:

Pewawancara - Sekolah – No. Sampel

☐ ☐ ☐☐☐

Nama :

Tanggal wawancara :

Hari ke- : 1 2 3 (lingkari hari yang dimaksud)

Waktu makan	Menu	Bahan makanan	URT	Berat (gram)

Pertanyaan tambahan:

1. Adakah diantara makanan di atas yang tidak biasa dimakan sehari-hari?
2. Jika ya, pada kondisi apa biasanya makanan tersebut dimakan?
3. Apakah kamu mengonsumsi vitamin atau suplemen makanan? Jika ya, sebutkan!

Pewawancara - Sekolah – No. Sampel

☐ ☐ ☐☐☐

Nama :

Tanggal wawancara :

Hari ke- : 1 2 3 (lingkari hari yang dimaksud)

Waktu makan	Menu	Bahan makanan	URT	Berat (gram)

Pertanyaan tambahan:

1. Adakah diantara makanan di atas yang tidak biasa dimakan sehari-hari?
2. Jika ya, pada kondisi apa biasanya makanan tersebut dimakan?
3. Apakah kamu mengonsumsi vitamin atau suplemen makanan? Jika ya, sebutkan!

Pewawancara - ☐ Sekolah ☐ – No. Sampel ☐☐☐

H. FOOD ACCEPTANCE QUESTIONNAIRE

Nama :
Kelas :
Nama Sekolah :

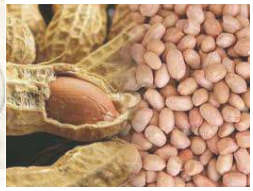
Pilih mana yang paling kamu sukai dari dua pilihan makanan/minuman berikut. Berilah tanda silang (X) untuk makanan/minuman yang kamu pilih.
Yuk kita coba mulai!

 Ubi  Tahu	1.  Mie  Salak
2.  Bihun  Tomat	3.  Kentang  Kacang panjang
4.  Ubi  Udang	5.  Singkong  Sirup
6.  Roti  Agar-agar	7.  Bihun  Jeruk

Pewawancara - Sekolah – No. Sampel

 Pepaya  Ayam	8.  Timun  Mangga
9.  Kacang kedelai  Pepaya	10.  Telur  Apel
11.  Jus Buah  Semangka	12.  Permen  Salak
13.  Kentang  Bayam	14.  Pisang  Kangkung
 Wortel  Teh	15.  Kacang Mede  Wortel
16.  Ikan tawar  Kacang Panjang	17.  Es krim  Tomat

Pewawancara - Sekolah – No. Sampel

18.  Chiki  Timun	19.  Ubi  Tahu
20.  Mangga  Tempe	21.  Kangkung  Kacang Hijau
 Kacang merah  Wafer	22.  Cumi-cumi  Kacang tanah
23.  Minuman soda  Kacang kedelai	24.  Kerupuk  Kacang mede
25.  Singkong  Daging	26.  Pepaya  Ayam

Pewawancara - Sekolah – No. Sampel

27.  Tauge  Ikan laut	28.  Tempe  Udang
 Ubi  Udang	29.  Air putih  Ikan tawar
30.  Wafer  Cumi-cumi	31.  Roti  Air putih
32.  Apel  Susu	33.  Wortel  Teh
34.  Kacang hijau  Sirup	35.  Ayam  Jus buah
 Jus buah  Semangka	36.  Batagor  Minuman soda

Pewawancara - Sekolah – No. Sampel

37.

Nasi

Permen

38.

Semangka

Chiki

39.

Kacang panjang

Kerupuk

40.

Kacang merah

Wafer

41.

Ikan laut

Batagor

42.

Teh

Gorengan

Chiki

Timun

Food Acceptance: Evaluation Form

No	Jenis Makanan	Hidrat arang (Ha)		Buah (B)		Sayur (S)		Protein Nabati (N)		Protein Hewani (H)		Minuman (M)		Jajanan (J)		Skor Vertikal
1.	Hidrat arang (Ha)	Ubi **19**	Skor Ha	Mie **1**	Skor Ha	Bihun **2**	Skor Ha	Kentang **3**	Skor Ha	Ubi **4**	Skor Ha	Singkong **5**	Skor Ha	Roti **6**	Skor Ha	Ha
		Tahu	Skor B	Salak	Skor S	Tomat	Skor N	K. panjang	Skor H	Udang	Skor M	Sirup	Skor J	Agar-agar		
2.	Buah (B)	Bihun **7**	Skor Ha	Pepaya **26**	Skor S	Timun **8**	Skor N	K. kedelai **9**	Skor H	Telur **10**	Skor M	Jus Buah **11**	Skor J	Permen **12**		B
		Jeruk	Skor B	Ayam	Skor B	Mangga	Skor B	Pepaya	Skor B	Apel	Skor B	Semangka	Skor B	Salak		
3.	Sayur (S)	Kentang **13**	Skor Ha	Pisang **14**	Skor B	Wortel **33**		K. polong **15**	Skor N	Ikan tawar **16**	Skor H	Es krim **17**	Skor M	Chiki **18**	Skor J	S
		Bayam	Skor S	Kangkung	Skor S	Teh manis		Wortel	Skor S	K. panjang	Skor S	Tomat	Skor S	Timun	Skor S	
4.	Protein Nabati (N)	Ubi **19**	Skor Ha	Mangga **20**	Skor B	Kangkung **21**	Skor S	K.merah **40**		Cumi[2] **22**	Skor H	Soda **23**	Skor M	Kerupuk **24**	Skor J	N
		Tahu	Skor N	Tempe	Skor N	K. hijau	Skor N	Biskuit/Wfr		K. Tanah	Skor N	K. kedelai	Skor N	K. polong	Skor N	
5.	Protein Hewani (H)	Singkong **25**	Skor Ha	Pepaya **26**	Skor B	Tauge **27**	Skor S	Tempe **28**	Skor N	Ubi **4**		Air putih **29**	Skor M	Biskuit **30**	Skor J	H
		Daging	Skor H	Ayam	Skor H	Ikan laut	Skor H	Udang	Skor H	Udang		Ikan tawar	Skor H	Cumi-cumi	Skor H	
6.	Minuman (M)	Roti **31**	Skor Ha	Apel **32**	Skor B	Wortel **33**	Skor S	K. hijau **34**	Skor N	Ayam **35**	Skor H	Jus Buah **11**		Siomay **36**	Skor J	M
		Air putih	Skor M	Susu	Skor M	Teh manis	Skor M	Sirup	Skor M	Jus Buah	Skor M	B.Semangka		M. soda	Skor M	
7.	Jajanan (J)	Nasi **37**	Skor Ha	Semangka **38**	Skor B	K. panjang **39**	Skor S	K. merah **40**	Skor N	Ikan Laut **41**	Skor H	Teh manis **42**	Skor M	Chiki **18**		J
		Permen	Skor J	Chiki	Skor J	Kerupuk/ Keripik	Skor J	Biskuit/ Wafer	Skor J	Siomay/ Batagor	Skor J	Gorengan	Skor J	Timun		
	Skor Horizontal	Ha =		B =		S =		N =		H =		M =		J =		
	Total Skor	**Hidrat arang (Ha)**		**Buah (B)**		**Sayur (S)**		**Protein Nabati (N)**		**Protein Hewani (H)**		**Minuman (M)**		**Jajanan (J)**		

P/G – Sekolah – No. Sampel ☐ ☐ ☐☐☐

KONTRIBUSI MAKANAN JAJANAN TERHADAP ASUPAN GIZI DAN PAJANAN KONTAMINAN PADA ANAK SEKOLAH DI KECAMATAN SENEN, JAKARTA PUSAT

South East Asian Ministers of Education Organization (SEAMEO)
Regional Center for Food and Nutrition (RECFON) - Universitas Indonesia (UI)
Jl. Salemba Raya 6 Jakarta Pusat
Telp. : (021) 31930205, Fax : (021) 3913933

KUESIONER: PEDAGANG MAKANAN JAJANAN

IDENTITAS RESPONDEN

Nama :
Pendidikan :
Makanan/minuman jajanan yang dijual :

A. Wawancara

1. Sudah berapa lama Bapak/Ibu menjual jenis makanan/minuman jajanan ini?
   _____
2. Berapa harga makanan/minuman jajanan yang Bapak/Ibu jual?
   _____
3. Komposisi bahan dan berat bahan untuk setiap porsi
   _____
   _____
   _____
   _____
4. Apakah Bapak/Ibu menambahkan bahan tambahan pangan seperti pengawet, pewarna, penguat rasa, dll?
   _____
   _____
   _____
   _____
5. Bagaimana cara membuat makanan/minuman jajanan yang Bapak/Ibu jual?
   _____
   _____
   _____
   _____

B. Analisis Kimia

No.	Jenis zat aditif	Ada / Tidak ada/ Tidak dianalisis	Jumlah (mg)
1.	Borax		
2.	Formaldehyde		
3.	Saccharine		
4.	Cyclamate		
5.	Lead (Pb)		

Appendix 8. Questionnaire for Teachers

P/G – Sekolah – No. Sampel

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KONTRIBUSI MAKANAN JAJANAN TERHADAP ASUPAN GIZI DAN PAJANAN KONTAMINAN PADA ANAK SEKOLAH DI KECAMATAN SENEN, JAKARTA PUSAT

South East Asian Ministers of Education Organization (SEAMEO)
Regional Center for Food and Nutrition (RECFON) - Universitas Indonesia (UI)
Jl. Salemba Raya 6 Jakarta Pusat
Telp. : (021) 31930205, Fax : (021) 3913933

KUESIONER: ISIAN MANDIRI UNTUK GURU

Nama Guru :
Nama Sekolah :
Kelas yang diajar :
Mata pelajaran yang diajar :

1. Apakah Bapak/Ibu pernah mengajari para siswa tentang Keamanan Pangan?
a. Ya b. Tidak (lanjut ke no. 4)

2. Jika ya, dalam mata pelajaran apa Bapak/Ibu mengajar tentang Keamanan Pangan?
_____
_____

3. Sebutkan topik-topik Keamanan Pangan yang pernah Bapak/Ibu ajarkan kepada para siswa!
_____
_____
_____
_____

4. Apakah ada program dari pemerintah atau organisasi non-pemerintah yang pernah datang ke sekolah ini untuk mempromosikan Keamanan Pangan kepada para siswa?
a. Ya b. Tidak

5. Jika ya, kapan program tersebut dilaksanakan? Sebutkan topik-topik Keamanan Pangan yang diajarkan pada program tersebut!
_____
_____
_____
_____

CURRICULUM VITAE

PERSONAL INFORMATION

Full Name : Karina Rahmadia Ekawidyani

Place and Date of Birth : Bogor, December 10, 1986

Religion : Islam

Current Address : Komplek Griya Melati 2 Blok EII no. 5, Kelurahan Bubulak, Kecamatan Bogor Barat, Kota Bogor

Occupation : Lecturer at Department of Community Nutrition, Faculty of Human Ecology, Bogor Agricultural University

Handphone : +6285710600528

Email : karina_rahmadia@yahoo.co.id

EDUCATION

Faculty of Medicine, University of Indonesia (Jakarta) Medical Doctor (Professional Program)	2008-2010
Faculty of Medicine, University of Indonesia (Jakarta) Bachelor of Medical Science	2004-2008

ENGLISH PROFICIENCY TEST

TOEFL IBT score : 96

(Taken on June 25, 2011)

SYMPOSIUM & TRAINING

Name	Year
Skin Problems in Daily Practice (Seminar)	2009
Course on Primary Diabetic Health Care	2009
Three Phases of Lifetime Beauty (Seminar)	2009
Current Updates in Pediatric Emergencies	2010
SYMCARD and ECG Course	2010
Malaysia, Indonesia, Brunei Darussalam Medical Science Conference	2010

RESEARCH EXPERIENCES

Research Title	Institution	Position	Year
Nutritional Status of Under Five Year Children in Mekarsari Village, Cilawu district, Garut and Its Influencing Factors	Student Research Organization SC FMUI	Member of project team	2007
Knowledge, Attitude and Practice of Parents about Prevention of Dengue Hemorrhagic Fever in Kayu Putih, Pulogadung District, East Jakarta	Student Research Organization SC FMUI	Member of project team	2008
Knowledge, Attitude and Practice of Pill Users on Its Proper Use and The Related Factors in Pulogadung Village 2008	Community Medicine Department, FMUI	Leader of project team	2008

OUTSTANDING ACHIEVEMENT

Name	Event Organizer	Year
Best Achievement in Research Proposal Competition ("Dual Burden in Poor Household and Its Influencing Factors")	Pra National Science Meeting - BAPIN ISMKI	2006
Third Achievement in Research Competition ("Nutritional Status of Under Five Year Children in Mekarsari Village, Cilawu district, Garut and Its Influencing Factors")	Liga Medika Science – SC FMUI	2008
Best Achievement in Research Competition ("Knowledge, Attitude and Practice of Parents about Prevention of Dengue Hemorrhagic Fever in Kayu Putih, Pulogadung District, East Jakarta")	National Science Meeting - BAPIN ISMKI	2008
Second Achievement in Research Competition in Epidemiology Category, Student Category ("Knowledge, Attitude and Practice of Pill Users on Its Proper Use and The Related Factors in Pulogadung Village 2008")	Medical Research Unit, Faculty of Medicine University of Indonesia	2009

PAPERS

Name	Year
Farmacologic Aspects of Entecavir as a Treatment for Hepatitis B (literature study, not published)	2005
Dual Burden in Poor Household and Its Influencing Factors (research proposal)	2006
Advantage of *Aloe vera* as an Alternative Treatment for Diabetes Mellitus type 2 (literature study, not published)	2007