Formative Research on Development of Semi-Quantitative Food Frequency Questionnaire for Selected Multi Ethnic Foods in Jakarta

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Abstract

Diet is an important modifiable risk factor for many diseases. However, specific tools for assessing food in a routine consumption among multi-ethnic urban population is limited. Therefore, we conducted a formative research to develop ethnic-specific semi-quantitative food frequency questionnaires (ES-SFFQs) for several ethnicities living in Jakarta.

We performed an online search, formative research, and questionnaires pretesting. The formative research used qualitative method including four focus group discussions (FGDs), eight in-depth interviews (IDIs) for 2 people in each ethnicity, and market surveys.

Before conducting FGDs and IDIs, a literature review was done to construct initial ethnic food list. Respondents were apparently healthy adults aged 19-55 years from Minangkabau, Sundanese, Chinese, and Betawi ethnicities whose parents originated from the same ethnicity.

Pretesting was performed to 25 subjects (Minangkabau, n=6, Sundanese, n=6, Chinese, n=7, Betawi, n=6) to confirm the final ES-FFQs. Four ES-SFFQs were developed common and ethnic foods. Each food was classified into 10 food groups in the final ES-SFFQs. A total of 248 common foods, 35 Minangkabau foods, 36 Sundanese foods, 31 Chinese foods, and 38 Betawi foods are included in the four final ES-SFFQs that were derived from the data of commonly consumed food based on total contribution of energy intake per day.

Four ES-SFFQs have been developed and pretested comprising 248 common foods, 35 Minangkabau, 36 Sundanese, 31 Chinese, and 38 Betawi foods. This developed ES-SFFQs can facilitate the standardization and comparable assessment of diets among ethnic groups in Jakarta and other areas.

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Introduction

The global prevalence of obesity is nearly tripled in the recent four decades. The World Health Organization (WHO) estimated a total of 650 million adults in 2016 were obese, with approximately 11% of adult men and 15% of adult women population. Overweight and obesity now has become a problem in low-and middle-income countries, despite prevention and various

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efforts that have been done.[1] According to the National Basic Health Survey, Indonesia bears a similar problem with increasing prevalence of obesity among adults from 14.3% in 2013 to 21.8 in 2018.[2,3] The 2013 data alone showed 2.5 times higher prevalence in men, and twice higher in women compared to the 2010 data.[2] Higher risk of having non-communicable diseases such as type-2 diabetes, cardiovascular diseases, certain cancers and others is the consequence of obesity which contributes as a cause of premature death worldwide.[1,4]

Diet is an important modifiable risk factor for many diseases. Some changes in dietary patterns are the results of environmental and societal changes.[5] Overconsumption of energy-dense or nutrient-poor food is associated with

obesity. A study done by Carol *et al* reported that ethnicity has a role in influencing food consumption among adult people.[6] Indonesia consists of more than 300 ethnic groups[7] and every ethnicity obviously has their own ethnic foods. Jakarta as an urban capital city of Indonesia is inhabited by people with various ethnicities that migrated from many parts of the country for numerous reasons.[8] However, information on types of specific foods consumed and to what extent traditional dietary habit could be different and changed from the original culture among ethnic groups in the urban city are not well documented. Therefore, identification of ethnic foods commonly consumed by some selected ethnicities living in urban city, Jakarta, may become an interesting finding. Then, the findings can later be useful to assess dietary quality and pattern that play important roles in the current problem of obesity and other non-communicable diseases. The study aims to develop specific tools, in a form of ethnic-specific semi food frequency questionnaires (ES-SFFQs), for assessing food pattern and quality in routine consumption among multi-ethnic urban populations.

Methods

We performed a literature search, initial food listing, formative research, and pretesting of the questionnaire. The formative research used qualitative method including eight in-depth interviews (IDIs) for 2 people in each ethnicity, four Focus Group Discussion (FGDs), and observations of food availability in market. Before conducting IDIs and FGDs, literature review was done to give an overview of the initial ethnic food list.

Subjects and Selection of Ethnic Groups. For FGDs and IDIs, we selected apparently healthy male and female adults aged 19-55 years from four ethnic groups living in Jakarta, namely Minangkabau, Sundanese, Chinese-Indonesian and Betawi, who have been residing in Jakarta for a minimum of 6 months prior to the studies. Both parents of the subjects originated from the same ethnicity. Based on the previous report, the majority of the ethnic group in Jakarta was not the native Betawi but the Javanese migrants, and Sundanese, Chinese-Indonesian, Minangkabau, and Batak ethnic groups.[8] The Minangkabau and Sundanese population originated from different islands of the western part of Sumatera and western part of Java, respectively. These ethnicities represented different food and lifestyle habits, as described by Stefani *et al*, 2018.[9] Indigenous traditional food habits of Minangkabau and Sundanese were thought to be predominantly animal- or plant-based traditional diets, but may have changed due to migration and/or dietary transition in the area. We also selected Betawi as a native group and Chinese-Indonesian as a foreign-origin ethnic group. These four ethnicities are expected to characterize contrast profiles of food varieties and habits in the questionnaires.

Food Items Searches and Selection. Internet-based search engines were used to gather literatures corresponding to multi-ethnic food frequency questionnaire. There were three search engines used, Google Scholar, PubMed, and Science direct, using the keywords multiethnic, food frequency questionnaire, Minangkabau, Sundanese, Chinese, and Betawi. The online information and available data for Indonesian foods were limited. Therefore, the initial food list was then developed from the existing ES-SFFQ used in a recent published study conducted by Stefani, *et al*. 2018.[9]

We divided the food items into common and ethnic foods. The common foods were defined as food items which were generally consumed by the general population and not different among ethnicities. The ethnic foods was defined as an ethnic group's or a country's cuisine that is culturally and socially accepted by consumers outside of the respective ethnic group" as described elsewhere.[10] Both common and ethnic food lists were then updated based on the current existing data of food consumption in Jakarta.

Identification of Commonly Consumed Food Items. Data regarding frequently consumed food were gathered from FGDs, IDIs, and market survey. FGDs were done to the Betawi and Chinese, while IDIs were done to all ethnic groups (Minangkabau, Sundanese, Chinese, Betawi). An FGD involving six people and IDIs with two people for Chinese group were held at *Teluk Gong*, North Jakarta in October 2017. While, the FGDs consisting of 6 and 7 people and IDIs of two people for Betawi group were held in West and South Jakarta in September and October 2017, respectively. FGDs for Minangkabau and Sundanese groups were not performed because it was considered to have been done in a previous study.[9] In addition, to clarify the food items list that they still commonly consumed, IDIs were conducted to some people

with Minangkabau and Sundanese ethnicities living in Jakarta. In-depth interviews for Minangkabau group (two subjects) and Sundanese group (three subjects) were held in the outskirt of South Jakarta in September 2017. FGDs and IDIs were led by a moderator covering a total of 15 topics regarding daily and ethnic food consumptions.

Simultaneously, market survey was conducted at 5 traditional markets and super-markets around Jakarta from September to October 2017, to ensure the food availability as well to gather portions of various food items that were listed in the food list.

Pretesting of Developed ES-SFFQs. Pretesting of the developed ES-SFFQs was performed to confirm the final form of the questionnaires in 25 subjects comprising of six Minangkabau, six Sundanese, seven Chinese and six Betawi. All pretesting subjects were not the same subjects as previously interviewed.

Subjects were interviewed with the developed ES-SFFQs on their habitual intakes in the preceding one month for the purpose of using the questionnaire to assess recent dietary intakes as applied elsewhere.[11] Food portions were predicted using food picture books arranged by the Ministry of Health (2014). Nutritional analysis was conducted to calculate total energy, carbohydrate, protein, fat and dietary fiber (g/day) which were later ranked based on the top 10% of total energy of all food and top 25% of total energy for each ethnicity. The total nutrient contents of the foods were calculated using a modified food database of Nutrisurvey 2004. Each nutrient was calculated based on gram per day data, obtained from 25 subjects in ES-SFFQ pretesting. The data collected included age, education level, expenses, ethnicity, smoking habit and contraceptive practices. Anthropometric measurements were performed to gather weight, height, and waist circumference data. Weight measurement used SECA scale type 876, and height measurements were done using *Shorrboard* 2 m. Both measurements were done twice with the average as the final value to calculate Body Mass Index (BMI). BMI were classified using World Health Organization guidelines for Asia Pacific.

Ethical Approval. This study was reviewed and approved by the Health Research Ethical Committee Universita Indonesia (ref no: 758/UN2.F1/ETIK/2017). Written consents from subjects were taken after the information sheets were explained by the interviewers and subjects understood what they would do and get from this research.

Results

Results for Literature Reviews, FGDs, IDIs, and Markets Survey. A total of 135 common foods consumed in Indonesia, 40 Minangkabau foods, and 42 Sundanese foods were adapted from literatures. The common foods generally found during the FGDs and IDIs comprised of staple foods (rice, noodle and bread), animal protein mostly from fish, chicken and beef, plant protein mainly consisting of tempeh and tofu, vegetables including spinach, vegetables soup, and bean sprouts, and fruits mainly banana, papaya, orange, and mango. Regarding the ethnic foods, FGDs for Chinese group revealed 13 new food items including pork and its products, arak, bakpao, angklak chicken and others. Whereas, a total of 35 ethnic foods from Betawi was obtained, such as sayur hasem, bir pletok, kerak telor, dodol betawi, geplak, pesmol, and others. Ethnic foods obtained from IDIs were: six Minangkabau's ethnic foods consisting of Minangkabau-style satay, godog, and others; 14 Sundanese ethnic foods including rengginang, sayur hasem, and others; seven Chinese ethnic food items such as campur rice, moon cake, and others; and six Betawi's ethnic food items consisting of pecak ikan, pesmol and others. In the condition where foods that were obtained from FGDs and found to be repeated in IDIs, the latter data were not listed.

Finalization of Food Categories for ES-SFFQ and Pretesting. The four final ES-SFFQs were developed for four ethnicities, the questionnaire consisted of several variables column for food frequency, cooking method and brands. Food frequency was categorized by daily, weekly, monthly, quarterly or never. Additional raw were added in every category for other food items that were not listed in the ES-SFFQ but consumed by the subjects. Cooking method and brand were taken into consideration. Subsequently, each food was classified into 10 categories as shown in **Table 1**.

Results from Pretesting ES-SFFQ. The majority of the participants were females, with the median age of around 31 years old. More than 90% of the participants had at least nine years of education. Based on the minimum monthly wages 2018 in DKI Jakarta, 80% of participants had moderate to high monthly expenses. There

were 92% of participants who did not smoke and 78.6% of the women did not use contraceptives. Minangkabau and Betawi ethnicities had an average BMI of > 25 kg/m^2. The Chinese group had the lowest mean of BMI (22.5 kg/m^2). Almost 50% of participants had central obesity with the average of waist circumferences around 84.6 cm. After calculation of energy intake of 254 common food items from all participants in the pretesting of ES-SFFQ, a list of 10th percentile of food according to the highest energy consumed per day were formed as shown in **Table 3**. The list of the common foods comprised of many carbohydrate source foods such as white rice (388 kcal/d), noodles (87.8 kcal/d), breads (47.5 kcal/d) and others. The highest carbohydrate, protein, fat and dietary fiber contents were obtained from white rice (89.6 g/d), *bakso malang* (10.3 g/d), palm oil (26.0 g/d), and breads (3.40 g/d), consecutively.

Categories of Food	Common Food Items	Minangkabau Ethnic Foods	Sundanese Ethnic Foods	Chinese Ethnic Foods	Betawi Ethnic Foods
Rice, wheat, potato, corn, tuber and products	19	1	3	4	1
Meat, egg and products	30	6	0	4	1
Fish, prawn, clam and products	29	4	0	0	3
Milk and products	13	0	0	0	0
Beans, grain, nuts and products	12	0	0	0	0
Vegetables and products	38	2	4	1	4
Fruits and products	32	0	0	0	0
Oil, fat and other products	15	0	0	0	0
Spices	15	0	0	0	0
Snacks and beverages	45	22	29	22	29
Total items	**248**	**35**	**36**	**31**	**38**

Minangkabau is an ethnic from West Sumatra, Sundanese is an ethnic from West Java, Betawi is an ethnic from Jakarta

Table 1. Ten Food categories and total food items in each category consumed by the selected Indonesian Ethnic Groups Living in Jakarta

Variable	All (n=25)	Minangkabau (n=6)	Sundanese (n=6)	Chinese (n=7)	Betawi (n=6)
Sex (female), n (%)	14 (56)	3 (50)	4 (66.7)	4 (57.1)	3 (50)
Age (year)[1]	31 (27.5-37.5)	33.5 (26-35.25)	37 (27.25-48.2)	29 (27-31)	33.5(29.5-46.25)
Education length category, n (%)[2]					
<9 years	2 (8)	0	0	1 (14.3)	1 (16.7)
≥9 years	23 (92)	6 (100)	6 (100)	6 (85.7)	5 (83.3)
Monthly Expenses category, n (%)[3]					
Low					
Moderate-high	5 (20)	2 (33.3)	1 (16.7)	0	2 (33.3)
	20 (80)	4 (66.7)	5 (83.3)	7 (100)	4 (66.7)
Smoking, n (%)	2 (8)	0	0	0	2 (33.3)
Use oral contraceptive (female), n (%)	3 (21.4)	1 (33.3)	0	1 (25)	1 (33.3)
BMI (kg/m^2), mean ± SD	24.4±4.8	25±6.6	24.9±5.2	22.5±2.6	25.3±4.7
BMI category, n (%)					
Underweight	4 (16)	2 (33.3)	1 (16.7)	1 (14.3)	0
Normal	5 (20)	0	1 (16.7)	2 (28.6)	2 (33.3)
Overweight	4 (16)	1 (16.7)	0	3 (42.8)	0
Obese	12 (48)	3 (50)	4 (66.7)	1 (14.3)	4 (66.7)
Waist circumference (cm), mean ± SD	84.6±12.4	90.8±16.3	80.4±11.1	79.3±8.96	88.6±11.11
Waist circumference category, n (%)					
Normal	13 (52)	4 (66.7)	3 (50)	2 (28.6)	4 (66.7)
Central obesity[4]	12 (48)	2 (33.3)	3 (50)	5 (71.4)	2 (33.3)

Note : BMI, body mass index;
[1]Data not normally distributed and presented in median (percentile 25 to percentile 75)[1]Education length [2]<9 years (not finished high school) [3]Rp=rupiah, expense low (<Rp3.648.035 ~<US$ 260), moderate-high (≥Rp3.648.035 ~≥US$ 260)
[4]Central obesity (>80cm for female, >90cm for male), BMI=body mass index,

Table 2. Sociodemographic Characteristics of the Multi-Ethnic Adults during Pretesting of Ethnic-Specific Semi-Quantitative Food Frequency Questionnaire.

Food	Energy (kcal/d)	Carbohydrate (g/d)	Protein (g/d)	Fat (g/d)	Dietary Fiber (g/d)
White rice	388.1	89.58	0	0	0
Palm oil	223.4	0	0	26.0	0
Chicken meat	45.6	7.59	0	0	0
Bakso malang	95.8	0	10.3	6.84	0
Noodles	87.8	0	7.31	7.31	0
Tempe	61.8	6.18	6.18	3.09	0
Bread	47.5	10.19	3.40	0	3.40
Orange	47.5	3.96	1.98	3.96	0
Tahu isi	45.7	0	0	0	0
Milk	48.4	8.97	1.79	0	0
Uduk rice	42.4	9.43	0	0	0
Banana	41.3	6.20	2.07	2.07	0
Ketoprak	62.2	13.32	2.22	0	0
White sugar	22.4	4.47	0	0	0
Porridge	39.4	10.09	0	0	0
Lontong	38.4	7.21	2.40	0	0
Chicken egg	37.9	0	2.52	2.52	0
Beef	37.9	7.98	0	0	0
Beef bakso	34.6	0	2.56	2.56	0
Mango	33.8	0	1.83	2.74	0
Tahu	32.5	9.29	0	0	0
Beef sausage	31.5	0	3.94	0	0
Margarine	31.3	2.61	1.30	1.30	0
Condensed milk	29.1	0	0	3.19	0
Sambal	28.4	5.17	0.86	0.86	0
Pecel	26.1	5.22	0	2.61	2.61
Butter	25.6	2.18	1.09	1.63	0.54
Brown rice	24.6	0	0	2.78	2.61

Table 3. Top 10th Percentile of the Common Foods Consumed by Minangkabau, Sundanese, Chinese-Indonesian and Betawi Ethnicities According to the Contribution of Energy Intake in A Day

Table 4 shows the highest 25% of energy intake based on ethnic food consumption per day. Minangkabau food with the highest energy intake per day was *Karupuk jangek* (a cattle skin cracker often eaten with *gulai* sauce) with a total energy of 75.08 kcal/day mainly from protein (14.3 g/d). The highest carbohydrate, protein, fat and dietary fiber sources were from *karupuk sanjai* (a thinly sliced cassava deep fried in coconut oil) with 7.37 g/d, *karupuk jangek* with 14.30 g/d, sala lauak (a fried dish made of rice flour with fish or small shrimp on the inside) with 0.87 g/d, and *karak kaliang* (traditional Minangkabau cake made of potato flour) with 0.75 g/d, consecutively.

Among Sundanese food, *cendol* (shaved ice topped with green jellies, coconut milk, java sugar or palm syrup) had the highest energy intake (62.47 kcal/d), mainly from carbohydrate (13.51 g/d). *Surabi*, a traditional pancake made from rice flour with coconut milk or shredded coconut had the highest protein (1.03 g/d) and fat (1.03 g/d) content. The Chinese food *cahkwe* (a long golden-brown deep-fried strip of dough) was shown to have the highest energy (39.43 kcal/d), carbohydrate (4.69 g/d), protein (0.94 g/d), and

fat (1.88 g/d) content. The highest dietary fiber sources were from *bakpao* (steamed bun) with 0.37 g/d. Among many Betawi food, *soto betawi* (beef broth with beef trotters, tendon and cartilage served in spicy coconut milk soup with potato, vegetables, vermicelli) had the highest energy about 76.90 kcal/d as well as the highest fat content with 5.49 g/d. *Cubit* cake, a traditional cake made of flour topped with varieties of toppings had the highest carbohydrate (7.50 g/d) and protein (1.50 g/d) content.

The protein sources of Minangkabau ethnic foods were from pop chicken, *gulai* and *rendang* (beef), as well as fish. However, in this study, Minangkabau people only ate these foods once a month. They still ate a lot of chicken, beef and fish but in different styles of cooking.

Chinese protein sources were from pork meat, *angkiu* and *angklak* chicken. In this study, Chinese people still ate a lot of chicken meat (*angklak* and *angkiu*; once a week), beef (1-2 times a week), and pork meat (once a week) but not specifically cooked in Chinese-style cooking. Fish was also one of the protein sources that was commonly consumed by the Chinese people.

Betawi ethnic usually eat *singgang* (goat), and fish (gabus pucung and pindang bandeng). However, this study found that Betawi people only ate these foods once every three months or none at all. Betawi people ate a lot of chicken, beef and fish which could be consumed 1-2 times a week.

The Sundanese did not have specific ethnic animal protein sources. They ate chicken and beef *bakso* almost twice a week, and beef three times a month. Almost all ethnic groups also ate shrimps or squids at least once a month.

All ethnic groups ate a lot of *tahu* or *tahu isi* and tempeh as the main plant protein sources. Both *tahu* and tempeh were eaten almost every day by all subjects. Sundanese ate red beans and nuts about 1-2 times a month, and mung beans about once a week. The Chinese ate mung beans about once a week, and red beans about once a month, consuming them as plant protein sources. The Betawi ethnic group consumed mung beans and nuts as plant protein sources. Glossary of the ethnic foods is described in **Table 5**.

Food	Energy (kcal/d)	Carbohydrate (g/d)	Protein (g/d)	Fat (g/d)	Dietary Fiber (g/d)
MINANGKABAU					
Karupuk jangek	75.1	0	14.3	0	0
Kerupuk sanjai	50.5	7.37	0	0	0
Karak kaliang	37.0	5.28	0	0	0.75
Campur ice	8.48	0	0	0	0
Bubur kampiun	6.55	1.16	0	0	0
Sala lauak	4.73	0	0.87	0.87	0
SUNDANESE					
Cendol	62.5	13.5	0	0	0
Surabi	24.6	4.11	1.03	1.03	0
Seblak	20.1	4.74	0	0	0
Doger ice	18.1	4.77	0	0	0
Rangginang	17.8	3.03	0.43	0.43	0
Misro	14.0	3.04	0	0	0
Laksa bogor	7.62	1.43	0	0	0
CHINESE					
Cahkwe	39.4	4.69	0.94	1.88	0
Bakpao	8.16	1.11	0.37	0.37	0.37
Wonton	7.90	1.19	0.40	0.26	0.26
Fu yung hai	6.73	0	0.52	0.52	0
Bakcang	2.06	0.41	0	0	0
Mochi	1.90	0.30	0	0.08	0
BETAWI					
Soto betawi	76.9	5.49	0	5.49	0
Cubit cake	49.5	7.50	1.50	1.50	0
Cucur cake	37.2	3.24	0	0.81	0
Talam cake	30.7	5.12	0	1.71	0
Asinan betawi	28.3	4.04	0	0	0
Timus cake	19.2	2.62	0.87	0.87	0

Minangkabau is an ethnic from West Sumatra, Sundanese is an ethnic from West Java, Betawi is an ethnic from Jakarta

Table 4. Top 25th Percentile of the Selected Minangkabau, Sundanese, Chinese-Indonesian and Betawi Ethnic's Foods According to the Energy Intake in A Day

FOOD	ETHNICITIES	DESCRIPTION
Asinan betawi	Betawi	various vegetables or fruit preserved in salty water, usually eaten with peanut sauce
Bakcang	Chinese	a glutinous rice can be filled with various fillings (commonly pork, beef or chicken) and wrapped in leafs
Bakpao	Chinese	a bun which can be filled with various fillings (pork, chicken, chocolate, peanut)
Bubur kampiun	Minangkabau	a dessert made from various porridges (rice, mung bean and black sticky rice) and banana/yam compote preserved in coconut milk and brown sugar. It used some spices such as cinnamon, ginger and pandan leaves
Cahkwe	Chinese	a long golden strip fried dough
Cendol	Sundanese	a type of dessert which consists of jelly made from rice flour with added green color (food coloring), coconut milk and palm sugar syrup.
Cubit cake	Betawi	a small muffin from Indonesia, made of flour
Cucur cake	Betawi	a traditional cake made of flour, wheat, brown sugar and granulated sugar
Doger ice	Sundanese	a type of beverages which consists of shaved ice made from coconut milk with pinkish color and topped with black sticky rice, fermented cassava (*tape*) and condensed milk.
Campur ice	Minangkabau	a dessert which consists of, but not limited to, coconut, seaweed jelly, jackfruit, syrup, condensed milk and finely crushed ice.
Fu yung hai	Chinese	a dish based on eggs topped with crab or chicken meat
Karak kaliang	Minangkabau	a type of crackers made from yam flour
Karupuak jangek	Minangkabau	a traditional Indonesian cracker (*Krupuk*) made from the soft inner skin of cow or water buffalo. It is frying in hot cooking oil until turning out into a crispy texture, It was previously diced and sun-dried before being fried.
Kerupuk sanjai	Minangkabau	a kind of chips that is made from thinly sliced cassava which has mix flavor both sweet and spicy.
Laksa bogor	Sundanese	a type of soup that consists of chicken, egg, bean sprouts, shrimp, vermicelli and is added with some spices and preserved in coconut milk
Misro	Sundanese	a snack made from mashed cassava filled with brown sugar
Mochi	Chinese	a glutinous rice cake filled with peanuts and other fillings
Rangginang	Sundanese	a type of thick sticky rice cracker
Sala lauak	Minangkabau	a round of fried snack made from rice flour that is mixed with little fish or little shrimp (*rebon*)
Seblak	Sundanese	a dish made from traditional Indonesian crackers (*kerupuk*) which is cooked with egg, chicken, seafood or beef and some mustard green leafy-vegetable preserved in spicy sauce
Soto betawi	Betawi	a type of beef soup in coconut or fresh milk mixed with spices and herbs
Surabi	Sundanese	a type of Indonesian pancake made from rice flour that is mixed with coconut milk or shredded coconut meat.
Talam cake	Betawi	a soft and salty two-layer cake usually mixed with pandan leave water
Timus cake	Betawi	a round of traditional snack made of fried sweet potato
Wonton	Chinese	a type of Chinese dumpling

Table 5. Glossary of Ethnic Minagkabau, Sundanese, Chinese-Indonesian, and Betawi's Foods (in Alphabetical Order)

Discussion

This study developed four ES-SFFQs and conducted pretesting to ensure the questionnaires could be used easily to interview participants and also provided sufficient information regarding the dietary pattern of Jakarta citizens. Many ethnic foods are considered common foods in Jakarta, mainly because the food components are the same with other ethnic groups, but with different cooking styles or methods. This study also collected data on the cooking method, however the data were difficult to be adjusted due to the numerous varieties in each household.

Almost 50% of participants were obese or had central obesity, corresponding with the higher prevalence of obesity and central obesity in Jakarta compared to the national prevalence.[2] Energy density and food portions appeared to be responsible for obesity, and this study agreed that the citizens of Jakarta consumed mostly high-density food which might be the cause of the rise of overweight and obesity.[12]

A study predicted that some ethnic foods might contribute to the nutrient intake in ethnic populations and another study also found that there were differences across ethnic home environments that may possess the risk for obesity.[13,14] Some common and ethnic foods with potentially high daily energy intake were listed based on people's consumption in Jakarta. Many carbohydrate sources were included in the lists. The results showed that the individual intake of carbohydrate was around 208 grams per day. Data from the Ministry of Health in 2015 showed that the daily average of individual carbohydrate intake was around 280 grams per day.[15]

Rice topped the food list contributing 14% of the total daily energy based on the results of this study. This is different from a previous study which mentioned that Asian people ate a lot of cereals, rice, and noodles, while our study showed that people in Jakarta rarely ate cereals, but ate a lot of rice and noodles.[16] There were no vegetables and only three fruits included in the list, which corresponded to the national data that people in Jakarta only ate a small amount of vegetables and fruits.[2] The majority of Minangkabau, Sundanese and Betawi ethnic foods included in the list were sweet, and the majority of Chinese ethnic foods were salty. This data agreed with the national data which showed that people who lived in Jakarta ate sweet foods more than once a day (61.4%).[2]

Regarding carbohydrate consumption, our study showed that carbohydrate took more than 50% of the total calorie intake in a day, in line with previous studies among South Asians and Chinese in North America.[17] This result is also consistent with the Food and Nutrition Board daily recommendation for carbohydrate intake to be 45-65% of total energy. Meanwhile, Indonesia, through the balanced diet guideline, recommends the consumption of carbohydrates to be 309-395 grams (55-60% from total energy recommendation) in a day depending on sex and age.[18]

Ethnic food is the combination of various locally available ingredients using different cooking methods that results in the differences of total energy. ES-SFFQ was developed to assist resolving those issue as well as to analyze the dietary pattern of Jakarta citizens from different ethnicities. This study found that most ethnic foods maintained by ethnic groups were snacks high in carbohydrates. Some ethnic foods rich in nutrient were not maintained, proved by low frequencies of consumption of some ethnic protein food sources. Animal-based protein consumption came from chicken, beef, fish for all ethnic groups and pork meat for the Chinese. Plant-based protein consumption mostly came from tofu, tempeh and beans. This study found that animal-based protein was consumed more than plant-based protein. These findings were similar with the shifting dietary pattern worldwide from vegetable-based food to fat-rich animal food sources and refined sugary foods, especially in urban areas. Based on previous studies, those dietary patterns were associated with obesity and diabetes, which is a global epidemic.[19]

Ting *et al* found that the intention to consume Dayak food in Malaysia might be determined by health condition, mood, convenience, sensory appeal, weight control, familiarity and price.[20] Subjects in this study had moderate to high expenses that may provide it convenient to choose a certain diet pattern. This may be the cause that the diet pattern in each ethnic group did not really show in this study.

The disadvantages of using ES-SFFQ were its time-consuming nature and susceptibility to recall bias whereas the advantages included its ease of use and ability to provide ethnic food information over a relatively long time period. This study was perplexed due to the limited availability of food macronutrient database in Indonesia especially for specific ethnic foods.

Conclusions

There were 248 common foods, 35 Minangkabau ethnic foods, 36 Sundanese ethnic foods, 31 Chinese ethnic foods, and 38 Betawi ethnic foods included in the final ES-SFFQ. Grains and other carbohydrates sources compose the majority of the top-list foods consumed in all ethnic groups, while people in Jakarta consumed animal-based protein more than plant based protein. This study will facilitate standardization and comparable assessment of dietary patterns among ethnic groups, but further and larger studies are needed to identify whether these common and ethnics foods contribute to body composition.

Acknowledgment

Conflict of Interest

Authors declare no conflict of interest.

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