Preference for and consumption of traditional and fast foods among adolescents in Indonesia

[1,*]Briawan, D., [1]Khomsan, A., [2]Alfiah, E., [1]Nasution, Z. and [1]Putri, P.A.

[1]Faculty of Human Ecology, IPB University, Indonesia
[2]Faculty of Science and Technology, Universitas Al-Azhar Indonesia, Indonesia

Abstract

This study aimed to examine the preference for and consumption of traditional and fast foods among adolescents in Indonesia and their relationship to social, economic, demographic, and regional factors. This cross-sectional study was conducted online in six provinces in Java and Bali (JB) and nine provinces outside Java and Bali (OJB), involving 4,500 junior high school, high school and university students. Questionnaire items that have been tested included personal and family information, food preferences (three Likert scales), frequency of food consumption (never, $\leq$ 1/month, 2-3 times/month, and $\geq$4 times/month) for about 10–20 types of traditional food and 17 types of fast food that varies among the provinces. The t-test was applied to analyze the differences in scores and frequency of food consumption in Java and Bali (JB) and the provinces outside Java and Bali (OJB). Logistic regression was employed to discover factors that contributed to the frequency of consumption of traditional food and fast food. In the provinces outside Java and Bali, traditional foods—especially groups of food made with cereals, vegetables, seafood, bean and legumes, and traditional snacks—are preferred and consumed over fast food. In Java and Bali, fast food is preferred over traditional food. However, some food groups such as cereals, vegetables and seafood are consumed more in the form of traditional food and snacks. The results showed that in Java and Bali, most adolescents preferred fast food to traditional food (P<0.05). Although fast food was preferred, adolescents in Java and Bali more than often consumed traditional foods made with cereals, vegetables, seafood, beans and legumes, and traditional snacks; because traditional food is more affordable (P<0.05). Meanwhile, in provinces outside Java and Bali, adolescents generally prefer traditional food to fast food. This is in line with the frequency of consumption of traditional food which was also higher than that of fast food from most food groups (P<0.05). Consumption of traditional food and fast food is influenced by several social, economic, and demographic factors such as gender, place of residence, educational level of the adolescents, parental occupation and income, as well as online food purchase habits (P<0.05).

1. Introduction

The term "nutrition transition" was coined in the early 1990s, describing changes in food consumption patterns and energy expenditure among individuals. In some countries, this transition occurs because of changes in demographic, socio-economic and epidemiological conditions. In developing countries, this transition is indicated, among other things, by changes in food consumption patterns among the people. Diets based on traditional foods rich in grains, vegetables, fruit, and local foods have shifted to western-style diets high in sugar, saturated fat, simple carbohydrates and animal-based foods (Popkin, 1993).

Similarly, adolescents living in low-to-middle-income countries (LMICs) also experience a change in the pattern of food consumption from traditional food to Western food consumption, which is then followed by an increase in the prevalence of obesity (Popkin *et al.*, 2012). A study conducted in 54 LMICs by Li *et al.* (2020) revealed that around 55% of adolescents consume

fast food at least once a week. A national survey in Malaysia revealed that almost 70% of adolescents aged 10–18 years consume fast food 1–3 times a week. The term fast food mostly refers to western-style fast food that is easy, fast, and ready to eat but is not nutritionally balanced. This diet is high in sugar, sodium, and saturated fat but low in fiber, which leads to insufficient nutritional needs for a healthy life (Fuhrman, 2018; Ashdown-Franks *et al.*, 2019; MacKay *et al.*, 2021).

Analysis of multi-center data from 36 countries was conducted by comparing the age groups of children and adolescents. In both age groups of children and adolescents, those who eat fast food more often have a higher BMI than those who rarely eat it (Braithwaite *et al.*, 2014). In cross-sectional and cohort studies, it has been shown that frequent consumption of fast food affects markers for metabolic syndromes, such as Body Mass Index (BMI), body fat, insulin, glucose, triglycerides and Low Density Lipoprotein (LDL) (Bahadoran *et al.*, 2013; Marlatt *et al.*, 2016).

A study conducted by Pengpid and Peltzer (2016) on adolescents in the Association of Southeast Asian Nations (ASEAN) countries showed that adolescents who consumed fast food twice or more a week were at risk of becoming overweight or obese. A study in Jakarta found that elementary school children who consumed fast food more than three times a week had a 4.2 times greater risk of obesity than those who consumed fast food less than three times a week (Febriani and Sudarti, 2019). The Indonesian National Health Survey reported an increase in obese adolescents (aged 16–18 years) from 7.3–13.5% in 2013 and 2018.

Indonesia is a developing country with rapid economic growth, followed by changes in food expenditure among its people. Expenditure on processed food (including fast food) increased from 16.72% in 2002 to 34.27% in 2020, and expenditure on processed food in urban areas was greater (38%) than that in rural areas (27%) (Rachman and Suryani, 2008; Statistics Indonesia, 2020). A cohort study in 13 provinces in Indonesia from 1993–2015 revealed a shift in food consumption towards Western-style food, such as animal-based food, packaged food, and ready-to-eat food. However, the preference for traditional foods, those were cereals and processed plant foods, remains high in both urban and rural areas (Colozza and Avendano, 2019).

Food preference analysis has been widely used to estimate food shopping choices in consumer research. Final food choices depend on several factors such as health, price, weight control, familiarity, ethical concern, and food preference (Vabø and Hansen, 2014). There is a strong correlation between food consumption habits, taste, and preferences (Contento *et al.*, 1995). Meanwhile, Drewnowski and Hann (1999) showed that food consumption among university students, as measured by food frequency, was related to their food preferences. There are not many studies in Indonesia that examine preference for and consumption of certain foods in adolescent groups across social, economic, cultural, and ethnic aspects and across islands. Therefore, this study examined the preference for and consumption of traditional food and fast food and their relationship with social, economic, demographic, and regional factors in Indonesia.

2. Materials and methods

2.1 Research design

This study used a cross-sectional design and online data collection. Data were collected from fifteen provinces in Indonesia, divided into the Java and Bali (JB) regions and outside the islands of Java and Bali (OJB). The JB region has consisted of six provinces, those are Jakarta, West Java, Central Java, Yogyakarta, East Java, and Bali; and the OJB covered nine provinces such as North Sumatra, West Sumatra, Riau Islands, Jambi, South Kalimantan, South Sulawesi, Gorontalo, West Nusa Tenggara, and East Nusa Tenggara. The difference in the prevalence of stunting among adolescents aged 13–18 ranges from the lowest in Bali (9.8%) to the highest in East Nusa Tenggara (41.0%).

2.2 Sampling method

The study sample was adolescents, consisting of groups of junior high school students (13–15 years), senior high school students (15–18 years), and university students (18–22 years old). The minimum sample size was based on Lemeshow *et al.* (1990) with the assumption that the proportion of adolescents who consume less fruit and vegetables in Indonesia is 96.4% (Basic Health Research, 2018), and the precision value (d) is 0.05. The sampling was performed from adolescents with less consumption of fruit and vegetables since a systematic review reported that fast food consumption is linked to poor dietary habits i.e. low intake of fruits and vegetables, among adolescents (Li *et al.*, 2020; Rachmi *et al.*, 2020). Thus, the minimum sample size of 93 people per school was obtained, and the minimum total sample size was 4,500 people. A sample size of less than 100 (2.2%) cannot be analyzed further because the returned questionnaires will provide incomplete data. This study collaborated with local university partners from 15 provinces to collect data. The university partners were tasked with determining the locations of the schools, managing research permits, and coordinating with schools in online data collection. The

samples were determined using quota sampling by first selecting schools purposively to obtain schools located in urban and rural areas.

2.3 Ethical approval

This study has received ethical approval from the Commission on Ethics for Research on Human Subjects, Bogor Agricultural University, with approval number 493/IT3.KEPMSM-IPB/SK/2021. Each respondent gave written informed consent after the background and research objectives were explained to them.

2.4 Research instrument and data collection

Data were collected by conducting an online survey using google forms. The food list contained in the FFQ that was used in this study was determined through Focus Group Discussion (FGD) with local research partners in each research area to decide the food items for each of the respective regions. The initial questionnaire developed was tested twice among junior high, high school and college students with a total of 128 respondents. The first trial was aimed to observe the familiarity and the frequency of the food items listed in the questionnaire. Food items with low familiarity were then excluded from the questionnaire. Next, the second trial was performed to check the comprehensiveness of the questionnaire to ensure that it was ready to be used on a larger scale. Data that were collected on respondent characteristics included age, gender, place of residence, weight, height, screen time, food sources and online food shopping habits. Meanwhile, data on family characteristics included educational attainment, occupation, parents' income, number of family members and family assets.

Adolescents' food preferences were measured using a three-point Likert scale: Dislike, Neither Like nor Dislike, and Like. The data regarding food consumption during the last month were collected using the Food Frequency Questionnaire (FFQ). In previous studies (Abdullah *et al.*, 2015; Van Rongen *et al.*, 2020), when most of the population consumed fast food within 1–3 months or less, the modified frequency scores were grouped into four ordinal categories, those were never consuming these food items, ≤ 1 time per month, 2-3 times per month and ≥ 4 times per month.

Food categorized as fast food is food or drink that has been processed, ready to serve, gives a modern impression (because major international chains sell it) and is commonly found in the research location. Examples of fast food from each food group are sushi (cereal), french fries (tubers), vegetable or fruit salad (vegetables and fruit), burgers and crispy fried chicken (meat or poultry), fish and chips(fish), clay pot tofu (beans), *tteokbokki* (snack) and non-dairy beverages (*boba* or bubble drink or grass jelly drink). Meanwhile, the requirements for the type of traditional food selected were popular and unique in each region and may be known by the respondents. Therefore, each questionnaire was designed specifically for each province. As many as 1–4 types of traditional food and fast food were selected from 9 food groups, and therefore, there were 10–20 types of traditional food and 17 types of fast food that varied among regions.

2.5 Data analysis

For analysis and discussion, as many as 15 provinces were grouped into two regions as research locations, based on a national development strategy, that included economic growth, poverty and unemployment rates (Bappenas, 2021). Provinces in Java and Bali are grouped into Java-Bali (JB), while other provinces are outside Java-Bali (OJB).

Respondents were defined as liking certain types of food if they liked at least one type of food. The preference score indicates the level of liking, 0 for "not consuming", 1 for "disliking", 2 for "neither liking nor disliking", and 3 for "liking". Preference score data per food group is the average of all food scores in that group. The preference scores in JB and OJB are presented in mean ± standard deviation, obtained from the average value of all food groups from all provinces in the two regions.

Respondents were defined to consume certain types of food if they have consumed it at least once in the past month. The food consumption frequency score was 0 for "not consuming", 1 for "consuming ≤1 time per month", 2 for "consuming 2-3 times per month" and 3 for "consuming ≥4 times per month". The consumption score per food group is the mean of all types of food in the group. Consumption scores in the provinces in Java-Bali and the provinces outside Java-Bali are shown in mean ± standard deviation, obtained from the mean value of all food groups from all provinces in the two regions.

As in most medical research, hypothesis testing employs parametric analysis based on the assumption of "central limit theorem", which states that data distribution is assumed to be normal as the sample size gets larger (Kwak and Kim, 2017). Mean values of both preference and consumption scores from each province were then averaged for the respective region, JB and OJB. Differences in preference scores and consumption scores between regions were tested using an independent t-test. Next, a multiple logistic regression test was conducted to examine the influence of individual

characteristics and family socioeconomic status on traditional and fast food consumption.

3. Results and discussion

3.1 Characteristics of respondents

Table 1 presents the characteristics of respondents based on their place of residence, which were provinces in Java-Bali and outside Java-Bali. The number of respondents living in the JB region was slightly lower (40%) than that of respondents living in OJB (60%). Meanwhile, the respondent's gender was mostly female, with 70% and 67% in JB and OJB, respectively.

Most of the respondents' nutritional status was normal (55% in JB and 67% in OJB), while 15% were obese. This is in agreement with the result from Indonesia's Basic Health Research 2018 that reported nutritional status in most adolescents aged 13-15 years old and 16-18 years old in Indonesia was normal (Ministry of Health, 2018).

Most respondents (72% and 58%, respectively) in JB and OJB take part in hybrid learning that combines online and offline classes because this study was conducted during the Corona Virus Disease 2019 (COVID-19) pandemic as instructed by the government of Indonesia (Ministry of Education, Culture, Research and Technology of the Republic of Indonesia, 2021; Ministry of Internal Affairs, 2021). The education stages of the respondents, those were junior high school, senior high school, and university, had a proportional distribution in both regions of 33.3%. Most of the respondents allocated more than four hours of screen time per day, but this was more often found in JB (63%) than in OJB (57%). The COVID-19 pandemic has made students spend more time in front of mobile, computer, or laptop screens for academic activities from home (Nagata *et al.*, 2020; Jahja *et al.*, 2021).

Most of the respondents consumed daily food and drinks prepared by their mothers at home (85% and 86%), while the rest bought convenience food outside. The government's recommendation to limit community activities and stay at home during the COVID-19 pandemic has led to changes in family eating habits. The results of the research done by Philippe *et al.* (2021) showed that more parents prepared and cooked meals at home during the pandemic than before the pandemic. The percentage of respondents in Java and Bali who bought food online more than twice a month was 44% and 41% outside of Java and Bali. Research by Rubby and Briawan (2020) on adolescents in Yogyakarta revealed almost similar results—the frequency of consumption and online food purchases of 1.6 times per week.

Table 1. Distribution of respondent characteristics based on the Indonesian region.

Characteristics of respondent	Java-Bali (JB)	Outside Java -Bali (OJB)
Residency	40%	60%
Gender:		
Male	30%	33%
Female	70%	67%
BMI category[1]:		
Overweight and obese	15%	15%
Thinnes	18%	30%
Normal	67%	55%
Learning methods:		
Hybrid[2]	72%	58%
Offline	14%	26%
Online	14%	16%
Education level:		
College	33.30%	33.30%
Senior High School	33.30%	33.30%
Junior High School	33.40%	33.40%
Screen time:		
<4 hours/day	37%	43%
≥4 hours/day	63%	57%
Food source:		
Buying	15%	14%
Cooking	85%	86%
Online food frequency:		
<2 times/month	56%	59%
≥ 2 times/month	44%	41%
Father's Education:		
Higher education	30%	28%
Primary/secondary/high school	69%	70%
No education	1%	2%
Mother's Education:		
Higher education	28%	28%
Primary/secondary/high school	70%	69%
No education	2%	3%
Father's monthly income:		
<5 million rupiahs	83%	84%
≥5 million rupiahs	18%	16%
Mother's monthly income:		
<1 million rupiahs	64%	66%
1 – 2.4 million rupiahs	18%	14%
≥2.5 million rupiahs	19%	20%
Number of family:		
>4	48%	58%
≤4	52%	42%
Asset ownership[3]:		
Have assets	44%	47%
Have no assets	56%	53%

[1]BMI category: for adult used BMI (kg/m^2): overweight/obese ≥ 25, 18.5<normal <25, thinness ≤ 18.5, and adolescent used BMI for age (z score): overweight/obese > 1, -2≥ normal ≤1, thinness <-2 (Ministry of Health Indonesia, 2020)
[2]Hybrid methods: mixed method of online and offline, offline: face to face learning in school
[3]Asset ownership: owned car/garden, and house ownership; did not own car/garden, and house.

Elementary, junior high, or high school graduates are the educational attainment of most of the respondents' parents, both fathers (69% and 70%) and mothers (70% and 69%). In JB and OJB, the percentages of fathers who are university graduates and equivalents were 30% and 29%, respectively. In comparison, the percentage of university graduates or the equivalent mothers was 28% in both regions. The socioeconomic status of the respondent's family was identified based on their parent's income. The income of fathers in the two regions was mostly less than IDR 5 million per month (83% and 84%), while the percentage of fathers with an income of more than five million per month in JB and OJB was not much different; 18% and 16% respectively. Most of the respondents' mothers are homemakers and have an income of less than one million per month, which was 64% and 66% in JB and OJB, respectively. The minimum wage in Jakarta in 2021 is around 4.5 million a month, while the average wage in Indonesia is around 2.6 million a month (Central Bureau of Statistics, 2021).

In the provinces outside Java-Bali, the number of families with > 4 family members (58%) was higher than the number of families with ≤ 4 family members (42%), while in the JB region, there were fewer families of > 4 family members (48%) compared to families with ≤ 4 family members (52%). Central Bureau of Statistics (2021) reported that the average number of household members in JB is between 3.3-3.6, while in OJB, the number of household members is between 3.6-4.8. One of the welfare indicators of a family is ownership of assets such as a house, farm, motorbike or car (Central Bureau of Statistics, 2011). By combining the indicators of ownership of car, farm, and house, and based on regional distribution, it was known that 56% of respondents in JB and 53% of respondents in OJB did not have a car, far, or their own house.

3.2 Food preference and consumption

In the provinces of Java-Bali, most adolescents preferred fast food to traditional food (P < 0.05). This was indicated by the preference score for fast food which was higher than the preference score for traditional food in almost all food groups, except for the group of beans and legumes. Although fast food was more popular, adolescents in Java-Bali more often consumed traditional foods in the cereal, vegetable, seafood, bean and legume groups and traditional snacks. Meanwhile, a small number of other food groups, those tubers, fruits, meat and poultry, and non-dairy beverages, were mostly consumed in the form of fast food (Table 2). The high consumption of traditional foods in the midst of a prominent preference for fast food indicates that eating behavior is determined by many factors, not only by

preference. Meanwhile, in the provinces outside Java-Bali, adolescents preferred traditional food to fast food. In the cereal, vegetable, seafood, bean and legume, and snack groups, the preference score for traditional processed foods was higher than the preference score for fast food. This is in agreement with the frequency of consumption of traditional foods from these food groups, which was also higher than the frequency of consumption of fast foods from the same food groups. However, the groups of tubers, meat and poultry, and non-dairy beverages were more preferred and consumed in the form of fast food than in the form of traditional foods (Table 2).

In the provinces in the Java-Bali region and outside Java-Bali, cereals were mostly consumed in the form of traditional foods, according to their preference and consumption scores (P < 0.05). Traditional cereal-based foods include fried rice, *mie kocok* (shaken noodles from west java, kocok means "shake", referring to the method of shaking noodles while being simmered in hot water), *gomak* noodles (noodles from Toba Batak that are prepared by grabbing the noodle with bare hand, gomak means "grab"), *nasi lemak* (rice with coconut milk), and *mie jawa* (Javanese noodle, made from yellow noodle, vegetables, egg and spices), while cereal-based fast foods include sushi, *onigiri*, ramen and *ramyeon*. Those cereal-based fast food are from Japan and South Korea and are popular among people in Indonesia. Various types of cereals are known as important sources of essential amino acids and are also associated with a reduced risk of coronary heart disease (Mirmiran *et al.*, 2016; Han *et al.*, 2019).

Food choice is influenced by various internal and external factors, including food characteristics (taste and shape), physiological needs, habits, knowledge, personal identity, social environment, culture, economic variables and political elements (Chen and Antonelli, 2020). Traditional food is generally more affordable than fast food, so it is widely chosen by people with low-to-moderate incomes. Aiding the maintenance of traditional food needs to be done continuously thus it will not be displaced by other types of food, especially fast food. Traditional food shows the cultural richness of Indonesia which consists of various ethnic groups that inhabit the islands that stretch from the west to the east end of Indonesia.

In the provinces in Java-Bali and outside Java-Bali, tubers were more preferred and consumed in the form of fast food than traditional food, according to the preference and consumption scores (P < 0.05). Fast food made with tubers, for example, is french fries, while traditional foods made with tubers are *perkedel* (fried

Table 2. Subject's preference and consumption of traditional and fast food.

Food Group	Preference			Consumption		
	Traditional	Fast food	P^1	Traditional	Fast food	P^1
	% like (score ± SD)	% like (score ± SD)		% consume (score ± SD)	% consume (score ± SD)	
Java-Bali (JB)						
Cereals	43 (2.01±1.07)	48 (2.11±0.94)	0.002*	64 (1.08±0.94)	50 (0.76±0.77)	0.000*
Tubers	36 (1.96±1.01)	64 (2.46±0.86)	0.000*	55 (0.89±0.94)	69 (1.19±1.00)	0.000*
Vegetables	38 (1.85±0.95)	30 (1.86±0.98)	0.795	57 (0.79±0.83)	46 (0.69±0.89)	0.000*
Fruit	25 (1.41±1.04)	50 (2.23±0.95)	0.000*	44 (0.60±0.80)	58 (0.92±0.95)	0.000*
Meat and poultry	46 (2.10±1.01)	76 (2.70±0.52)	0.000*	60 (0.97±0.92)	81 (1.44±0.79)	0.000*
Seafood	38 (2.03±0.97)	45 (2.13±0.99)	0.001*	58 (0.86±0.92)	51 (0.82±0.95)	0.194
Bean and legumes	46 (2.14±0.92)	22 (1.55±1.11)	0.000*	66 (1.08±0.89)	38 (0.58±0.87)	0.000*
Snack	50 (2.22±0.72)	54 (2.21±0.70)	0.728	64 (1.08±0.76)	55 (0.85±0.67)	0.000*
Non-dairy Beverages	43 (1.96±0.83)	57 (2.37±0.63)	0.000*	60 (1.11±0.93)	74 (1.22±0.80)	0.000*
Outside Java-Bali (OJB)						
Cereals	52 (2.24±0.98)	34 (1.74±1.05)	0.000*	63 (1.04±1.00)	35 (0.53±0.72)	0.000*
Tubers	37 (1.95±1.05)	50 (2.09±1.11)	0.000*	53 (0.77±0.91)	53 (0.88±0.98)	0.000*
Vegetables	53 (2.27±0.93)	29 (1.73±1.07)	0.000*	70 (1.21±1.02)	40 (0.61±0.88)	0.000*
Fruit	47 (2.14±0.98)	51 (2.15±1.05)	0.593	57 (0.88±0.96)	53 (0.86±0.94)	0.336
Meat and poultry	59 (2.33±0.95)	73 (2.59±0.70)	0.000*	66 (1.10±0.99)	75 (1.34±0.87)	0.000*
Seafood	46 (2.05±1.08)	41 (1.94±1.13)	0.000*	65 (1.17±1.10)	47 (0.81±1.02)	0.000*
Bean and legumes	49 (2.14±1.04)	24 (1.48±1.16)	0.000*	67 (1.30±1.15)	34 (0.52±0.84)	0.000*
Snack	42 (2.09±0.80)	48 (1.93±0.89)	0.000*	60 (0.94±0.75)	47 (0.74±0.70)	0.000*
Non-dairy Beverages	36 (1.98±0.98)	54 (2.35±0.74)	0.000*	58 (1.11±1.01)	71 (1.26±0.82)	0.000*

[1] t- test, significant if p<0.05

mashed potato with egg), fried or boiled sweet potatoes, *sanjai* chips (spicy cassava chips from West Sumatera) and potato *dodol* (a sweet, chewy, caramel-like, and sticky snack). French fries, a type of fast food, have been known by the Indonesian people for a long time since international fast food chains, such as McDonald's, Kentucky Fried Chicken, and Burger King, expanded their business into Indonesia. Globalization is one aspect that is able to shift preferences and consumption of local or traditional food to foods that are considered to be more modern (Mardatillah *et al.*, 2019).

Fast food, as food sold by international franchises, began its expansion to Indonesia around the 1990s and its expansion to various big cities in Indonesia was very rapid. The distribution of fast food chains in various cities makes it easier for people to buy fast food as an alternative to authentic Indonesian food. Research in India discovered that 22.4% of adolescents who consumed fast food were overweight and 9.52% were obese (Shah *et al.*, 2014). As many as 54.40% of students liked fast food and more than 60% of students were not aware of the fact that fast food is food that is not nutritionally balanced (Purohit *et al.*, 2015).

In the vegetable group, adolescents in Java-Bali preferred vegetables that were processed into fast food, but they still consumed vegetables more often in the form of traditional foods. Meanwhile, outside Java-Bali, vegetables were preferred and consumed in the form of traditional foods (P < 0.005). The vegetable-based traditional foods in question were *gado-gado* (mix raw/half cooked vegetables served with peanut sauce and usually served with boiled egg and tofu), *karedok gado* (mix raw vegetables served with peanut sauce), *pecel* (mix cooked vegetables served with peanut sauce), mashed cassava leaves, *gulai pucuk ubi* (cassava leaves with coconut milk), and *gudeg* (raw jackfruit boiled with palm sugar and coconut milk for hours), while vegetable-based fast food is the vegetable salad with common salad dressing. This is different from the preference and consumption of fruits in the provinces in Java-Bali, which tended to score higher if the fruit was in the form of fast food than if the fruit was in the form of traditional food (P < 0.005), and there was no significant difference in preferences and consumption in the provinces outside Java-Bali. A study conducted by Anggraeni and Sudiarti (2018) has shown that adolescents with fruit and vegetable availability at home have higher fruit and vegetable consumption.

The results of Basic Health Research (2013) revealed that 93.6% of the population aged ≥ 10 years consumed less vegetables and fruit, where the portion of vegetables and fruit consumed was less than five portions per day for seven days a week. Meanwhile, in the Guidelines for

Balanced Nutrition referring to the World Health Organization (WHO), the Ministry of Health of the Republic of Indonesia (2019) recommends the consumption of vegetables and fruits of 400 g per person per day, of which about two-thirds are vegetables, in order to maintain a healthy lifestyle.

The results of another study on adolescent high school students in four major cities in Indonesia, those were—Palembang, Bali, Yogyakarta, and Pontianak— showed that vegetables were the food group with a low level of preference (Hendra *et al.*, 2019). Dishes made with vegetables need to be modified to increase public acceptance. Taste and price are the two aspects that most determine a person's food preferences (Ernawati and Prakoso, 2019).

The preference score for the meat and poultry group among adolescents in the provinces in Java-Bali and outside Java-Bali was higher and the frequency score for the consumption of the two food items in the form of fast food was higher than the consumption in the form of traditional foods (P < 0.05). The meat and poultry-based fast foods include burger, kebab, and fried chicken, while the traditional ones include *empal* (sweet, dry, and spicy mashed beef), beef jerky, *rendang* (slow cooked beef with coconut milk and spices), *opor* (boiled chicken with coconut milk and spices), *gulai* (spicy chicken/beef with coconut milk), *semur* (chicken/beef with brown gravy made from soy sauce and spices), *soto* (indonesian soup), *sate kere* (skewered tempe/fermented soy bean), and *garang asem* (chicken cooked with banana leaves and has a sour and spicy taste). Fast food consumption is influenced by the number of fast food restaurants in an area and people's income. Additionally, fast food for some people is also considered a prestigious food (Xiao *et al.*, 2018).

In the Java-Bali provinces, the preference for seafood products in the form of fast food was higher than the preference for products made with similar food items in the form of traditional foods. Moreover, the consumption of fast food made with seafood was more frequent than the consumption of traditional foods made with seafood (P < 0.05). In the provinces outside Java-Bali, traditional foods made with seafood were preferred and consumed more, based on the preference and consumption scores (P < 0.05). Examples of seafood-based traditional foods are *pepes ikan* (fish wrapped in banana leaves), *sambal teri Medan* (Indonesian sauce served with ancovies), fish curry, sour and spicy Hemibagrus stew, *kerutup ikan* (fish cooked with specific spices, consumed widely in Jambi), *mangut lele* (catfish cooked with coconut milk), milkfish cake, while seafood-based fast food is fish and chips. Overall, it can

be said that seafood processed into traditional foods is consumed more than seafood processed into fast food (fish and chips).

In Java-Bali and outside Java-Bali, beans and legumes processed into traditional foods were preferred and consumed more often than those processed into fast food. Traditional foods made with beans and legumes are fried tempeh and tofu, *tahu gejrot* (mashed tofu with spices), *tahu gunting* (chopped tofu), *sambal tempeh* (Indonesian spicy sauce with tempe/fermented soy bean), mung bean *bakpia* (pastry filled with mung bean), *tahu petis* (tofu served with petis/sauce made by shrimp or fish extract), *tahu tek* (fried tofu with lontong/rice wrapped in banana leaves, and served with peanut sauce and petis), pigeon peas, and spicy hyacinth bean, while fast food made with beans and legumes is clay pot tofu.

Snacks were preferred and consumed more often in the form of traditional snacks than fast food snacks, both in the provinces in Java-Bali and outside Java-Bali (P < 0.05). The types of snacks consumed by adolescents were quite diverse. Fast food snacks included JCo/ Dunkin Donuts, sweet cakes, waffles/pancakes, tempura and *tteokbokki*. The traditional snacks that were consumed were *cilok* (ball shaped snack made from tapioca flour), *seblak* (spicy and hot dish from Cianjur), fritters, *ombusombus* (cake made from rice flour with palm sugar in the middle and wrapped in banana leaves), *lemang* (rice with coconut milk wrapped by banana leaves), *lompong sagu* (snack made from sago flour and coconut, wrapped by banana leaves), *dodol* (a sweet, chewy, caramel-like, and sticky snack), *pempek* (indonesian fish cake served with special vinegar sauce, "cuko") and *jenang sumsum* (rice pudding). According to Intani (2014), the expansion of modern food (fast food) was initially able to marginalize the existence of traditional food. Fast food is simple in terms of ingredients, equipment and processing and presentation methods. However, over time, slowly, some traditional foods began to rise in popularity. This phenomenon is shown by the increasing number of traditional food sellers even in the shopping mall or shopping center areas.

In the provinces in Java-Bali and outside Java-Bali, non-dairy fast food beverages were preferred and consumed more frequently, according to preference scores and consumption scores (P < 0.05). Non-dairy fast food beverages include boba/grass jelly drinks, franchised tea/coffee (Starbucks), and carbonated soft drinks (Cola/Fanta), while traditional types of drinks are *bandrek/bansus* (warm ginger drink), *es doger* (shaved ice beverages with coconut milk, fermented sticky rice and cassava, and red colored syrup), *es cincau*

(indonesian grass jelly beverages), traditional coffee drinks, passion fruit juice, tamarillo juice, cinnamon syrup, and *wedang angsle* (sweet and hot dish made from ginger soup, coconut milk, sticky rice, green beans, and slices of bread). There are many types of traditional, non-dairy beverages in the target regions of the study.

It can be said that non-dairy fast food beverages have become part of the lifestyle trend of young people and have shifted the trend of consumption of traditional drinks. Young people need a comfortable place to mingle with their peers while consuming fast food drinks. There were 53.1% of the Indonesian population aged ≥ 10 years consumed sugary drinks ≥ 1 time a day (Basic Health Research, 2013). In fact, consumption of sugary drinks is correlated with the incidence of type 2 diabetes, heart disease, kidney disorders, liver disease, nutritional damage, and gout (arthritis) (Bomback *et al.*, 2010; Malik and Hu, 2015; Malik and Hu 2019; Valenzuela *et al.*, 2021). The Center for Disease Control and Prevention (CDC) recommends consuming sugary drinks, one of which is soft drinks, of no more than 130 kcal because people who consume sugary drinks usually do not reduce their food portions, resulting in excess energy intake (Pan and Hu, 2011).

3.3 Factors that influence fast food consumption among adolescents in Indonesia

Logistic regression analysis was conducted on the variables that influenced the consumption of fast food from nine food groups based on the place of residence, socio-economic status, and demographic conditions of the respondents and their parents. The results of the analysis are presented in Table 3.

The place of residence of the respondents (Java-Bali (JB) vs. outside Java-Bali (OJB)) was a significant variable in the level of consumption of fast food from the categories of cereals, tubers, vegetables and fruit and snacks. Meanwhile, the place of residence (urban areas vs rural areas) had a significant influence on the level of consumption of fast food made with cereals, tubers, fruit, meat and beans. Living in Java-Bali and urban areas is convenient for obtaining fast food. This is in agreement with the research conducted by Widaningrum *et al.* (2020) in Jakarta, which revealed that fast food restaurants are located in the vicinity of entertainment venues, educational, religious, and health facilities, and office buildings and are therefore very easy to access on a daily basis.

Fruit-based fast food that tends to be consumed by respondents living in rural areas indicates its popularity. Moreover, it is expanding faster and consumers could reach it easily. Research conducted by Story *et al.* (2002)

discovered that the consumption of fruits and vegetables among individuals can be influenced by four factors, those were individual factors (knowledge and reasons an individual consumes fruits and vegetables), social environmental factors (family and peers), physical environmental factors, and mass media factors (marketing). Fruit and vegetable consumption was significantly and negatively related to the incidence of chronic heart disease. For an increase in one serving of fruit and vegetable consumption, there is a 4.0% reduction in the risk of developing chronic heart disease (Dauchet *et al.*, 2006). This conclusion is in agreement with the research conducted by Mikkilä *et al.* (2004), which revealed that the diet of children aged 3–18 years who consume more foods high in saturated fat than fruits and vegetables can increase the risk of cardiovascular disease later in their life. Meanwhile, according to Drapeau *et al.* (2004), the consumption of fruits and vegetables can prevent obesity because it can reduce hunger and does not cause excess fat intake.

In terms of respondent characteristics, Table 3 shows that gender is a determining variable in the level of consumption of fast food from all food categories, except vegetables and fruit, among adolescents in Indonesia. The tendency of female respondents to consume fast food indicates their preference for modern food. Eating habits are influenced by several environmental factors such as the cultural environment, the natural environment and the population. Adolescents usually have their own choice of favorite foods because by that time, eating habits have already been formed (Fuster *et al.*, 2019). Boys tend to like filling food, while girls tend to like snacks (Monge-Rojas *et al.*, 2015; Blum *et al.*, 2019).

The educational background of the respondents was an important variable on the level of consumption of fast food from the categories of vegetables, seafood, beans and snacks. The habit of adolescent respondents in shopping online for food was also a variable that had a significant influence on the consumption of fast food in Indonesia from all food categories. Meanwhile, daily screen time only influenced the consumption of fast food made from vegetables, fruit, meat, seafood and beans. Learning methods (online or offline learning) during the current COVID-19 pandemic situation influenced the consumption of fast food from the fruit category.

Lifestyle, especially consumption patterns, has undergone many changes due to the development of internet technology. Various services can be accessed online, one of which is food purchasing service (Grunert and Ramus, 2005). Online food delivery applications are currently widely used by various groups of people,

Table 3. Variables associated with fast food consumption.

Variable	Category	OR (95%CI) food group[1]								
		Cereals	Tubers	Vegetables	Fruit	Meat and poultry	Seafood	Bean and legumes	Snack	Non-dairy beverages
Residency:										
JB and OJB	JB=1, OJB=0	1.493	1.565	1.179	0.651	-	-	-	1.319	-
Rural and Urban	Urban=1 Rural=0	1.153	1.420	-	0.867	1.208	-	0.842	-	-
Subject Characteristics:										
Gender	Male=1 Female=0	0.609	0.739	-	-	0.581	0.831	1.191	0.518	0.571
Education level	High school + college = 1 Junior high school = 0	-	-	0.864	-	-	0.851	0.787	0.849	-
Online food frequency	< 2 times/month = 1 ≥ 2 times/month = 0	0.445	0.494	0.542	0.497	0.364	0.619	0.549	0.472	0.478
Screen time	< 4 hours/day = 1 ≥ 4 hours/day = 0	-	-	1.457	1.365	0.783	1.233	1.397	-	-
Learning methods	Hybrid = 1 Non-hybrid = 0	-	-	-	1.141	-	-	-	-	-
Family socio-economy:										
Father's education	> high school = 1 ≤ high school = 0	1.279	1.28	-	-	-	-	-	-	-
Mother's education	> high school = 1 ≤ high school = 0	-	-	-	0.812	-	-	0.823	-	-
Father's occupation	Employee = 1 Non-employee = 0	1.610	1.641	-	1.451	1.554	1.504	1.219	1.763	1.36
Mother's occupation	Working = 1 Not working = 0	-	-	-	-	0.691	-	-	0.717	-
Father's monthly income	≥ 5 million = 1 < 5 million = 0	1.633	1.847	1.38	-	2.127	1.414	-	1.522	1.456
Mother's monthly income	Have income = 1 Not have income = 0	1.462	1.659	1.565	1.572	1.686	1.431	1.480	1.57	1.408
Asset ownership	Have asset[2] = 1 Not have asset[2] = 0	-	-	-	-	-	-	-	1.228	-

[1]OR only presented variables significantly associated to fast food consumption.

[2]Owned car/garden + house, [2]did not own car/garden + house.

including adolescents. Online food delivery applications provide satisfaction to adolescents, especially in terms of efficiency, privacy, desire fulfillment and food variety (Suhartanto *et al*., 2019). They provide various types of food from food stalls or restaurants across a wide area. The foods offered are varied, ranging from main dishes, side dishes, vegetables, fruits, snacks, drinks, and all can be purchased easily. A study in Bangladesh discovered that factors related to students' preferences for fast food consumption include service effectiveness, easy access, food taste, price and fast service (Goon *et al*., 2014). Fast food consumption habits are based on the fast food industry's ability to meet consumer needs, which include easy access, easy ordering process, and fast and convenient service (Untaru and Ispas, 2013).

Regarding the socio-economic status of the respondents' families, Table 3 shows that the educational background of the respondents' fathers had a significant influence on the consumption of fast food from the cereal and tuber category among adolescents, while the educational background of their mothers had a significant influence on the consumption of fast food made with fruits and beans. Father's occupation was a factor that had a significant influence on the consumption of fast food from all food categories, except vegetables. Meanwhile, the mother's occupation only had a significant influence on the consumption of meat-based fast food and snacks. Parental income was also a variable that had a major influence on the consumption of fast food from all food categories, except for the fruit group and bean group, among adolescents in Indonesia. Meanwhile, the ownership of family assets only had a significant influence on the consumption of fast food in

the form of snacks.

The factors that influence the consumption of fast food include the socio-economic and socio-demographic characteristics of the family. Consumption of fast food has rapidly become common in the last ten years especially among children and adolescents (Das, 2015). The results of several studies reveal that consumption of fast food is higher among children, adolescents, young adults and those with high incomes (Pereira *et al.*, 2005). According to Ariani *et al*. (2018), the income factor affects the level of food consumption. The higher the income level of a household, the greater the level of animal protein consumption per capita becomes. Children from families with higher socio-economic status tend to prefer fast food to traditional food. Fried chicken is often chosen by respondents in various studies as the type of fast food that is most often consumed and preferred because it is considered to have a good taste and therefore respondents declared their intention to eat it again (Ishak *et al.*, 2020). Fried chicken is made with broiler chicken, which is processed by frying. This kind of fast food that is cooked by frying will absorb more oil than fast food that is cooked using other cooking methods, such as baking. In addition, the addition of wheat flour and spices add a more savory taste and a crunchy texture to fried chicken. Although the nutritional content tends to be damaged because of the frying process, fried food tastes more savory, contains higher calories, and often tastes better than foods that are cooked by other methods, for example boiling.

Apart from animal protein, it can be observed that family income has a significant influence on the level of consumption of fast food from the non-dairy beverages category. Consuming soft drinks regularly and excessively can have a bad impact on the body. Consumption of sweetened soft drinks is associated with the increasing incidence of obesity, diabetes mellitus and dyslipidemia (Bahadoran *et al.*, 2013; Marlatt *et al.*, 2016). Soft drinks are generally consumed together with fast food. In fact, according to the results of research by Bowman and Vinyard (2004), people who consume fast food and soft drinks tend to have a higher BMI. The consumption of high-calorie drinks is associated with an increase in energy intake (Woodward-Lopez *et al.*, 2011).

3.4 Factors influencing the consumption of traditional foods among adolescents in Indonesia

Logistic regression analysis was conducted on the variables that influence the consumption of traditional foods from nine food groups based on the place of residence, socio-economic status, and demographic conditions of the respondents and their parents. The results of the analysis are presented in Table 4 below.

Living in the provinces of Java-Bali significantly influenced the consumption of traditional foods from the categories of cereals, tubers, vegetables, meat and snacks among adolescents in Indonesia. Meanwhile, living in urban areas had a wider influence on almost all traditional food categories, except seafood, snacks and non-dairy beverages. A study in the Special Region of Yogyakarta showed that traditional foods that are still widely consumed by people are usually vegetable-based and consumed as a main course (Harsana and Triwidayati, 2020). Another study discovered that adolescents who live in rural areas consume more fruits and vegetables because of their sufficient availability (Anggraeni and Sudiarti, 2018).

In terms of respondent characteristics, gender was a variable that had a significant influence on the consumption of traditional foods from all food groups, except for vegetable-based traditional foods, among adolescents in Indonesia. Meanwhile, the educational background of the respondents had a significant influence on the consumption of traditional foods from the cereal, vegetable, seafood, bean and snack groups. Furthermore, online shopping habits significantly influenced the consumption of traditional foods from all food groups. In contrast, the learning method (online or offline learning) only had a significant influence on the consumption of traditional foods from the fruit group. In addition, the total time spent per day in front of the screen (screen time) had a significant influence on the consumption of traditional foods from the vegetable, fruit, meat and seafood groups.

In terms of gender, a study showed that tubers were mostly consumed as snacks and it was more consumed in urban areas by female respondents (Rachmawati and Sari, 2020). In terms of the respondent's educational background, among junior high and high school students, meal planning is more often done by parents because they are not like university students who do not live with their parents and prefer to buy ready-to-eat food (Blum *et al.*, 2019). Parents of respondents who have sufficient income will support their purchase of vegetables. Apart from that, living in rural areas gives the advantage of sufficient availability of vegetables (Anggraeni and Sudiarti, 2018). Peer pressure was also a factor that influenced the level of consumption of traditional foods among adolescents. A study conducted on junior high school students in Bandung showed that the low consumption of traditional drinks (for example *es goyobod, es cendol, es cingcau, sekoteng*) was due to the influence of peers (Yulia *et al.*, 2017).

In terms of family socio-economic status, the

Table 4. Variables associated with traditional food consumption.

Variable	Category	OR (95%CI) food group[1]								
		Cereals	Tubers	Vegetables	Fruit	Meat and poultry	Seafood	Bean and legumes	Snack	Non-dairy beverages
Residency:										
JB and OJB	JB=1, OJB=0	1.493	1.565	1.179	-	1.180	-	-	1.319	-
Rural and Urban	Urban=1 Rural=0	1.153	1.420	0.893	0.867	1.208	-	0.842	-	-
Subject Characteristics:										
Gender	Male=1 Female=0	0.609	0.739	-	0.651	0.581	0.831	1.191	0.518	0.571
Education level	High school + college = 1 Junior high school = 0	0.886	-	0.864	-	-	0.851	0.787	0.849	-
Online food frequency	< 2 times/month = 1 ≥ 2 times/month = 0	-	-	1.457	1.365	0.783	1.233	-	-	-
Screen time	< 4 hours/day = 1 ≥ 4 hours/day = 0	-	-	-	1.141	-	-	-	-	-
Learning methods	Hybrid = 1 Non-hybrid = 0	-	-	-	-	0.795	0.854	-	-	-
Family socio-economy:										
Father's education	> high school = 1 ≤ high school = 0	1.279	1.280	-	-	-	-	-	-	-
Mother's education	> high school = 1 ≤ high school = 0	-	-	0.868	0.812	-	0.869	0.823	-	-
Father's occupation	Employee = 1 Non-employee = 0	1.61	1.641	1.38	1.451	1.554	1.504	1.219	1.763	1.36
Mother's occupation	Working = 1 Not working = 0	-	0.823	-	-	0.691	-	-	0.717	-
Father's monthly income	≥ 5 million = 1 < 5 million = 0	1.633	1.847	-	-	2.127	1.414	-	1.522	1.456
Mother's monthly income	Have income = 1 Not have income = 0	1.462	1.659	1.565	1.572	1.686	1.431	1.480	1.57	1.408
Asset ownership	Have asset[2] = 1 Not have asset[2] = 0	-	1.140	-	-	-	-	-	1.228	-

[1]OR only presented variables significantly associated to fast food consumption.
[2]Owned car/garden + house, [2]did not own car/garden + house.

educational background of the respondents' fathers only influenced the level of consumption of traditional foods from the cereal and tuber groups, while the educational background of their mothers had a significant influence on the level of consumption of traditional foods made with vegetables, fruit, seafood and beans. In addition, the father's occupation influenced the level of consumption of traditional foods from all food categories, while the mother's occupation only influenced the level of consumption of traditional foods made with tubers and meat as well as traditional snacks. Interestingly, the mother's income significantly influenced the level of consumption of traditional foods from all food categories among adolescents, while the father's income only influenced the consumption of traditional foods from the groups of cereal, tuber, meat, seafood, snack and non-dairy beverages. The aspect of asset ownership did not

have a strong influence and its influence was only on the level of consumption of traditional foods from the tuber group and the snack group. A study on adolescent high school students in the cities of Indonesia (Palembang, Yogyakarta, Bali and Pontianak) showed that in these cities, chicken meat was the main type of food group favored by students (Hendra *et al*., 2019). The important role of family income also appears in the seafood-based food group in which the research of Fuada *et al*. (2018) showed that economic status, affordability, and prices of fish are influential factors in fish consumption in Indonesia. The same thing was also discovered in another study regarding snacks, where good parental income allows respondents to try various kinds of traditional foods in the form of snacks thus respondents are more interested in consuming them (Bastami *et al*., 2019).

FULL PAPER

4. Conclusion

Traditional foods, especially those made with cereals, vegetables, seafood, beans, legumes and traditional snacks are more preferred and consumed than fast food in the provinces outside Java-Bali. In the provinces of Java-Bali, fast food is preferred over traditional food. However, some food groups such as cereals, vegetables, seafood, and snacks are mostly consumed as traditional foods.

Consumption of fast food and traditional food among adolescents is influenced by several socio-economic and demographic factors. Female and junior high school respondents are more likely to consume fast food. The respondent's place of residence (Java-Bali and urban areas) greatly influences the respondents' consumption of fast food. Consumption of fast food, in general, is also higher if the father works and has an income of more than or equal to IDR 5 million per month. Fast food consumption will be higher if respondents have a habit of buying food online. Meanwhile, in terms of traditional food, female junior high school respondents who live in the provinces of Java-Bali consume traditional foods more often. The residence of the respondents has an influence on their food consumption habits. Higher consumption of traditional foods was found in respondents whose parents had jobs with an income of more than IDR 5 million per month and who had the habit of shopping online.

Conflict of interest

The authors declare no conflict of interest.

References

Abdullah, N.N., Mokhtar, M.M., Bakar, M.H.A. and Al-Kubaisy, W. (2015). Trend on fast food consumption in relation to obesity among Selangor urban community. *Procedia-Social and Behavioral Sciences*, 202, 505-513. https://doi.org/10.1016/j.sbspro.2015.08.189.

Anggraeni, N.A. and Sudiarti, T. (2018). Dominant factors of fruits and vegetables consumption in adolescents at SMPN 98 Jakarta. *Indonesian Journal of Human Nutrition*, 5(1), 18-32. https://doi.org/10.21776/ub.ijhn.2018.005.01.3

Ariani, M., Suryana, A., Suhartini, S.H. and Saliem, H.P. (2018). Animal-based food consumption performance by region and income at household level. *Agricultural Policy Analysis*, 16(2), 147-163. https://doi.org/10.21082/akp.v16n2.2018.147-163

Ashdown-Franks, G., Vancampfort, D., Firth, J., Smith, L., Sabiston, C.M., Stubbs, B. and Koyanagi, A. (2019). Association of leisure-time sedentary behavior with fast food and carbonated soft drink consumption among 133,555 adolescents aged 12–15 years in 44 low-and middle-income countries. *International Journal of Behavioral Nutrition and Physical Activity*, 16, 35. https://doi.org/10.1186/s12966-019-0796-3

Bahadoran, Z., Mirmiran, P., Hosseini-Esfahani, F. and Azizi, F. (2013). Fast food consumption and the risk of metabolic syndrome after 3-years of follow-up: Tehran Lipid and Glucose Study. *European Journal of Clinical Nutrition*, 67(12), 1303-1309. https://doi.org/10.1038/ejcn.2013.217.

Bastami, F., Zamani-Alavijeh, F. and Mostafavi, F. (2019). Factors behind healthy snack consumption at school among high-school students: a qualitative study. *BMC Public Health*, 19, 1342. https://doi.org/10.1186/s12889-019-7656-6.

Blum, L.S., Mellisa, A., Sari, E.K., Yusadiredja, I.N., van Liere, M., Shulman, S., Izwardy, D., Menon, R. and Tumilowicz, A. (2019). In-depth assessment of snacking behaviour in unmarried adolescent girls 16–19 years of age living in urban centers of Java, Indonesia. *Maternal and Child Nutrition*, 15(4), e12833.https://doi.org/10.1111/mcn.12833.

Bomback, A.S., Derebail, V.K., Shoham, D.A., Anderson, C.A., Steffen, L.M., Rosamond, W.D. and Kshirsagar, A.V. (2010). Sugar-sweetened soda consumption, hyperuricemia, and kidney disease. *Kidney International*, 77(7), 609-616. https://doi.org/10.1038/ki.2009.500.

Bowman, S.A. and Vinyard, B.T. (2004). Fast food consumers vs. non-fast food consumers: A

comparison of their energy intakes, diet quality, and overweight status. *Journal of American College of Nutrition*, 23(2), 163-168.

Braithwaite, I., Stewart, A.W., Hancox, R.J., Beasley, R., Murphy, R., Mitchell, E.A. and ISAAC Phase Three Study Group. (2014). Fast food consumption and body mass index in children and adolescents: an international cross-sectional study. *British Medical Journal Open*, 4, e005813. https://doi.org/10.1136/bmjopen-2014-005813

Central Bureau of Statistics (BPS). (2011). Social Protection Program Survey 2011. Jakarta, Indonesia: BPS-Statistics Indonesia

Central Bureau of Statistic (BPS). (2020). Consumption expenditure of population of Indonesia. Jakarta, Indonesia: BPS-Statistics Indonesia

Central Bureau of Statistics (BPS). (2021). Trends of Selected Socio-Economic Indicators of Indonesia. Jakarta, Indonesia: BPS-Statistics Indonesia

Chen, P. and Antonelli, M. (2020). Conceptual models of food choice: Influential factors related to foods, individual differences, and society. *Foods*, 9(12), 1898. https://doi:10.3390/foods9121898.

Colozza, D. and Avendano, M. (2019). Urbanization, dietary change and traditional food practices in Indonesia: A longitudinal analysis. *Social Science and Medicine*, 233, 103-112. https://doi.org/10.1016/j.socscimed.2019.06.007

Contento, I., Balch, G.I., Bronner, Y.L., Lytle, L.A., Maloney, S.K., Olson, C.M. and Swadener, S.S. (1995). The effectiveness of nutrition education and implications for nutrition education policy, programs, and research: a review of research. *Journal of Nutrition Education*, 27(6), 284-418.

Das, J.C. (2015). Fast food consumption in children: A review. *Medical and Clinical Reviews*, 1, 1.

Dauchet, L., Amouyel, P., Hercberg, S. and Dallongeville, J. (2006). Fruit and vegetable consumption and risk of coronary heart disease: a meta-analysis of cohort studies. *The Journal of Nutrition*, 136(10), 2588-2593. https://doi.org/10.1093/jn/136.10.2588.

Drapeau, V., Després, J.P., Bouchard, C., Allard, L., Fournier, G., Leblanc, C. and Tremblay, A. (2004). Modifications in food-group consumption are related to long-term body-weight changes. *The American Journal of Clinical Nutrition*, 80(1), 29-37. https://doi.org/10.1093/ajcn/80.1.29.

Drewnowski, A. and Hann, C. (1999). Food preferences and reported frequencies of food consumption as predictors of current diet in young women. *The American Journal of Clinical Nutrition*, 70(1), 28-36. https://doi.org/10.1093/ajcn/70.1.28.

Ernawati, H. and Prakoso, D. (2019). Consumer preferences for Indonesian food. *Journal of Indonesian Economy and Business*, 34(3), 280-293. https://doi.org/10.22146/jieb.52637.

Febriani, D. and Sudarti, T. (2019). Fast food as drivers for overweight and obesity among urban school children at Jakarta, Indonesia. *Indonesian Journal of Nutrition and Food*, 14(2), 99-106. https://doi.org/10.25182/jgp.2019.14.2.99-106.

Fuada, N., Muljati, S. and Triwinarto, A. (2018). The contribution of marine fisheries in protein adequacy Indonesian population. *The Journal of Nutrition and Food Research*, 41(2), 77-88. https://doi.org/10.22435/pgm.v41i2.1889.

Fuhrman, J. (2018). The hidden dangers of fast and processed food. *American Journal of Lifestyle Medicine*, 12(5), 375-381. https://doi.org/10.1177%2F1559827618766483.

Fuster, M., Weindorf, S., Mateo, K.F., Barata-Cavalcanti, O. and Leung, M.M. (2019). "It's sort of, like, in my family's blood": Exploring latino pre-adolescent children and their parents' perceived cultural influences on food practices. *Ecology of Food and Nutrition*, 58(6), 620-636. https://doi.org/10.1080/03670244.2019.1652819.

Goon, S., Bipasha, M.S. and Islam, M.S. (2014). Fast food consumption and obesity risk among university students of Bangladesh. *European Journal of Preventive Medicine*, 2(6), 99-104. https://doi:10.11648/j.ejpm.20140206.14.

Grunert, K.G. and Ramus, K. (2005). Consumers' willingness to buy food through the internet: A review of the literature and a model for future research. *British Food Journal*, 107(6), 381-403. https://doi.org/10.1108/00070700510602174.

Han, F., Han, F., Wang, Y., Fan, L., Song, G., Chen, X., Jiang, P., Miao, H. and Han, Y. (2019). Digestible indispensable amino acid scores of nine cooked cereal grains. *British Journal of Nutrition*, 121(1), 30-41. https://doi.org/10.1017/s0007114518003033.

Harsana, M. and Triwidayati, M. (2020). The potential of traditional food as a culinary tourism attraction in DI Yogyakarta, presented at the Prosiding Pendidikan Teknik Boga Busana. Yogyakarta, Indonesia: Department of Culinary and Fashion Engineering Education, Faculty of Engineering, Yogyakarta State University

Hendra, P., Suhadi, R., Virginia, D.M. and Setiawan, C.H. (2019). Vegetable is not preferences of adolescents in Indonesia. *Jurnal Kedokteran*

Brawijaya, 30(4), 331-335. https://doi.org/10.21776/ub.jkb.2019.030.04.18.

Intani, R. (2014). The tips of the traditional foods seller to emerge the markets. *Patanjala*, 6(2), 315-328. https://doi.org/10.30959/patanjala.v6i2.202.

Ishak, S.I.Z.S., Chin, Y.S., Taib, M.N.M. and Shariff, Z.M. (2020). Malaysian adolescents' perceptions of healthy eating: A qualitative study. *Public Health Nutrition*, 23(8), 1440-1449. https://doi:10.1017/S1368980019003677

Jahja, F., Hananta, L., Prastowo, N. and Sidharta, V. (2021). Sedentary living, screen time, and physical activities in medical students during the coronavirus (Covid-19) pandemic. *Sport Mont*, 19(3), 21-25. https://doi.org/10.26773/smj.211005

Kwak, S.G. and Kim, J.H. (2017). Central limit theorem: the cornerstone of modern statistics. *Korean Journal of Anesthesiology,* 70(2), 144-156. https://doi.org/10.4097/kjae.2017.70.2.144

Lemeshow, S., Hosmer, D.W., Klar, J. and Lwanga, S.K. (1990). Adequacy of Sample Size in Health Studies. Chichester, England: Wiley for the World Health Organization.

Li, L., Sun, N., Zhanga, L., Xu, G., Liuc. J., Hu, J., Zhang, Z., Loue, J., Deng, H., Shen, Z. and Han, L. (2020). Fast food consumption among young adolescents aged 12–15 years in 54 low- and middle-income countries. *Global Health Action*, 13(1), 1795438. https://doi.org/10.1080/16549716.2020.1795438.

Mackay, S., Gontijo de Castro, T., Young, L., Shaw, G., Ni Mhurchu, C. and Eyles, H. (2021). Energy, sodium, sugar and saturated fat content of New Zealand fast food products and meal combos in 2020. *Nutrients*, 13(11), 4010. https://doi.org/10.3390/nu13114010.

Malik, V.S. and Hu, F.B. (2015). Fructose and cardio metabolic health: what the evidence from sugar-sweetened beverages tells us. *Journal of the American College of Cardiology*, 66(14), 1615-1624. https://dx.doi.org/10.1016/j.jacc.2015.08.025.

Malik, V.S. and Hu, F.B. (2019). Sugar-sweetened beverages and cardio metabolic health: an update of the evidence. *Nutrients*, 11(8), 1840. https://doi.org/10.3390/nu11081840.

Mardatillah, A., Raharja, S.U.J., Hermanto, B. and Herawaty, T. (2019). Riau Malay food culture in Pekanbaru, Riau Indonesia: commodification, authenticity, and sustainability in a global business era. *Journal of Ethnic Foods*, 6, 3. https://doi.org/10.1186/s42779-019-0005-7.

Marlatt, K.L., Farbakhsh, K., Dengel, D.R. and Lytle, L.A. (2016). Breakfast and fast food consumption are associated with selected biomarkers in adolescents. *Preventive Medicine Reports*, 3, 49-52. https://doi.org/10.1016/j.pmedr.2015.11.014.

Mikkilä, V., Räsänen, L., Raitakari, O.T., Pietinen, P. and Viikari, J. (2004). Longitudinal changes in diet from childhood into adulthood with respect to risk of cardiovascular diseases: The Cardiovascular Risk in Young Finns Study. *European Journal of Clinical Nutrition*, 58(7), 1038-1045. https://doi.org/10.1038/sj.ejcn.1601929.

Ministry of Education, Culture, Research and Technology of the Republic of Indonesia. (2021). Circular Letter Number 4 of 2021 concerning the Implementation of Face-to-Face Learning for the Academic Year of 2021/2022. Jakarta, Indonesia: Directorate General of Higher Education, Research and Technology

Ministry of Health Republic of Indonesia. (2013). Basic Health Research Report 2013. Jakarta, Indonesia: Health Research and Development Agency.

Ministry of Health Republic of Indonesia (2018). Basic Health Research Report 2018. Jakarta, Indonesia: Health Research and Development Agency.

Ministry of Health Republic of Indonesia. (2019). Balanced Nutrition Guidelines. Jakarta, Indonesia: Directorate General of Nutrition and Maternal and Child Health, Ministry of Health Republic of Indonesia.

Ministry of Health Republic of Indonesia. (2020). Anthropometry Standard for Children. Jakarta, Indonesia: Ministry of Health Republic of Indonesia.

Ministry of Internal Affairs. (2021). Instruction of the Minister of Home Affairs Number 43 of 2021 concerning the Implementation of Restrictions on Community Activities Level 4, Level 3, and Level 2 Corona Virus Disease 2019 in the Java and Bali Regions. Jakarta, Indonesia: Ministry of Internal Affairs.

Bappenas (Ministry of National Development Planning of Indonesia). (2021). Regulation of the Minister of National Development Planning / Head of the National Development Planning Agency of the Republic of Indonesia Number 2 year 2021. Jakarta, Indonesia: Bappenas.

Mirmiran, P., Bahadoran, Z., Khalili Moghadam, S., Zadeh Vakili, A. and Azizi, F. (2016). A prospective study of different types of dietary fiber and risk of cardiovascular disease: Tehran lipid and glucose study. *Nutrients*, 8(11), 686. https://doi.org/10.3390/nu8110686

Monge-Rojas, R., Fuster-Baraona, T., Garita, C.,

Sánchez, M., Smith-Castro, V., Valverde-Cerros, O. and Colon-Ramos, U. (2015). The influence of gender stereotypes on eating habits among Costa Rican adolescents. *American Journal of Health Promotion*, 29(5), 303-310. https://doi.org/10.4278% 2Fajhp.130904-QUAL-462.

Nagata, J.M., Magid, H.S.A. and Gabriel, K.P. (2020). Screen time for children and adolescents during the coronavirus disease 2019 pandemic. *Obesity*, 28(9), 1582-1583. https://doi.org/10.1002/oby.22917.

Pan, A. and Hu, F.B. (2011). Effects of carbohydrates on satiety: differences between liquid and solid food. *Current Opinion in Clinical Nutrition and Metabolic Care*, 14(4), 385-390. https://doi: 10.1097/MCO.0b013e328346df36.

Pengpid, S. and Peltzer, K. (2016). Overweight, obesity and associated factors among 13-15 years old students in the Association of Southeast Asian Nations member countries, 2007-2014. *Southeast Asian Journal of Tropical Medicine and Public Health*, 47(2), 250-262.

Pereira, M.A., Kartashov, A.I., Ebbeling, C.B., Van Horn, L., Slattery, M.L., Jacobs Jr, D.R. and Ludwig, D.S. (2005). Fast food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *The Lancet*, 365, 36-42. https://doi.org/10.1016/S0140-6736(04)17663-0.

Philippe, K., Chabanet, C., Issanchou, S. and Monnery-Patris, S. (2021). Child eating behaviors, parental feeding practices and food shopping motivations during the COVID-19 lockdown in France:(How) did they change? *Appetite*, 161, 105132. https://doi.org/10.1016/j.appet.2021.105132.

Popkin, B.M. (1993). Nutritional patterns and transitions. *Population and Development Review*, 19, 138-157. https://doi.org/10.2307/2938388.

Popkin, B.M., Adair, L.S. and Ng, S.W. (2012). Global nutrition transition and the pandemic of obesity in developing countries. *Nutrition Reviews*, 70(1), 3-21. https://doi.org/10.1111/j.1753-4887.2011.00456.x

Purohit, G., Shah, T. and Harsoda, J.M. (2015). Prevalence of obesity in medical students and its correlation with cardiovascular risk factors: emergency alarm for today? *Kathmandu University Medical Journal*, 13(4), 341-345. https://doi.org/10.3126/kumj.v13i4.16834.

Rachman, H.P. and Suryani, E. (2008). Changes in food consumption patterns of carbohydrate sources in rural areas. *Jurnal Pangan*, 17(3), 13-25. https://doi.org/10.33964/jp.v17i3.264.

Rachmawati, R. and Sari Y.D. (2020). Food away from home (FAFH) contribution of nutrition to daily total energy intake in Indonesia. *The Journal of Nutrition and Food Research*, 43(1), 29-40. https://doi.org/10.22435/pgm.v43i1.2891.

Rachmi, C.N., Jusril, H., Ariawan, I., Beal, T. and Sutrisna, A. (2020). Eating behaviour of Indonesian adolescents: a systematic review of the literature. *Public Health Nutrition*, 24(S2), s84–s97.

Rubby, A.S.H. and Briawan, D. (2020). Online food delivery and food consumption quality among students of SMA Negeri 2 Yogyakarta Indonesia. *Malaysian Journal of Medicine and Health Sciences,* 16, 33-34.

Shah, T., Purohit, G., Nair, S.P., Patel, B., Rawal, Y. and Shah, R.M. (2014). Assessment of obesity, overweight and its association with the fast food consumption in medical students. *Journal of Clinical and Diagnostic Research*, 8(5), CC05-CC07. https://dx.doi.org/10.7860%2FJCDR%2F2014% 2F7908.4351.

Story, M., Neumark-Sztainer, D. and French, S. (2002). Individual and environmental influences on adolescent eating behaviors. *Journal of the American Dietetic Association*, 102(3), S40-S51. https://doi.org/10.1016/S0002-8223(02)90421-9.

Suhartanto, D., Dean, D., Leo, G. and Triyuni, N.N. (2019). Millennial experience with online food home delivery: A lesson from Indonesia. *Interdisciplinary Journal of Information, Knowledge, and Management*, 14, 277- 279. https://doi.org/10.28945/4386.

Untaru, E.N. and Ispas, A. (2013). Why do young people prefer fast food restaurants? An exploratory study. *Revista De Turism-Studii Si Cercetari In Turism*, 15, 27-34.

Valenzuela, M.J., Waterhouse, B., Aggarwal, V.R., Bloor, K. and Doran, T. (2021). Effect of sugar-sweetened beverages on oral health: A systematic review and meta-analysis. *European Journal of Public Health*, 31(1), 122-129. https://doi.org/10.1093/eurpub/ckaa147.

Van Rongen, S., Poelman, M.P., Thornton, L., Abbott, G., Lu, M., Kamphuis, C.B., Verkooijen, K. and De Vet, E. (2020). Neighborhood fast food exposure and consumption: the mediating role of neighborhood social norms. *International Journal of Behavioral Nutrition and Physical Activity*, 17, 61. https://doi.org/10.1186/s12966-020-00969-w.

Vabø, M. and Hansen, H. (2014). The Relationship between Food Preferences and Food Choice: A Theoretical Discussion. *International Journal of Business and Social Science*, 5(7), 145–157.

Widaningrum, D.L., Surjandari, I. and Sudiana, D.

(2020). Discovering spatial patterns of fast food restaurants in Jakarta, Indonesia. *Journal of Industrial and Production Engineering*, 37(8), 403-421. https://doi.org/10.1080/21681015.2020.1823495.

Woodward-Lopez, G., Kao, J. and Ritchie, L. (2011). To what extent have sweetened beverages contributed to the obesity epidemic? *Public Health Nutrition,* 14 (3), 499-509. https://doi:10.1017/S1368980010002375.

Xiao, A., Yang, S. and Iqbal, Q. (2018). Factors affecting purchase intentions in generation Y: An empirical evidence from fast food industry in Malaysia. *Administrative Science,* 9, 4. https://doi:10.3390/admsci9010004.

Yulia, C., Nikmawati, E.E. and Widiaty, I. (2017). Preliminary study in developing traditional street foods as nutrition education media for Indonesian youth. *Innovation of Vocational Technology Education,* XII(1), 1-7. https://doi.org/10.17509/invotec.v13i1.6256.