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Food Preferences, Eating Habits, and Nutritional Status of Full-Day School Students in Urban Areas

Preferensi Makanan, Kebiasaan Makan, dan Status Gizi Anak Sekolah Full-day di Perkotaan

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ABSTRACT

Background: Food preferences play an important role in determining eating habits. School-age children spend a significant amount of time in school; therefore, school food environment can influence their eating habits and ultimately their nutritional status.
Objectives: This study aimed to investigate eating habits and food preferences (with a focus on vegetables and snacks) among normal, overweight and obese of full-day school children in urban areas of Surabaya City.
Methods: This cross-sectional study was conducted at a full-day elementary school in Surabaya City, Indonesia, involving 110 students. Dietary habits were assessed using a food frequency questionnaire, while nutritional status was evaluated by measuring weight and height. The students' nutritional status was determined using the BMI-for-age index with the WHO AnthroPlus software. Differences between variables were analyzed using the Chi-Square test, Fisher's Exact test, and Likelihood Ratio test.
Results: A high prevalence of overweight and obesity (41.8%) was observed in this study, with boys showing a higher prevalence than girls. Overweight/obese boys tended to eat more frequently and had a lower proportion of breakfast habits compared to girls, although these differences were not statistically significant (p-value>0.05). Food preferences for vegetables (carrot, spinach, water spinach) were similar between normal-weight and overweight/obese children. However, there were slight differences in snack preferences, with boys showing a greater preference for snacks than girls.
Conclusions: The high prevalence of overnutrition among school-aged children, particularly boys, requires greater attention from parents and schools. Both home and school food environments should consistently promote healthy eating to improve children's nutritional status by encouraging regular breakfast habits in boys and providing healthier snack options.

INTRODUCTION

Over the past five years, Indonesia's formal education system has transitioned from a six-day to a five-day school week. Many schools now operate for eight hours a day, Monday through Friday[1]. Therefore, students spend most of their time in school. Adequate nutrition is essential for children to achieve their full potential in growth, development, and overall health[2]. However, in recent years, the increasing prevalence of overweight and obesity among school-aged children particularly in urban areas has become a growing concern for public health practitioners[3].

Eating habits and food preferences developed from early childhood and are shaped by various factors, including family environment, food availability, early experiences with different tastes and flavors, parental influence, socioeconomic status, and lifestyle factors such as physical activity, screen time, and sleep habits[4]. A study conducted in Indonesia found that parents' perceptions on eating affect their children's diets[5]. Additionally, mass media exposure also plays a role[4]. A systematic review revealed that social media exposure influences children's and adolescents' diets by increasing intake of unhealthy snacks, sugar and sweetened beverages and decreasing intake of fruits and vegetables[6]. Research by Bouhlal et al. further suggests that child gender may influence maternal food choices, with mothers tending to select more calorie-dense foods for boys than girls[7].

Food preferences continue to evolve throughout life and play a significant role in shaping eating habits[8,9]. Children tend to prefer familiar foods, with parents serving as key influencers in developing their eating behaviors[4,8]. However, as school-aged children spend

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more time in school, the school food environment and peer influences increasingly shape their dietary patterns and food preferences[4]. Peer influence and social modeling of eating behavior often occur outside the family, primarily during interactions with friends. Children observe their peers' food choices and eating habits in settings like school or extracurricular activities. The availability of various foods in these environments significantly impacts children's food choices and consumption. Unhealthy foods, being easily accessible, tasty, and convenient, tend to attract children, increasing their likelihood of purchasing and consuming these foods. This dynamic, combined with social bonding, means that eating unhealthy foods with friends becomes a common behavior[10].

Full-day school that serve lunch programme provide meal which provide 25-30% of nutrient adequacy. However, studies have revealed that vegetable waste was the highest among other foods in school meals[11,12]. Additionally, school-aged children frequently consume snacks, making the nutritional quality of these snacks an important factor[13,14]. Reducing vegetable waste and improving the nutrient density of snacks can significantly enhance the overall nutrient intake of school-aged children[11,13].

School meals play a role in shaping children's eating habits, which may, in turn, influence their parents to try new foods and adopt different eating habits at home[15]. School meal also have beneficial side effects, such as increasing fruit and vegetable consumption, with a more significant impact on fruits intake[16]. In the United States, children who receive school lunches have a higher diet quality compared to those bringing lunch from home[17]. In contrast, a study in Indonesia found that children in full-day schools consume higher fat and lower carbohydrates than those in half-day schools[18].

High exposure of diverse food from school lunch programme can influence student eating habit and food preference[4,19,20]. There are several study that explore the relationship of eating habit, food preference and nutritional status[21–23] but none of them were conducted in full-day school in Indonesia. Therefore the aim of this study was to investigate eating habits and food preferences (focus on vegetables and snacks) of full-day school students in urban areas.

METHODS

Design and Sample

This cross sectional study was conducted in full-day school in Surabaya City, Indonesia on March-December 2019 The participants included 110 fourth- and fifth-grade boys and girls, aged 10-12 years, from two elementary schools that implemented a school meal service. The sample size was calculated using the Lwanga and Lemeshow formula for hypothesis testing for two population proportions, with a 95% confidence interval, 99% power, anticipated population proportions of 48.2% and 19.6%[18], and an additional 15% to account for the response rate. Children who participated in the school meal program were eligible for inclusion in this study.

Data Collection and Analysis

A structured questionnaire was used in this study to collect data on student characteristics, eating habits, and food preferences. A separate questionnaire on household characteristics was completed by parents. Eating habits and food preferences were self-reported by students, and questions about food preferences regarding vegetables and snacks were open-ended. The food preferences questionnaire was developed by the research team based on the availability of food at the school. The questionnaire for parents was distributed to children at school, who then delivered it to their parents. All parents submitted their completed questionnaires to the researchers through their children.

The nutritional status of school-aged children was assessed based on anthropometric measurements of body weight and height, expressed as Body Mass Index-for-Age (BMI/A). Overweight and obesity were defined as >+1SD according to the WHO growth reference. Differences between variables were analyzed using the Chi-Square test. When the Chi-Square assumption was violated, Fisher's Exact test was used for 2×2 tables, while the Likelihood Ratio test was applied for larger tables. IBM SPSS Statistics (version 22) was used for both descriptive and inferential analyses.

Ethical Approval

The research protocol was approved by the Ethical committee of Faculty of Nursing, Universitas Airlangga, Indonesia, on April 1, 2019 (No 1347-KEPK). Informed consent was given to parents and signed before the interview was conducted. The questionnaire was filled out in school by students under the supervision of a teacher and a researcher.

RESULTS AND DISCUSSIONS

This study revealed a high prevalence of overweight and obesity (41.8%) among full-day school students in urban areas (Table 1). Boys exhibited a higher prevalence (30.9%) than girls (10.9%). The prevalence of overweight and obesity among full-day school students in urban areas are serious public health problem, particularly among boys. Nearly half of children was classified as overweight and obesity and one out of three boys is obese. The prevalence of overweight /obese in this study was higher than national prevalence[3], Asian countries[24], and even world wide prevalence[25]. The high prevalence of overweight/obese could be caused by lack of physical activity, increasing screen time, and unhealthy eating habit[26]. Food environment both home and school are also influencing children overweight and obesity[27]. Children spend 8 hours in full-day school from Monday to Friday. Therefore, school environment have an important role in influencing children eating habit and nutritional status.

Table 1. Proportion of the nutritional status of full-day school students in urban areas [n(%)]

Gender	Nutritional Status		p-value
	Normal	Overweight/Obese	
Boy	31 (28.2)	34 (30.9)	0.007[a]

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Girl	33 (30.0)	12 (10.9)

[a]=Chi-Square Test

In general, parents of children in full-day school in urban areas have a high formal education level. Fathers education (90%) were slightly higher than mothers (87.3%). This study showed that fathers occupation were quite diverse. More than third were private employee (36%), and 23.6% of them were govermment officers. The others were enterpreuneur and work in service area. Meanwhile, almost half of mothers were housewifes (43.6%), particularly in normal students. Many working mothers are goverment officers, work in service sectors and also private sectors (Table 2).

Table 2. Frequency distribution of parents' and children's characteristics [n(%)]

Characteristics	Normal (n=64)		Overweight/Obese (n=46)		p-value	
	Boy (n=31)	Girl (n=33)	Boy (n=34)	Girl (n=12)	Sex	Nutritional Status
Fathers Education						
Basic Education	1 (3.2)	1 (3)	0 (0)	0 (0)	0.457[b]	0.322[b]
Secondary Education	3 (9.7)	2 (6.1)	4 (11,8)	0 (0)		
Higher Education	27 (87.1)	30 (90.9)	30 (88,2)	12 (100)		
Mothers Education						
Basic Education	1 (3.2)	0 (0)	0 (0)	1 (8,3)	0.964[b]	0.431[b]
Secondary Education	4 (12.9)	5 (15.2)	3 (8,8)	0 (0)		
Higher Education	26 (83.9)	28 (84.8)	31 (91,2)	11 (91,7)		
Fathers Occupation						
Private Employee	10 (32.3)	11 (33.3)	14 (41,2)	5 (41,7)	0.966[a]	0.322[a]
Government Officers	7 (22.6)	6 (18.2)	8 (23,5)	5 (41,7)		
Enterpreuneur	7 (22.6)	6 (18.2)	6 (17,6)	1 (8,3)		
Service	5 (16.1)	7 (21.2)	3 (8,8)	0 (0)		
Others	2 (6.5)	3 (9.1)	3 (8,8)	1 (8,3)		
Mothers Occupation						
Private Employee	2 (6.5)	2 (6.1)	7 (20,6)	1 (8,3)	0.176[b]	0.302[b]
Government Officers	5 (16.1)	7 (21.2)	7 (20,6)	4 (33,3)		
Enterpreuneur	6 (19.4)	0 (0)	1 (2,9)	1 (8,3)		
Service	5 (16.1)	3 (9.1)	5 (14,7)	2 (16,7)		
Housewife	13 (41.9)	19 (57.6)	13 (38,2)	3 (25)		
Others	0 (0)	2 (6.1)	1 (2,9)	1 (8,3)		
Student's Pocket Money						
≤5,000 IDR	11 (35.5)	15 (45.5)	7 (20,6)	5 (41,7)	0.110[a]	0.286[a]
>5,000 - ≤10,000 IDR	18 (58.1)	12 (36.4)	21 (61,8)	6 (50)		
>10,000 IDR	2 (6.5)	6 (18.2)	6 (17,6)	1 (8,3)		

[a]=Chi-Square Test, [b]=Likelihood Ratio

On the other side, more than half students who participate in this study were boys (59.1%), and given pocket money by their parents >5,000 - ≤10,000 IDR (51.8%) or equal to 0.37-0.73 USD. Distribution of characteristics of students and parents is comprehensively displayed in Table 2. Parental characteristics and children's eating habits were similar across sex and nutritional status. Parents were generally well-educated and employed in professional roles. A higher proportion of working mothers were associated with overweight/obese children, although this difference was not statistically significant.

In this study, eating habit was reflected by meal frequency, breakfast habit, and eating with family. Table 3 revealed that majority of the students ate three times a day and always breakfast regardless their sex and nutritional status. In the overweight/obese children, boys tend to eat ≥4 ×/day and girls (75%) have a higher proportion of always breakfast than boys (67.6%) and vice versa in the normal children. Students who have normal nutritional status have a higher proportion of always eating together with their family regardless their sex. On the other hand, in the overweight/obese group, the proportion of children who stated sometimes eating together with their family were higher than normal group. Nonetheless, no significant differences were found (p-value>0.05). The habit of eating together was usually practiced at dinner and breakfast (Table 3).

Table 3. Differences in eating habits among full-day school students in urban areas [n(%)]

Characteristics	Normal (n=64)		Overweight/Obese (n=46)		p-value	
	Boy (n=31)	Girl (n=33)	Boy (n=34)	Girl (n=12)	Sex	Nutritional status
Meal Frequency						
2 ×/day	3 (9.7)	3 (9.1)	2 (5.9)	1 (8.3)	0.900[a]	0.720[a]
3 ×/day	26 (83.9)	25 (75.8)	25 (73.5)	11 (91.7)		

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Characteristics	Normal (n=64)		Overweight/Obese (n=46)		p-value	
	Boy (n=31)	Girl (n=33)	Boy (n=34)	Girl (n=12)	Sex	Nutritional status
≥4 ×/day	2 (6.5)	5 (15.1)	7 (20.6)	0 (0)		
Breakfast Habit						
Always	22 (71)	20 (60.6)	23 (67.6)	9 (75)	0.036[b]	0.419[b]
Sometimes	6 (19.4)	12 (36.4)	5 (14.7)	3 (25)		
Rarely	2 (6.5)	1 (3)	4 (11.8)	0 (0)		
Never	1 (3.2)	0 (0)	2 (5.9)	0 (0)		
Eating with Family						
Always	17 (54.8)	13 (39.4)	16 (47.1)	4 (33.3)	0.203[a]	0.914[a]
Sometimes	11 (35.5)	17 (51.5)	14 (41.2)	8 (66.7)		
Rarely	3 (9.7)	3 (9.1)	4 (11.8)	0 (0)		
Times Eating with Family						
Breakfast	18 (58.1)	16 (48.5)	14 (41.2)	6 (50)	0.972[a]	0.318[a]
Lunch	3 (9.7)	4 (12.1)	4 (11.8)	0 (0)	1.000[b]	0.759[b]
Dinner	24 (77.4)	26 (78.8)	30 (88.2)	11 (91.7)	0.907[a]	0.132[a]

[a]=Chi-Square Test, [b]=Likelihood Ratio

Children with normal weight were more likely to eat meals with their families compared to their overweight or obese peers. Among overweight and obese children, boys tended to eat more frequently and skip breakfast more often than girls, although these differences were not statistically significant. A meta-analysis by Horikawa et al. revealed a positive association between skipping breakfast and the prevalence of overweight and obesity in the Asian and Pacific regions[28]. Additionally, a meta-analysis by Dallacker et al. demonstrated that the frequency of eating together as a family was significantly associated with better nutritional health outcomes, including higher diet quality and lower body mass index, regardless of the specific meal (breakfast, lunch, or dinner)[29].

Frequent family meals have been shown to positively influence children's dietary habits[30]. Children who eat with their families at least three times per week are more likely to consume nutrient-rich foods, such as fruits and vegetables, while simultaneously reducing their intake of energy-dense, low-nutritional-value foods, including fast food and sugar-sweetened beverages. Additionally, regular family meals are associated with greater food enjoyment and a lower prevalence of fussy or emotional eating behaviors among young children[30]. These findings underscore the importance of shared mealtimes in fostering healthier eating patterns and overall well-being in children.

The role of mothers on feeding practices and children's eating behaviors is described in many studies. The family meal represents an important moment of interaction and control. There is evidence that the food environment that parents create at home shapes children's food preferences and food-acceptance patterns, such that availability and exposure to foods can affect children's food selections and intakes. Parents should choose meal times, propose adequate food and portion sizes, and promote social interaction and role modeling for eating behaviors[20].

Table 4 revealed that carrot is the most prefered vegetables among school aged children in full-day school regardless gender and nutritional status. The students also liked spinach more than water spinach, brocolli, and beans. Vegetables preferences were similar between normal and overweight/obese children. Meanwhile, there were several differences between boys and girls. Boys tend to prefer brocolli and beans than long beans and cabbage. On the contrary, girls liked long beans and cabbage more than brocolli and beans.

Table 4. Differences in vegetable preferences among full-day school students in urban areas

Vegetables	Normal (n=64)		Overweight/Obese (n=46)		p-value	
	Boy (n=31)	Girl (n=33)	Boy (n=34)	Girl (n=12)	Sex	Nutritional Status
Carrot	28 (90.3)	28 (84.8)	32 (94.1)	10 (83.3)	0.224[b]	0.528[a]
Spinach	23 (74.2)	27 (81.8)	21 (61.8)	8 (66.7)	0.248[a]	0.083[a]
Water Spinach	10 (32.3)	14 (42.4)	8 (23.5)	4 (33.3)	0.176[a]	0.208[a]
Brocolli	9 (29)	3 (9.1)	9 (26.5)	2 (16.7)	0.036[a]	0.511[a]
Beans	10 (32.3)	2 (6.1)	4 (11.8)	4 (33.3)	0.273[a]	0.855[a]
Long Beans	1 (3.2)	5 (15.2)	7 (20.6)	2 (16.7)	0.626[a]	0.124[a]
Cabbage	1 (3.2)	3 (9.1)	4 (11.8)	3 (25)	0.352[b]	0.196[b]
Chinese Cabbage	3 (9.7)	2 (6.1)	4 (11.8)	1 (8.3)	0.522[b]	0.739[b]
Tomato	2 (6.5)	2 (6.1)	3 (8.8)	1 (8.3)	1.000[b]	0.718[b]
Corn	1 (3.2)	3 (9.1)	2 (5.9)	0 (0)	0.687[b]	1.000[b]
Sprout	2 (6.5)	3 (9.1)	0 (0)	1 (8.3)	0.224[b]	0.398[b]
Cucumber	1 (3.2)	1 (3)	2 (5.9)	0 (0)	0.643[b]	1.000[b]
Chayote	1 (3.2)	2 (6.1)	1 (2.9)	0 (0)	1.000[b]	0.639[b]
Potato	0 (0)	0 (0)	3 (8.8)	0 (0)	0.268[b]	0.070[b]

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[a]=Chi-Square Test, [b]=Fisher's Exact Test

In general, this study found that boys liked snacks more than girls. More than 50% overweight/obese students liked salty crispy fried snacks (*chiki*). Meanwhile, in the normal students, *chiki* was prefered by boys than girls. Wafer was the second popular snacks among students especially normal children. Meanwhile, overweight/obese children liked meatball more than normal children (Table 5).

Table 5. Frequency distribution of snack preferences among full-day school students in urban areas [n(%)]

Snacks	Normal (n=64)		Overweight/Obese (n=46)	
	Boy (n=31)	Girl (n=33)	Boy (n=34)	Girl (n=12)
Chiki	16 (51.6)	7 (21.2)	20 (58.8)	6 (50)
Wafer	13 (41.9)	13 (39.4)	8 (23.5)	4 (33.3)
Fried foods	9 (29)	6 (18.2)	9 (26.5)	0 (0)
Biscuit	5 (16.1)	6 (18.2)	6 (17.6)	2 (16.7)
Chocolate	8 (25.8)	3 (9.1)	6 (17.6)	1 (8.3)
Bread	5 (16.1)	8 (24.2)	4 (11.8)	1 (8.3)
Meatball	2 (6.5)	6 (18.2)	4 (11.8)	3 (25)
Chips	4 (12.9)	2 (6.1)	6 (17.6)	2 (16.7)
Macaroni	4 (12.9)	2 (6.1)	1 (2.9)	0 (0)
Ice cream	0 (0)	3 (9.1)	2 (5.9)	2 (16.7)
Sausage	3 (9.7)	0 (0)	2 (5.9)	1 (8.3)
Pilus	1 (3.2)	0 (0)	3 (8.8)	0 (0)
Cracker	0 (0)	1 (3)	3 (8.8)	0 (0)
Kebab	2 (6.5)	1 (3)	1 (2.9)	0 (0)
Candy	1 (3.2)	1 (3)	2 (5.9)	0 (0)
Donuts	0 (0)	3 (9.1)	1 (2.9)	0 (0)
Martabak	0 (0)	3 (9.1)	1 (2.9)	0 (0)

In general, vegetables preferences were similar between normal and overweight/obese children. Vegetable rich in provitamin A (carrot) and dark green leafy vegetables (spinach and water spinach) were favorite vegetables among students in full-day school students. It seems that school lunch programme have made their preferences for vegetables become similar. Meanwhile, there were a slight differences in snack preferences. There was a tendency that boys liked snacks more than girls and overweight/obese children liked salty crispy fried snacks (*chiki*) more than normal children. The effects of the snack consumption on caloric intake were more pronounced among overweight or obese children. Frequent snacking has been associated with higher intake of total energy and energy from added and total sugars[23]. Food likes and dislikes play an important role in food preferences and food consumption, especially in children. It is possible that high consumption of snacks caused higher proportion of overweight and obesity among boys.

Preferences are shaped by a combination of genetic and environmental factors. A mixture of innate preferences and the ability to develop new preferences. Influence of home food environment become decreases when children get older[9]. Food environment that parents create at home shapes children's food preferences and food-acceptance patterns, such that availability and exposure to foods can affect children's food selections and intakes. Parents should choose meal times, propose adequate food and portion sizes, and promote social interaction and role modeling for eating behaviors[20].

Energy-dense, nutrient-poor snacks which related to overweight and obesity are widely available in settings where youth spend their time such as schools and retail stores[31]. Therefore school environment have an important role in developing food preferences and eating habit, particularly in full-day school which provide school lunch for the students. A study on school lunch programs in the United States demonstrated that these initiatives positively influenced students' overall dietary quality by offering more nutritious meals, characterized by higher intakes of dairy, refined grains, and lower intakes of foods containing empty calories. Nevertheless, the nutritional quality of food consumed outside the school lunch context remained suboptimal, thereby diminishing the overall benefits. Consequently, the 24-hour dietary patterns of participants were largely comparable to those of non-participants in the program[32]. School environment is a good place to introduce a health education or improving eating behaviour such as increasing consumption of vegetable and fruit, reducing consumption of sweetened food and drink, high fat and energy food, junk food, as well as increasing physical activities and reducing a sedentary lifestyle[33].

The limitations of this study include the potential bias in self-reported data on eating habits and food preferences due to recall inaccuracies or social desirability. Additionally, caution is needed when interpreting the results, as the study was conducted in two schools in Surabaya City with a small sample size. However, a key strength of this study is its contribution to understanding eating habits and food preferences among full-day school students in an urban setting, providing valuable insights for future research and policy development. Future studies could address these limitations by incorporating additional data sources, such as direct observation or dietary logs, as well as utilizing a larger sample size and a broader range of schools to enable wider generalization.

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CONCLUSIONS

The high prevalence of overnutrition among the school-aged children, particularly boys needs more attention from parents and schools. Regardles nutritional status and sex, food preferences of vegetables and snacks can be a valuable information in planning menu for school lunch programme in full-day school. Home and school food environment should continuously provide a healthy food environment for better children nutritional status.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

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AUTHOR CONTRIBUTIONS

RD: conceptualization, methodology, formal analysis, writing-original draft; SWS: methodology, writing-review and editing; ANA: methodology, writing-review and editing.

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