

## DEMOGRAPHIC AND HOUSEHOLD CHARACTERISTICS RELATED TO CHILDHOOD OBESITY IN PUBLIC ELEMENTARY SCHOOLS IN PENJARINGAN

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### ABSTRACT

Indonesia is experiencing the rise of childhood obesity prevalence, and the majority profound in low socioeconomic areas, which may aggravate the harmful impacts on the children's growth and health. This study was conducted to find significant factors of childhood obesity in low socioeconomic areas. A cross-sectional study design was carried out at two public elementary schools in Penjaringan subdistrict, North Jakarta. All students in both schools participated in the study and were selected based on inclusion criteria. A total of 731 students (grades 1 to 6) were eligible. The nutritional status was assessed by trained staff by calculating the Body Mass Index (BMI) for age and classifying the outcome based on the WHO z-scores chart. Parents filled a demographic and socioeconomic questionnaire to collect children's birthdate, parents' educational level, employment status, income, and health insurance. Logistic regression was performed to evaluate the association. The prevalence of obesity among students was 13.41%. The regression showed that male and younger students were likely to be obese. The students whose mothers were in secondary level of education, have an unemployed father, or in the low-income family ( $p < 0.05$ ) were more likely to be obese. The study shows that male and younger students were associated with childhood obesity. Besides, educated mothers, unemployed fathers, and families with low income tend to have obese children. The school needs to have a specific program for male and younger age students to increase healthy habits. Nutrition assessment, recommendation, and parents' involvement in school-based health programs need to be enhanced.

**Keywords:** nutritional status, obesity, primary school students, sociodemographic, socioeconomic

### ABSTRAK

Indonesia tengah mengalami masalah gizi obesitas anak sejak satu dekade terakhir, dan mayoritas ditemukan di wilayah dengan sosioekonomi rendah, yang dapat memperberat dampak buruk pada tumbuh kembang dan kesehatan anak. Penelitian ini bertujuan untuk mengetahui faktor signifikan pada obesitas anak di wilayah sosioekonomi rendah. Penelitian potong lintang dilakukan pada siswa-siswi di dua Sekolah Dasar Negeri Kecamatan Penjaringan, Jakarta Utara. Semua siswa pada kedua sekolah berpartisipasi dalam penelitiannya terpilih berdasarkan kriteria inklusi. Keseluruhan 731 siswa (kelas 1 sampai 6) memenuhi syarat. Penilaian status gizi dilakukan oleh tenaga kesehatan terlatih dengan menghitung indeks masa tubuh (IMT) anak menggunakan pengukuran antropometrik dan menggolongkannya berdasarkan grafik *z-score* WHO. Kuesioner demografi dan sosioekonomi diisi oleh orang tua untuk mendapatkan tanggal lahir anak, tingkat pendidikan orang tua, status pekerjaan orang tua, pendapatan orang tua dan adanya jaminan kesehatan. Regresi logistik dilakukan untuk mengevaluasi faktor-faktor yang signifikan. Prevalensi obesitas pada siswa adalah 13,41%. Hasil regresi menunjukkan bahwa siswa laki-laki dan siswa yang berumur lebih muda cenderung mengalami obesitas. Siswa dengan ibu berpendidikan akhir pada tingkat sekunder, memiliki ayah yang tidak bekerja, atau dalam keluarga berpenghasilan rendah ( $p < 0.05$ ) cenderung mengalami obesitas. Studi ini menunjukkan bahwa siswa laki-laki dan siswa kelas yang lebih muda berkaitan dengan obesitas. Selain itu, ibu yang berpendidikan tinggi, ayah yang tidak bekerja, dan keluarga dengan pendapatan rendah cenderung memiliki anak dengan obesitas. Sekolah perlu memiliki kegiatan khusus bagi siswa yang lebih muda untuk meningkatkan kebiasaan sehat. Evaluasi status gizi, rekomendasi, dan keterlibatan orang tua dalam program kesehatan berbasis sekolah perlu ditingkatkan.

**Kata Kunci :** status gizi, obesitas, anak sekolah dasar, sosiodemografi, sosioekonomi

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## **Introduction**

Twenty-five years of observations in 195 countries confirmed that the increase in the prevalence of childhood obesity in many countries has been more significant than adult obesity, with approximately 107 million children recorded as obese.<sup>1</sup> The Centers for Disease Control and Prevention (CDC) also reported the prevalence of obesity (18.4%) among children between the ages of 6-11 years old is the second-highest prevalence after those in teenage groups (20.6%) from the world's population.<sup>2</sup> Childhood obesity may significantly impact children's health, both physically (such as diabetes, hypertension, and dyslipidemia) and mentally (through bullying or low level of confidence).<sup>3,4</sup>

Obesity prevalence has increased noticeably in developing countries, including Indonesia. *Riset Kesehatan Dasar* (Riskesdas) in 2018 stated that the underweight children in Indonesia were 9.2%, whereas the prevalence of overweight and obesity is 10.8% and 9.2%, respectively. Compared to the 2013 data, an increase occurred in obesity prevalence.<sup>5</sup> The result also highlighted childhood obesity as one of the main malnutrition problems in Indonesia's big cities, evidenced by approximately 14% of children are obese in Jakarta, exceeding the prevalence of national childhood obesity in Indonesia of 9.2%.<sup>6</sup> Previous studies across the world demonstrate that socioeconomic statuses (SES), parents' income and health insurance owned by them<sup>7</sup> and sociodemographic factors, such as the children's age and gender,<sup>8</sup> as well as their parents' marital status, employment, and education level, may affect the children's nutrition and therefore affecting the childhood obesity prevalence. For example, the higher the parents' income and education level, the more likely children's food has been adequately fulfilled.<sup>9,10</sup> Other studies, however, found that there is no significant correlation between age or gender and nutrition.<sup>11</sup>

People used to think that obese children are found in families with high economic status. However, recently, the low SES creates an "obesogenic environment" that drives people to be more exposed to a higher risk of obesity, especially in countries with Western lifestyle transitions and a higher rate of urbanization, which is predominantly found in middle-low income countries.<sup>12,13</sup> Rogers *et al* highlighted that the obesity rate had increased more significantly for children with low-education, low-income, and higher-unemployment households in the US than the overall obesity prevalence increase nationally.<sup>14</sup> Multiple reports about obesity in low SES households highlighted inadequate healthier and balanced food consumption, lack of physical activities, and higher time spent watching television or video games as a significant factor contributing to higher obesity incidence.<sup>14,15,16</sup> As food consumption is often dictated by its price, those with lower economic status often opted for energy-dense diets due to the high prices of fresh and high-quality products. They are

less likely to adhere to acceptable health practices such as daily exercise and lack of sleep, lack of access to proper sports facilities, and higher stress that enhances lousy lifestyle habits. The poor diet, combined with a lack of basic health practices and possibly lack of medical aids due to affordability issues, may lead to obesity.<sup>17</sup>

There are still limited studies conducted to evaluate the increasing level of childhood obesity in Jakarta's low socioeconomic areas. This study aimed to identify students' demographic and household characteristics associated with the prevalence of childhood obesity in the low socioeconomic area at two public elementary schools, Penjaringan subdistrict, North Jakarta.

## Methods

The cross-sectional study design was conducted on 731 students in two public elementary schools in Penjaringan subdistrict, North Jakarta. All students in grades 1 to 6 who were present during the examination were enrolled in the study. Their parents completed the questionnaire that contains information such as gender, birth date, parents' education and marital status, parents' income and employment status, and the family's health insurance. The written consent from the school and parents obtained before the study began.

The anthropometric measurement using the Body Mass Index (BMI) for age based on samples' height and weight, measured by microtoise stature meter and calibrated Tanita weight scale with one digit (0.1 gram). The students' nutrition status was classified based on the BMI for age, according to WHO 2007's grow chart. In this study, the nutritional status was then categorized as obese and non-obese. The dependent and independent variables from the data obtained above were then analyzed using the Chi-square test for categorical variables, and the logistic regression was performed in all variables that have a p-value less than 0.25 in bivariate analysis. The significance level is 0.05, and the odds ratio with a 95% of confidence interval was used to determine the study effect. The Ethical Committee of the School of Medicine and Health Sciences, Atma Jaya Catholic University, has approved all study procedures with clearance number 43/11/KEP-FKUAJ/2019.

## Results

Male students (53.2%) were dominant in the two schools. The students' average age was ten years old. Most fathers had no education (39.3%) or had primary education (46.1%), working (98.2%), and earned above the national minimum wage (79.6%). On the other hand, most mothers had no education (48.7%) or had primary education (37.1%), not working (87.7%), and earned below the national minimum wage (80.5%). The family member mostly owned health insurance. While processing the sample data, the marital status was removed due to major missing data.

Students' nutritional status was generally normal for their age (70.8%). Out of the 731 students, 13.4% were classified under obesity, whereas 86.4% were non-obese. Table 1 suggests the student's

characteristics based on their obesity status. Obese children were occupied 13.4% (98 out of 731), with grade 2 had the highest proportion. Students whose fathers are employed receive a lower income than the minimum wage, and unworking mothers are likely to be obese. Obese students commonly from a family that possessed health insurance for all family members. The result also indicates that the higher the parents' education, the prevalence of obesity is increased.

**Table 1. Student's Characteristics Based on Their Obesity Status**

Characteristics	Obesity Status			
	Non-obese (n=633)		Obese(n=98)	
	n	%	n	%
<b>Age</b>				
Grade 1 (7 years old)	106	84.1	20	15.9
Grade 2 (7-8 years old)	100	82	22	18
Grade 3 (8-9 years old)	103	86.6	16	13.4
Grade 4 (9-10 years old)	98	84.5	18	15.5
Grade 5 (10-11 years old)	114	91.2	11	8.8
Grade 6 (11-13 years old)	112	91.1	11	8.9
<b>Gender</b>				
Male	327	84.1	62	15.9
Female	306	89.5	36	10.5
<b>Father's Education</b>				
No education	259	90.2	28	9.8
Primary	281	83.4	56	16.6
Secondary	93	86.9	14	13.1
<b>Mother's Education</b>				
No education	317	89	39	11
Primary	229	84.5	42	15.5
Secondary	89	83.7	17	16.3
<b>Fathers employment status</b>				
Employed	624	86.9	94	13.1
Unemployed	9	69.2	4	30.8
<b>Mother's employment status</b>				
Employed	74	82,	16	17.8
Unemployed	559	87.2	82	12.8
<b>Father's Health Insurance</b>				
Possessed Health Insurance	573	86.9	86	13.1
No health Insurance	60	83.3	12	16.7
<b>Mother's Health Insurance</b>				
Possessed Health Insurance	583	87.1	86	12.9
No health Insurance	50	80.6	12	19.4
<b>Child's Health insurance</b>				
Possessed Health Insurance	580	86.8	88	13.2
No health Insurance	53	84.1	10	15.9
<b>Father's Income</b>				
< Rp 3.940.973	495	85.1	87	14.9
> Rp 3.940.973	138	92.6	11	7.4
<b>Mother's Income</b>				
< Rp 3.940.973	516	87.3	75	12.7
> Rp 3.940.973	117	83.6	23	16.4

The logistic regression analysis was conducted on variables that have p-value less than 0.25 in bivariate analysis. The enter method performed on obesity status as a dependent variable. The result indicates that younger students, male, have unemployed and low-income fathers, and whose mothers having secondary education were likely to be obese ( $p < 0.05$ ) (Table 2).

**Table 2. Logistic Regression Analysis on Student's Characteristics Related to Obesity Status**

Variable	OR(Confidence Intervals 95%)
Age (years)	0.55(0.32-0.90)
Gender	
Male	1.87(1.17-2.98)
Mother's Education	
Secondary education	4.53(2.00-10.43)
Fathers employment status	
Employed/working	6.74 (4.70-10.19)
Father's Income	
< Rp 3.940.973	5.79(2.33-14.36)

## Discussion

The prevalence of childhood obesity in the study population was 13.41%, which was higher than the national prevalence of 9%.<sup>5</sup> This issue is highlighting the needs of particular concern of childhood obesity in the low socioeconomic area. Previous studies also justified that low SES has significantly affected the risk of childhood obesity in recent decades.<sup>18</sup> Childhood obesity is known to be related to social impairment and low economic productivity in adulthood.<sup>19</sup> Those effects would be more exaggerated in the low socioeconomic community considering many aspects contribute, including lack of parents' attention and care,<sup>20</sup> inability to preserved healthy habits and lifestyles,<sup>21</sup> less educated social groups,<sup>22</sup> and less access to health information.

This study shows that the younger age group is related to higher obesity risk. Sartika supports the result by stating that children under ten years old are likely to have obesity in her study.<sup>23</sup> Contradicts with a study by Konstantin *et al.*, that stated there is no significant association between age and gender to nutritional status.<sup>11</sup> Thibault *et al.* explaining about factors that significantly affect the risk of obesity in younger children, namely female gender, low or moderate SES family, no presence or infrequent intake of breakfast or lunch and have a high level of leisure activity.<sup>24</sup> It is common for children, especially those under ten years old, to unlikely eating vegetables and fruits. Younger children are more interested in high-sugar and high-fat food such as candies, jellies, junk food, and snacks, accompanied by more sedentary activity in a younger child, contributing to a higher risk of obesity. Also, low SES families can afford healthier foods, wherein in developing countries, carbs and sugary foods are relatively cheaper.<sup>25</sup> A study by Dutra *et al.* concluded that there is a high

prevalence of sedentary behavior identified in children at eight years old, with 60% of them spend more than two hours watching television daily regardless of gender, income, or family socioeconomic levels.<sup>26</sup>

The regression analysis shows male students are likely to be obese than female students. The result is in line with the study by Pizzaro & Royo-Bordonada, and Bereket & Atay stated that the prevalence of childhood obesity was higher in boys than in girls in Spain and Turkey.<sup>27,28</sup> The frequency was increasing with the lower SES in all sex and age groups, except in girls under age 12. A study by Sartika noted that male children had 1.4 times higher risks of obesity than females, potentially due to the higher energy intake and carbohydrate consumption on male students.<sup>23</sup>

Low income and unemployed fathers were consistent with low SES status evidenced in several works of literature on childhood obesity. Rao *et al.* stated the income level has a significant association with childhood obesity. The lower-income population group is likely to have an increased risk of obesity.<sup>29</sup> Notara *et al.* noted that children with an unemployed father had a significantly higher BMI, supporting this study's outcome.<sup>30</sup> The family structure in the study population reveals that the father's income positively affected family economic status due to less likelihood of working mother in the community even if the mother has higher education level. The lower the income, the family has low source to provide healthier and varied options for their children. Again, carbs and sugar are cheaper sources in most developing countries.

When conducting this study, we acknowledged some limitations that may affect the outcome. The data was obtained using the cross-sectional approach, which may not be ideal for causal inference. Another limitation is we failed to provide the students' dietary habits due to time limitations, so that we were unable to justify the assumption made in the argument above. The nutritional assessment follow-up and student's dietary habit evaluation needs to be included in regular school-based health programs.

## **Conclusion**

Students' nutritional status in two public elementary schools located in a low socioeconomic area is generally normal, although the prevalence of childhood obesity relatively higher than the national rate. Younger students, male, have an unemployed and low-income father, and whose mothers having secondary education were more likely to be obese. The program should specifically address male and younger students to encourage healthy habits, such as physical activity and consume healthier food, accompanied by parents counseling on the importance of a healthy diet and any adverse condition related to childhood obesity.

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## **Conflict of Interest**

The author(s) of this study has confirmed no conflict of interest regarding this study and publication.

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