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Low Economic Level and the Risk of Overweight Among Indonesian Junior and Senior High School Students

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Abstract

Overweight and obesity among Indonesian adolescents have emerged as a pressing public health issue, reflecting global trends. This study examines the relationship between economic status and overweight prevalence among junior and senior high school students in Indonesia, using secondary data from the Global School-based Health Survey (GSHS). This study analyzed data from 9,977 students aged 11–18 years through a cross-sectional design and binary logistic regression, adjusting for dietary habits, physical activity, and sedentary behavior. Overall, 14.7% of students were overweight; the prevalence was notably higher among low-income students (27.4%) compared to high-income groups (14.2%). Students from lower economic backgrounds were 1.374 times more likely to be overweight (95% confidence Interval (CI): 1.011–1.867). Although many reported healthy behaviors, including regular fruit and vegetable consumption and participation in physical education, sedentary lifestyles and limited access to nutritious food remained significant challenges for low-income adolescents. These results highlight the complex interplay between economic status, health behaviors, and environmental factors, highlighting the need for targeted, equity-focused interventions to address disparities and curb obesity in Indonesia's youth.

Keywords: cross-sectional studies, health inequities, overweight, students

Introduction

The rising prevalence of overweight and obesity in Indonesia poses a major public health challenge, particularly in the context of the country's rapid nutritional transition. According to the Indonesian Basic Health Research, the proportion of overweight adults increased from 13.6% in 2007 to 21.8% in 2018.[1] A 2024 community-based assessment similarly revealed a high proportion of overweight or obese children, based on anthropometric indices, emphasizing the growing burden on the healthcare system.[1,2] Significant regional disparities have been reported, with provinces such as South Sumatra and Bengkulu exhibiting higher prevalence rates, suggesting the influence of localized socioeconomic and dietary factors. While these patterns are consistent with global trends, Indonesia faces unique challenges linked to rapid urbanization and shifting dietary habits.[3]

Urban areas, in particular, show elevated rates of overweight, driven by greater access to energy-dense foods and increasingly sedentary lifestyles compared with rural regions.[4,5] Dietary shifts, including increased consumption of fast foods and sugar-sweetened beverages, as well as other energy-dense, nutrient-poor items, combined with low physical activity levels, are among the primary contributors to this trend.[4] Adolescents, who experience heightened nutritional needs and lifestyle changes, face particular vulnerability. Urban adolescents, with greater exposure to unhealthy food choices outlets, are at heightened risk.[6] In rural areas, limited access to recreational facilities and the availability of inexpensive, calorie-rich foods also contribute to weight gain. Also, rural adolescents often spend long periods engaged in screen-based activities with minimal physical activity.[7–9] This pattern is exacerbated by the consumption of low-cost, nutrient-poor foods.[10]

The use of technology, including extended gaming and social media engagement, further reduces opportunities for physical activity, thereby compounding the risk of being overweight.[4,11–13] Socioeconomic status (SES) is a well-established determinant of adolescent obesity. Higher SES families may adopt dietary lifestyle patterns that increase

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body mass index,[12] while lower SES is associated with barriers to healthy eating and safe opportunities for exercise. A previous study indicated that economic status operates as a robust risk factor, with both extremes of the economic spectrum influencing overweight prevalence through distinct mechanisms.[2]

While several studies have explored the prevalence of overweight adolescents and risk factors in general,[4,5,12–15] few have examined the school-based adolescent population specifically. This study addresses that gap by focusing on junior and senior high school students in Indonesia using Global School-based Health Survey (GSHS) data to assess the relationship between economic status and overweight. Findings from this study provided further evidence that adolescents from lower socioeconomic backgrounds were also vulnerable to overnutrition-related health issues, underscoring the need for tailored prevention strategies.

Method

This cross-sectional study analyzed secondary data from the GSHS, conducted in Indonesia by the Ministry of Health in collaboration with the World Health Organization (WHO). The Indonesian GSHS was implemented from January to December 2015, with the dataset officially released on June 13, 2019. The GSHS was designed to assess behavioral risk factors contributing to adolescent health problems. Data were collected from 75 junior and senior high schools located across Sumatra, Java, Kalimantan, Nusa Tenggara, Sulawesi, Bali, Maluku, and Papua. However, the GSHS website does not specify how many of these schools were junior and senior high schools. The dataset was analyzed by the author in Samarinda City, Indonesia, in 2025 for this study.

Although not recent, the dataset remains the most current nationally representative source for Indonesia, including comprehensive indicators related to adolescent overweight. Its rigorous sampling design and standardized methodology enhance both validity and generalizability, making it a reliable baseline for understanding adolescent health behaviors at the time of collection. Consequently, this study served as a key reference point for future research, particularly until recent datasets became available.

Secondary data analysis, particularly when using large-scale datasets such as the GSHS, requires careful methodological consideration before inferring causality. Researchers must first examine the dataset's scope, design, and available variables, while also accounting for potential confounders, mediators, and moderators. The use of a theoretical framework grounded in existing literature is essential for developing hypotheses about causal mechanisms. Additionally, given the reliance on self-report data, cultural norms specific to Indonesia (across all surveyed provinces) were taken into consideration during interpretation to enhance contextual relevance and minimize bias.

Data were collected via a self-administered, anonymized questionnaire using a standardized two-stage cluster sampling method at both the school and classroom levels. Previous validation studies have confirmed that the GSHS instrument demonstrates acceptable reliability and validity. The original sample included 11,142 students aged 11–18 years. After excluding 1,809 cases due to missing data, the final analytic sample consisted of 9,977 students, comprising 7,113 from junior high school and 2,864 from senior high school. The dataset is publicly accessible at: https://extranet.who.int/ncdsmicrodata/index.php/catalog/489. While self-reported data may be subject to bias, the Indonesian GSHS achieved a high response rate of 94%, which strengthens the robustness of the findings.

The Indonesian GSHS was administered during school hours. As participants were minors, written informed consent was obtained from their parents or legal guardians prior to data collection, and assent was also obtained from the students themselves. The survey was conducted anonymously and adhered to ethical standards, with approval from the Indonesian Ministry of Health, WHO, and the U.S. Centers for Disease Control and Prevention (CDC). All questions were administered in Indonesian. A two-step cluster sampling method was used. In the first stage, schools were randomly selected based on enrollment size. In the second stage, classes within these schools were randomly chosen. All students in the selected classes (grades 7–12) were eligible to participate, except those who were absent due to illness or other reasons.

Study variables were measured using items from the GSHS questionnaire. The primary variable under investigation was overweight status, determined based on the item "Percentage of students who were overweight (>+1 SD from the median body mass index [BMI] for age and sex)." Responses were categorized as Yes (coded 0) and No (coded 1). Sex, and the responses coded as male (0) or female (1), school grade, and the responses coded as junior high school (0) or senior high school (1), economic status, assessed through the question of "Percentage of students who most of the time or always went hungry every day because there was not enough food in their home during the 30 days before the survey." Responses coded as Yes (low economic status = 0) and No (high economic status = 1;

reference category).

Fruit consumption was assessed with the question of "Percentage of students who did not eat fruit during the 30 days before the survey." Responses coded as No (0) and Yes (1). Vegetable consumption was assessed with the question of "Percentage of students who did not eat vegetables during the 30 days before the survey." Responses coded as No (0) and Yes (1). Physical activity was assessed with the question of "Percentage of students who were not physically active for at least 60 minutes per day on any day during the 7 days before the survey." Responses coded as Yes (0) and No (1). Bicycling/walking to school was assessed with the question of "Percentage of students who did not walk or ride a bicycle to or from school during the 7 days before the survey." Responses coded as Yes (0) and No (1).

Physical education participation was assessed with the question of "Percentage of students who did not attend physical education classes each week during this school year." Responses coded as Yes (0) and No (1). Sedentary behavior was assessed with the question of "Percentage of students who spent three or more hours per day in sedentary activities (e.g., watching television, playing computer games, or talking with friends outside of schoolwork)." Responses coded as Yes (0) and No (1). Carbonated soft drinks consumption was assessed with the question of "Percentage of students who usually drank carbonated soft drinks three or more times per day during the 30 days before the survey." Responses coded as Yes (0) and No (1). Fast food consumption was assessed with the question of "Percentage of students who ate food from a fast-food restaurant three or more days during the 7 days before the survey." Responses coded as Yes (0) and No (1).

Univariate analysis was first conducted to describe the frequency of study variables, with results stratified by gender. Chi-square tests were then used for bivariate analysis. Subsequently, binary logistic regression with a 95% confidence Interval (CI) was employed to examine the association between economic status and overweight, adjusting for potential confounding variables. The multivariate analysis employed the backward elimination method, in which potential confounders were removed one at a time. A variable was retained if its exclusion changed the odds ratio (OR) of the main independent variable by more than 10%. This study adopted a significance threshold of 5% ($\alpha = 0.05$), equivalent to a 95% confidence level.

Results

Of the 9,977 students analyzed, 55.3% were female, and 71.3% attended junior high school. Most students (95.8%) reported a high economic level. Fruit consumption was high (90.5%), as was vegetable consumption (97.1%). Regarding physical activity, 68.2% of students reported being physically active, and 87.6% attended physical education classes regularly; however, only 39.5% cycled to school. Despite these healthy habits, 27.0% engaged in sedentary behavior, and 14.7% were classified as overweight. The prevalence of unhealthy dietary habits was relatively low, with 3.9% drinking carbonated soft drinks and 12.0% eating fast food frequently. Overall, the student population exhibited a generally healthy lifestyle, though sedentary behavior remained a notable concern.

As shown in Table 2, economic status was significantly associated with overweight prevalence. Among students from low economic backgrounds, 27.4% were overweight, compared with 14.2% among those from high economic backgrounds. Students from low economic status were 1.37 times more likely to be overweight (95% CI: 1.011–1.867). Based on the bivariate analysis results in Table 2, the researcher conducted a multivariate analysis using binary logistic regression, including variables with a p-value <0.25. The final multivariate model is presented in Table 3.

Table 1. Descriptive Characteristics of Respondents (N = 9,977)

Variable	n	%
Sex		
Male	4,455	44.7
Female (Reference)	5,522	55.3
School Grade		
Junior high school	7,113	71.3
Senior high school (Reference)	2,864	28.7
Economic Status		
Low	424	4.2
High (Reference)	9,553	95.8
Fruit Consumption		
No	948	9.5
Yes (Reference)	9,029	90.5
Vegetable Consumption		
No	292	2.9
Yes (Reference)	9,685	97.1
Physical Activity		
No	3,172	31.8
Yes (Reference)	6,805	68.2
Bicycling/Walking to School		
No	6,036	60.5
Yes (Reference)	3,941	39.5
Physical Education Participation		
No	1,238	12.4
Yes (Reference)	8,739	87.6
Sedentary Behavior		
Yes	2,695	27.0
No (Reference)	7,282	73.0
Overweight		
Yes	1,464	14.7
No (Reference)	8,513	85.3
Carbonated Soft Drinks Consumption		
Yes	392	3.9
No (Reference)	9,585	96.1
Fast food Consumption		
Yes	1,198	12.0
No (Reference)	8,779	88.0

Table 2. Bivariate Analysis of Risk Factors Associated with Overweight Among Indonesian Junior And Senior High School Students

Variable	p-value*	OR	95% CI	
Sex	0.317	0.94	0.844	1.056
School Grade	0.001	0.79	0.697	0.906
Economic Status	0.043	1.37	1.011	1.867
Fruit Consumption	0.377	1.09	0.897	1.331
Vegetable Consumption	0.995	1.01	0.716	1.400
Physical Activity	0.783	1.02	0.898	1.153
Bicycling/Walking to School	0.750	1.02	0.908	1.143
Physical Education Participation	0.364	1.09	0.91	1.295
Sedentary Behavior	0.001	0.76	0.672	0.861
Carbonated Soft Drinks Consumption	0.354	1.15	0.855	1.547
Fast Food Consumption	0.404	0.93	0.786	1.102

OR = Odds Ratio; CI = Confidence Interval; *significant level at 0.05

Table 3. Multivariate Analysis of the Association Between Economic Level and Overweight Among Indonesian Junior and Senior High School Students

Variable	β	p-value*	OR	95% CI	
School Grade	−0.227	0.001	0.79	0.701	0.906
Economic Status	0.316	0.043	1.37	1.010	1.862
Sedentary Behavior	−0.280	0.000	0.75	0.668	0.854
Constant	1.994	0.000	7.34		-

OR = Odds Ratio; CI = Confidence Interval; *Significant level set at 0.05

Table 3 shows that three variables were significantly associated with overweight among junior and senior high school students in Indonesia (p-value < 0.05). The model was developed using a backward elimination approach, retaining variables if their exclusion changed the OR of the main independent variable by >10%. The findings revealed a statistically significant association between economic status and overweight. Students from lower economic backgrounds were 1.37 times more likely to be overweight compared with their higher economic counterparts (95% CI: 1.010–1.862).

The logistic regression equation is as follows:

$$\log\frac{p}{1-p} = \beta 0 + \beta 1X1 + \beta 2X2 + \cdots + e$$

$$\log\frac{p}{1-p} = -1.200 + (0.316 \times \text{Economic Level}) - (0.227 \times \text{School Grade}) - (0.280 \times \text{Sedentary Habits})$$

Interpretation of Coefficients

- Economic level (+0.316): Students from lower economic backgrounds are more likely to be overweight.
- School grade (−0.227): Junior high school students are less likely to be overweight compared with senior high school students.
- Sedentary habits (−0.280): Students with sedentary habits show lower odds of being overweight, which is contrary to expectations and may require further investigation to rule out reverse coding or measurement bias.

Discussion

The association between low economic status and overweight or obesity among adolescents has been extensively documented in recent public health research. Adolescents from low-income families are consistently more likely to be overweight or obese, a trend observed across multiple studies and indicative of systemic issues requiring urgent attention. Low household income is not merely correlated with higher obesity rates; it is often a key determinant. For example, reported that adolescents in the lowest income quantile were 2.1 to 4.1 times more likely to be overweight or obese than those in higher income brackets.[14] This study's findings were supported by a previous study, which stated that higher household income correlates with better purchasing power and food affordability, thereby directly influencing dietary quality.[5]

Financial limitations often compel families to opt for cheaper, calorie-dense, nutrient-poor food, which contributes to increased body mass index (BMI) in children and adolescents.[15] Environmental factors further exacerbating this problem: low-income neighborhoods often lack access to healthy food outlets and safe recreational spaces. Children in such "obesogenic" environments face increased exposure to unhealthy dietary practices, amplifying obesity risk.[6,16,17]

Low household income is also associated with adverse childhood experiences, which have been linked to higher obesity risks in adolescence. The psychological effects of poverty also warrant consideration. Psychosocial stress associated with low SES can influence both food choices and physical activity patterns. Literature highlights that such stress perpetuates the obesity epidemic among youth, reinforcing the need for an integrated understanding of obesity's multifaceted determinants.[18] Public health interventions should therefore not only promote healthy diets but also address the broader socioeconomic and environmental barriers faced by low-income families.

In Indonesia, the link between low economic status and overweight or obesity among children and adolescents is an increasingly pressing public health issue. This challenge reflects a complex interplay of socioeconomic constraints, evolving dietary patterns, and cultural changes driven by economic growth and urbanization. Urbanization has expanded access to inexpensive but unhealthy, energy-dense foods. As Indonesia's economic sectors expand, children, including those from low-income households, are increasingly exposed to processed, calorie-rich foods, elevating obesity risk.[19,20] Parents in low-income quintiles often face food insecurity, which forces them to rely on cheaper, processed products instead of nutrient-rich alternatives, thereby fostering poor dietary patterns.[21,22]

Urban areas, in particular, often lack affordable and healthy food outlets, while rural areas, although still consuming more traditional foods such as tubers and fish, are gradually shifting toward processed foods due to improved road access and the spread of mobile food vendors.[23,24] Cultural and lifestyle changes further shape these trends. Many Indonesian children now spend a substantial amount of time on sedentary activities (e.g., watching videos, playing online games), a pattern linked to urban living conditions and changes in family dynamics. A previous study found that peer influence and the normalization of inactivity significantly contribute to the development of obesogenic behaviors.[8,25]

Physical inactivity, especially when combined with poor dietary habits, significantly increases the risk of overweight and obesity.[15,25] Psychosocial factors, including body image perceptions, also influence patterns of obesity. A previous study suggested that in higher-income Indonesian families, obesity correlates passively with perceived happiness, creating a cultural paradox in which excess weight is not universally seen as undesirable. This perception can conflict with public health messages about maintaining a healthy body weight, thereby complicating intervention strategies.[26]

Disparities in health literacy and education amplify the problem. Families with lower economic status often have less access to nutrition education and health-promoting resources. This knowledge gap hinders informed dietary

decision-making and limits participation in physical activities or organized sports.[27,28] Compared to their wealthier peers, low-income children are less likely to receive adequate nutrition guidance and have reduced access to safe recreational facilities.[2,29]

Emerging evidence suggested that junior high school students (aged 12–15 years) exhibit a higher prevalence of overweight and obesity compared with their senior high school counterparts (aged 16–18 years). This difference was likely due to a combination of behavioral and physiological factors. A previous study found that younger adolescents spend more time in unstructured sedentary activities, such as prolonged screen use (more than 5 hours/day), which is strongly associated with an elevated BMI.[30] In contrast, senior high students are more often engaged in regulated physical activities (e.g., organized sports, part-time employment) or academically focused sedentary behaviors (e.g., studying), which may offset obesity risk despite similar total sedentary hours.[30,31]

The counterintuitive observation that some sedentary behaviors may protect against obesity reflects important contextual nuances. A study reported that "purpose-driven" sedentary activities (e.g., reading, homework) are associated with lower obesity rates compared with passive screen time. One explanation is that cognitively engaging activities often reduce opportunities for unhealthy snacking and are more common among senior high students from higher socioeconomic backgrounds, which are associated with healthier dietary habits.[9] Additionally, senior high school students may experience puberty-related metabolic advantages, such as increased lean body mass and higher resting energy expenditure, that partially mitigate the effects of sedentary behavior.[31,32]

The GSHS offers several strengths. It draws from a large sample of students across multiple schools, enhancing representativeness and enabling international comparisons. However, certain limitations must be acknowledged. The cross-sectional design prevents conclusions about causality and effects. The sample includes only students who were in school at the time of the survey, excluding those who were absent or had dropped out—groups that may face greater health challenges. The data were self-reported, which may introduce recall bias or socially desirable responses, particularly on sensitive topics. Furthermore, the survey was conducted only in selected schools, limiting generalizability to all schools in Indonesia.

To address these limitations, future studies should consider including out-of-school youth, using clearer survey items, and complementing questionnaires with interviews or objective health measures. Longitudinal follow-up could help track over time. Collecting additional background information, such as family and community-level factors, would also offer a more comprehensive understanding of student health. Conducting a nationally representative survey would further strengthen the applicability of the findings to all Indonesian junior and senior high school students.

Conclusion

The findings confirm that students from lower socioeconomic backgrounds are significantly more likely to be overweight compared with their higher-income peers. These results highlight the need for public health strategies that address economic disparities to reduce overweight and obesity among Indonesian youth.

Abbreviations

SES: socioeconomic status; GSHS: Global School-based Health Survey; WHO: World Health Organization; OR: odds ratio; CI: confidence interval.

Ethics Approval and Consent to Participate

The Global School-based Student Health Survey (GSHS) in Indonesia received ethical approval from relevant national authorities, including the Ministry of Health of the Republic of Indonesia, as well as from collaborating international bodies such as the World Health Organization (WHO) and the U.S. Centers for Disease Control and Prevention (CDC). Standard ethical procedures were followed, including obtaining informed consent from students and guardians, ensuring voluntary participation, and maintaining respondent confidentiality and anonymity.

Competing Interest

The authors declare that they have no competing interests.

Availability of Data and Materials

The data used in this study are publicly available from the Global School-based Student Health Survey (GSHS) conducted in Indonesia. The dataset can be accessed via the WHO or U.S. CDC GSHS website at: https://extranet.who.int/ncdsmicrodata/index.php/catalog/489.

Authors' Contribution

AN contributed to the study conception and design, as well as data interpretation. PSN conducted the data analysis and assisted in drafting the manuscript. AY contributed to the literature review, managed data, and edited the manuscript. SS provided critical revisions, supervised the overall project, and ensured research integrity. All authors read and approved the final manuscript.

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