

CALORIE INTAKE AND NUTRITIONAL STATUS AMONG STUDENTS 13-15 YEARS AT SMP NEGERI 2 TANJUNG PINANG

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ABSTRAK

Status gizi pada remaja merupakan masalah global dan nasional. Kelebihan berat badan adalah kondisi di mana berat badan seseorang melebihi berat badan normal yang disebabkan oleh penumpukan lemak berlebih. Dampak dari kelebihan berat badan pada remaja dapat menjadi faktor risiko penyakit degeneratif pada usia dewasa muda hingga lanjut usia. Penelitian ini bertujuan untuk mengetahui distribusi status gizi, asupan kalori harian, dan hubungan antara asupan kalori dengan status gizi pada remaja. Penelitian ini dilakukan secara observasional analitik dengan desain potong lintang (cross-sectional). Penelitian dilakukan di SMP Negeri 2 Tanjung Pinang terhadap 262 pada siswa kelas IX. Sebagian besar subjek penelitian adalah laki-laki (51,9%), berusia 15 tahun (58,8%). Status gizi sebagian besar subjek berada dalam kategori normal (44,7%), dengan 30,5% tergolong kurus dan 24,8% mengalami kelebihan berat badan atau obesitas. Hasil penelitian menunjukkan bahwa terdapat hubungan antara asupan kalori dengan status gizi pada siswa usia 13–15 tahun dengan nilai $p = <0,001$ menggunakan uji Chi-Square.

ABSTRACT

Association between Calorie Intake and Nutritional Status among Students Aged 13-15 Years at SMP Negeri 2 Tanjung Pinang. Nutritional status among adolescents is a global and national issue. Being overweight is a condition where a person's weight exceeds normal body weight, caused by excess fat accumulation. The impact of being overweight in adolescents will be a risk factor for degenerative diseases in young adulthood and old age. The study aimed to determine the distribution of nutritional status, daily caloric intake, and the relationship between caloric intake and nutritional status among adolescents. This study was conducted in an analytical observational manner with a cross-sectional design. This study was conducted at SMP Negeri 2 Tanjung Pinang to 262 grade IX students. Results: Most respondents were male (51.9%), aged 15 (58.8%). The nutritional status of most subjects was in the normal category (44.7%), with 30.5% being underweight and 24.8% overweight or obese. The study results showed a relationship between calorie intake and nutritional status in students aged 13-15, with a $p\text{-value} = <0.001$ using the Chi-Square Test.

INTRODUCTION

Nutrition issues are a global and national challenge, with the trend of overweight adolescents aged 13–15 years in Indonesia increasing from 6.9% in 2013 to 9.5% in 2018.¹ The Riskesdas survey recorded an increase in obesity rates since 2007, from 10.5% to 14.8% in 2013, and surged to 21.8% in 2018.² The 2023 Indonesian Health Survey shows that the prevalence of malnutrition among adolescents aged 13–15 years is 7.6%, overweight is 12.1%, and obesity is 4.1%. In Riau Province, the figures are 7.8%, 12.9%, and 3.5%, respectively.³

Nutritional status reflects the extent to which the body receives and utilizes nutrients, whether they are sufficient for metabolic.⁴ Overweight occurs when body fat accumulates beyond the limits required by the body. In adolescents, this condition not only affects appearance but also increases the risk of chronic diseases such as heart disease, type 2 diabetes, bone and muscle problems, and certain types of cancer such as breast, endometrial, and colorectal cancer.¹ Adolescence is a critical phase marked by rapid physical and hormonal growth, requiring optimal nutrient intake to support development and prevent nutritional deficiencies in adulthood.⁴

Excess weight in adolescents is influenced by genetic factors, age, gender, diet, and physical activity. One of the main causes is continuous excessive calorie consumption. The high prevalence of overweight among adolescents reflects that nutritional issues remain a serious concern that requires urgent attention. This finding reinforces that an imbalance in calorie intake, whether a deficit or surplus, significantly impacts adolescents' nutritional status.⁵ Based on the above discussion, the researcher is interested in investigating the "Relationship Between Daily Calorie Adequacy Levels and Nutritional Status Among Adolescents Aged 13-15 Years at SMP Negeri 2 Tanjung Pinang in the City of Tanjung Pinang in 2025."

METHOD

This study was conducted using a cross-sectional and analytical observational design. Calorie intake data were collected using the Food Frequency Questionnaire instrument and the 24-Hour Food Recall method. Data collection was conducted in the classroom at SMP Negeri 2 Tanjung Pinang, with data collection taking place in January 2025. The study subjects comprised 262 students aged 13–15 years at SMP Negeri 2 Tanjung Pinang in 2025.

Data collection in January 2025 included the names, gender, class status, and students' birth dates at SMP Negeri 2 Tanjung Pinang. Anthropometric data were obtained by measuring height and weight using a stadiometer, and they were measured using a digital scale. Information on daily eating patterns over 3 days, weekly, monthly, and the frequency of foods rarely or never consumed was also collected. Data analysis used univariate analysis to determine age frequency, gender, nutritional status distribution, and calorie intake adequacy levels. Bivariate analysis via Chi-Square Tests was used to determine the relationship between calorie adequacy levels and nutritional status. This analysis was considered significant if the p-value was less than 0.05.

RESULT

This study was conducted at SMP Negeri 2 Tanjung Pinang on January 30 and February 3–4, 2025. The subjects were students aged 13–15 years, but only ninth-grade students were allowed to participate because they were considered more capable of cooperating than seventh- and eighth-grade students.

Table 1. Distribution of Subject Characteristics Based on Gender and Age

Subject Characteristics		Frequency	Percentage
Gender	Female	126	48.1 %
	Male	136	51.9%
Age	13	13	5.0%
	14	108	41.25%
	15	141	58.8%

Of the 262 subjects, 126 were female (48.1%) and 136 were male (51.9%). Thus, most subjects in this study were male. Based on age, there were 13 subjects aged 13 years (5%), 108 subjects aged 14 years (41.2%), and 141 subjects aged 15 years (53.8%). This indicates that most of the subjects in this study were 15 years old.

Table 2. Frequency Distribution of Daily Calorie Adequacy Based on AKG for Ages 13-15 and Total Energy Expenditure

Daily Calorie Intake	Frequency	Percentage
Nutritional Adequacy Rate		
Good	11	4.2 %
Insufficient	238	90.8 %
More	13	5.0 %
Total Energy Expenditure		
Good	53	20.2%
Insufficient	136	51.9%
More	73	27.9%

The results of the analysis showed that most subjects (238 people or 90.8%) had insufficient calorie intake. Only 11 subjects (4.2%) had adequate calorie intake, and 13 subjects (5.0%) had excessive intake. Meanwhile, based on the results of the Total Energy Expenditure analysis, most subjects, namely 136 individuals (51.9%), had insufficient calorie intake. A total of 73 individuals (27.9%) had excessive calorie intake, and 53 individuals (20.2%) had adequate calorie intake according to their needs.

Table 3. Distribution of Nutritional Status Categories

Nutritional Status	Frequency	Percentage
<i>Underweight</i>	80	30.5 %
Normal	117	44.7 %
<i>Overweight-Obese</i>	65	24.8%

Based on nutritional status assessed using BMI (Body Mass Index), most subjects were in the normal category, totaling 117 people (44.7%). However, there were still 80 subjects (30.5%) who were underweight. Additionally, there were 65 subjects (24.8%) who were classified as overweight or obese. These data indicate that nearly half of the subjects had abnormal nutritional status, either underweight or overweight-obese.

Table 4. Relationship between Daily Calorie Adequacy and Nutritional Status

	Chi-Square Tests		
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	58709.833 ^a	56274	<.001
Likelihood Ratio	2808.268	56274	1.000
Linear-by-Linear Association	132.329	1	<.001
N of Valid Cases	262		

a. 56750 cells (100.0%) have expected count less than 5. The minimum expected count is .00.

Table 4 shows the results of the Chi Square Test between calorie intake and nutritional status in 262 subjects. The analysis results showed a significant relationship between daily calorie adequacy and nutritional status, with a significant value of $p < 0.001$.

Table 5. Relationship Between Daily Calorie Adequacy Based on Nutritional Adequacy Rate for Ages 13-15 and Nutritional Status

Daily Calorie Intake	Nutritional Status			Total
	Normal	Overweight-Obese	Underweight	
Good	7 (2.7%)	3 (1.1%)	1 (0.4%)	11 (4.2%)
Insufficient	104 (39.7%)	58 (22.1%)	76 (29.0%)	238 (90.8%)
More	6 (2.3%)	4 (1.5%)	3 (1.1%)	13 (5.0%)

Total	117 (44.7%)	65 (24.8%)	80 (30.5%)	262 (100.0%)
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Table 5 shows the results of the analysis of the relationship between daily calorie adequacy according to the RDA for ages 13–15 years and the nutritional status of 262 subjects. Most of those with normal nutritional status had insufficient calorie intake, namely 103 people (90.8%), while those with adequate or higher intake were only slightly adequate (4.2%) or higher (5.0%). For the overweight-obese category, 22.1% of subjects with overweight-obesity had insufficient calorie intake, only 1.1% had adequate intake, and 1.5% had excessive intake according to the RDA. Overall, out of 262 subjects, 238 (90.8%) had insufficient calorie intake, only 11 (4.2%) had adequate calorie intake, and 13 (5.0%) had excessive calorie intake. This distribution indicates that most adolescents in this study had insufficient calorie intake, regardless of their nutritional status.

Table 6. Relationship Between Daily Calorie Adequacy Based on Total Energy Expenditure and Nutritional Status

Daily Calorie Intake	Nutritional Status			Total
	Normal	Overweight-Obese	Underweight	
Good	2 (0.8%)	0 (0.0%)	0 (0.0%)	2 (0.8%)
Insufficient	70 (26.7%)	41 (15.6%)	54 (20.6%)	165 (63.0%)
More	45 (17.2%)	24 (9.2%)	26 (9.9%)	95 (36.3%)
Total	117 (44.7%)	65 (24.8%)	80 (30.5%)	262 (100.0%)

Table 6 shows the results of the crosstab analysis between calorie intake based on Total Energy Expenditure and nutritional status in 262 subjects. In the normal nutrition group, most (26.7%) had insufficient calorie intake, followed by excessive intake (17.2%) and adequate intake (0.8%). In the overweight-obese group, 15.6% had insufficient calorie intake, 9.2% had excessive intake, and none had adequate intake. This indicates that despite being overweight or obese, many had insufficient calorie intake. In the underweight group, 20.6% had insufficient calorie intake, 9.9% had excessive intake, and none had adequate intake.

DISCUSSION

a. Daily Calorie Intake of Students Aged 13-15 Years at SMP Negeri 2 Tanjung Pinang

Most adolescents in Table 3 showed insufficient calorie intake, namely 90.8% based on the Recommended Dietary Allowance (238 out of 262 subjects) and 51.9% based on Total Energy Expenditure (136 out of 262 subjects). According to the Balanced Nutrition Guidelines, good nutritional status is achieved through adequate calorie intake and a balanced diet that meets the requirements for carbohydrates, protein, fat, vitamins, and minerals. The category of insufficient calorie intake differed significantly between RDA (238 individuals, 90.8%) and TEE (136 individuals, 51.9%) because the Recommended Dietary Allowance is the average daily calorie requirement based on age group and gender for a healthy population and aims to be preventive or prevent diseases caused by insufficient or excessive calorie intake.⁵ Total energy is the total calories required by everyone based on their weight, height, gender, and age.

Based on the researcher's analysis, the body will feel adverse effects such as Protein Energy Malnutrition (PEM) when food intake is insufficient, and one of the contributing factors is insufficient calorie intake. The level of physical activity can also influence insufficient calorie intake. If physical activity is light while calorie intake is excessive, this tends to cause overweight. If someone frequently engages in various physical activities but does not obtain sufficient calories from their diet, the body will utilize fat reserves as an energy source. If this condition persists over an extended period, the individual is at risk of malnutrition, characterized by low body weight (underweight). A previous study explains that the higher the level of physical activity, the greater the energy required.

Conversely, if someone consumes more calories than needed without adequate physical activity, the excess energy will be stored as fat, eventually leading to obesity.⁶

In addition to physical activity, calorie intake is also influenced by genetic factors and health history. The children of overweight parents are at higher risk of experiencing the same condition, especially if both parents are obese, with the risk reaching 50-70%.⁷ This tendency is related to genetic factors, such as hormonal disorders or specific syndromes that affect children's growth and development and can hinder normal growth.⁸ The results study show a relationship between parental overweight and obesity among students at SMP Negeri 24 Surabaya.⁸ This finding is supported by statistical analysis using Pearson's correlation test, which yielded a significance value of 0.030, indicating a statistically significant relationship as it is below 0.05.⁸

Health conditions affect the number of calories consumed. found that adults with a history of illness are more likely to be malnourished than healthy individuals. When someone experiences health problems, their immune system weakens, increasing energy requirements to maintain bodily strength.⁹ This study also noted a significant relationship between health history and nutritional adequacy. Illness can cause a decrease in appetite, which ultimately reduces calorie intake and leads to weight loss.⁹

b. Nutritional Status of Students Aged 13-15 Years at SMP Negeri 2 Tanjung Pinang

The results of this study show that 30.5% of students are underweight, while 44.7% have normal nutritional status. Nutritional status reflects the body's response to nutritional intake and is influenced by a balanced diet. Nutritional needs vary depending on age and gender, in accordance with the Recommended Dietary Allowances (RDA).⁹ Other research states that unhealthy eating patterns among adolescents, such as frequently skipping breakfast and consuming high-calorie foods with minimal vegetables and fruits, can lead to nutritional imbalance and increase the risk of malnutrition.¹⁰

The results of this study align with the research before that most adolescents aged 13 to 15 years are underweight. This period is the early transition toward adulthood, during which adolescents experience psychological and social changes, including increased attention to self-image. Especially among adolescent girls, attention to body shape and physical appearance becomes more dominant.¹¹

Based on this study, 30.5% of subjects were underweight, possibly due to an imbalance between daily calorie intake and energy expenditure, particularly because of high physical activity. Malnutrition can occur due to insufficient intake of nutrients such as carbohydrates, protein, and fat, not just because of disease. Carbohydrate intake has a significant impact on the nutritional status of adolescents.¹² Carbohydrate deficiency can cause energy deficiency and KEP, while excess carbohydrates can lead to obesity.⁶ Fat plays an important role in the nutritional status of adolescents. Fat deficiency can cause weight loss, while excess fat can cause overweight. Therefore, balancing energy intake and expenditure is important for optimal growth.¹³

During puberty, protein requirements increase to support growth, and according to, there is a relationship between adequate protein consumption and the nutritional status of adolescents.⁶ Protein is important for forming and repairing body cells, so a lack of protein can hinder physical growth. If protein deficiency persists for a long time, it can cause stunted growth, a weak immune system, increased risk of infection, and mental health and energy disorders.⁶

c. Relationship between Daily Calorie Adequacy and Nutritional Status

Table 5 shows the relationship between calorie intake and nutritional status, where higher calorie consumption is associated with better nutritional status. This finding is consistent with the

research, which states that dietary patterns influence the nutritional status of adolescents aged 13–15 years at the Al-Yusufiah boarding school.¹¹

Other research shows a strong correlation between daily energy sufficiency and nutritional status, which was statistically proven through a chi-square test with significant results ($p = 0.000 < 0.05$) in adolescents in Bumut Village.¹⁴ Adolescents who frequently consume high-calorie foods without balancing them with physical activity are at risk of obesity, especially if their fiber intake from fruits and vegetables is also low.¹⁵ Daily eating habits reflect consumption patterns that affect nutritional adequacy. Balanced nutrition is important for digestion, organ function, and supporting physical and mental growth, especially in adolescents.

According to the Ministry of Health in 2017, poor nutritional status among adolescent girls is often caused by families providing inappropriate food. Nutritional status is influenced by daily eating patterns and how well the body absorbs nutrients. If food intake is sufficient and of good quality, nutritional status will be good. However, individuals with low body weight are more susceptible to infectious diseases.¹⁶ Meanwhile, cases of obesity that occur across generations are often triggered by excessive eating patterns that do not align with energy needs according to the Recommended Dietary Allowances (RDA) and Total Energy Expenditure (TEE). The elementary school-aged children tend to become overweight due to the influence of their parents' unbalanced eating habits, which ultimately leads to fat accumulation in the body.¹⁷

In addition, other factors that influence the nutritional status of adolescents include the level of physical activity, parental supervision of food, availability of food at home, daily pocket money, and family economic conditions. Although many adolescents do not have ideal eating patterns, some are able to maintain energy balance by regularly engaging in physical activity. Based on the researcher's direct experience during the implementation of this study, there were several limitations encountered that may be of concern to future researchers in their efforts to improve future studies. The limitations in question include Synergy between the school and parents, which is key in building students' awareness of the importance of consuming nutritious and balanced meals.

CONCLUSION

A study conducted in 2025 among students aged 13–15 years at SMP Negeri 2 Tanjung Pinang found a significant relationship between daily calorie sufficiency and nutritional status. The average nutritional status of the participants fell within the normal category. However, based on the Recommended Dietary Allowances (RDA) and each subject's Total Energy Expenditure (TEE), the majority of students had insufficient daily calorie intake.

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