



ANALYSIS OF EATING PATTERNS AND NUTRITIONAL ADEQUACY IN ADOLESCENTS BASED ON THE 24-HOUR FOOD RECALL OF SMKPP CITY OF BIMA

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ARTICLE INFORMATION	ABSTRACT
Received: 5th June 2026 Accepted : 11th June 2026 Published : 13th June 2026 DOI: https://doi.org/10.64479/XXX	This study aimed to analyze dietary patterns and nutritional adequacy among adolescents at SMKPP Negeri Kota Bima using the 24-hour food recall method. A descriptive cross-sectional design was employed involving 20 respondents aged 14–17 years selected through purposive sampling. Data were collected through 24-hour food recall interviews, anthropometric measurements, and physical activity questionnaires. Descriptive statistics and the Chi-Square test were used for data analysis with a significance level of 0.05. The findings revealed that most adolescents had inadequate intake of energy, carbohydrates, protein, fat, and iron compared with recommended dietary allowances. Dietary patterns were generally unfavorable, characterized by irregular meal consumption, frequent breakfast skipping, and low intake of vegetables and fruits. Most respondents had normal nutritional status (60%), while 30% were underweight and 10% were overweight. Statistical analysis showed a significant association between dietary patterns and nutritional status ($p < 0.05$). These findings indicate the importance of improving dietary habits through nutrition education to support adequate nutrient intake and optimal adolescent health.
 This work is licensed under a Creative Commons Attribution- ShareAlike 4.0 International license.	Keywords: diet, nutritional adequacy, adolescents, 24-hour food recall, nutritional status.

1. INTRODUCTION

Adolescence is a crucial period in the human life cycle due to rapid growth and development, both physically, psychologically, and socially. During this period, nutritional needs increase significantly to support growth and high levels of physical activity. Adolescents are a vulnerable group to nutritional problems such as undernutrition, overnutrition, and micronutrient deficiencies like iron (Rahmah et al., 2024).

Rapid growth in adolescents results in greater energy and nutrient needs than in other age groups. If these needs are not optimally met, it can lead to growth disorders, developmental delays, and an increased risk of future disease (Utami et al., 2020).

Furthermore, today's adolescent diets tend to be unhealthy. Many teenagers have a habit of skipping meals, such as breakfast, and frequently consume snacks or snacks that are high in energy but low in nutrients. These unbalanced eating habits can impact adolescents' nutritional status and future health (Irdiana & Nindya, 2017).

This is further supported by previous research by Khansa Atikah Khairunnisa, Ai Nurhayati, and Rita Patriasih (2024), which showed that adolescents often have insufficient nutrient intake. This is caused by an unvaried diet, consumption of low-nutrient foods, and the habit of skipping meals. Furthermore, according to Rahmah et al. (2024), most adolescents have insufficient energy and protein intake, which can potentially lead to nutritional problems such as chronic energy deficiency.

To determine the actual dietary patterns and nutritional adequacy of adolescents, an appropriate consumption assessment method is required. One commonly used method is the 24-hour food recall, which provides a snapshot of the types and quantities of food consumed in a day, thus allowing it to assess an individual's nutritional adequacy.

Based on the background description above, the researcher is interested in conducting a study entitled "Analysis Of Eating Patterns And Nutritional Adequacy In Adolescents Based On 24-Hour Food Recall At Smk Negeri City Of Bima", in order to determine the description of food consumption patterns and the level of nutritional adequacy in adolescents, so that it can be a basis for efforts to improve nutritional status and improve the quality of adolescent health.

2. LITERATURE STUDY

Extensive research has been conducted on dietary patterns and nutritional adequacy in adolescents, as adolescence is a period of growth that requires optimal nutritional intake. Several studies have shown that

nutritional issues in adolescents remain a significant issue, both in the form of undernutrition and overnutrition.

Research by Khairunnisa (2024) found that most high school students' macronutrient intakes fall short of their daily needs. Low energy, protein, and carbohydrate intakes are caused by a less diverse diet and a habit of consuming foods with low nutritional value.

Rahmah et al. (2024) reported a relationship between macronutrient intake and nutritional status in adolescents. Most respondents in the study had insufficient energy and protein intake, putting them at risk of chronic energy deficiency (CED).

Meanwhile, Utami et al. (2020) found that dietary patterns, energy and protein adequacy were significantly associated with adolescent nutritional status. A good and regular diet contributes to optimal nutritional status.

Furthermore, research by Irdiana and Nindya (2017) shows that skipping breakfast and low nutrient intake impact adolescents' nutritional status. Adolescents who don't eat regularly are more likely to experience nutritional problems than those who maintain a healthy diet.

Tabel 1. Various previous studies have used different approaches in examining the relationship between dietary patterns and nutritional status of adolescents.

Researchers	Focus Study	Method	Main Variables
Irdiana & Nindya (2017)	Habit breakfast and nutritional status	Cross-sectional	Breakfast , intake substance nutrition , nutritional status
Utami et al. (2020)	Diet and sufficiency energy - protein	Cross-sectional	Diet , energy , protein, nutritional status
Rahmah et al. (2024)	Intake substance nutrition macro and nutritional status	Observational	Energy , protein, carbohydrates , nutritional status
(Khairunnisa 2024)	Adequacy level substance nutrition macro student	Descriptive	Intake substance nutrition macro

This comparison shows that most studies focus solely on the relationship between specific nutrient intake and nutritional status. However, this study not only measured macronutrient adequacy but also evaluated daily food consumption patterns using a 24-hour *food recall method* and related these to adolescents' nutritional status.

3. MATERIALS AND METHODS

3.1. Research Design.

This research is a quantitative descriptive study using a cross-sectional approach. A cross-sectional approach is a research method conducted at a specific point in time to describe a current condition or phenomenon, in this case, the dietary patterns and nutritional adequacy of adolescents at the State Vocational High School (SMKPP) in Bima City (Arief et al. 2025; Madanijah et al. 2016).

3.2. Study Population

The population in this study was all adolescents at the State Vocational High School (SMKPP) in Bima City. The sample used was 20 respondents, consisting of male and female adolescents aged 14–17 years. The sampling technique used was purposive sampling, which selects respondents based on certain criteria, such as willingness to participate and ability to recall food consumption over the past 24 hours.

3.3. Data Collection Procedures.

The variables examined in this study included nutrient intake consisting of energy, carbohydrates, protein, fat, and iron, dietary patterns obtained through a 24-hour food recall, physical activity, and nutritional status calculated using Body Mass Index (BMI). All variables were collected simultaneously to reflect the respondents' actual condition at the time of the study. Implementation study done through a number of stage starting from characteristic data collection respondents including age, type gender, weight, and height. Activity data physique obtained through interview about activity daily along with duration. Data consumption food collected use method 24-hour food recall with take notes all over food and drink consumed respondents.

3.4. Data analysis.

Data analysis was carried out in two stages, namely descriptive analysis and analytical analysis. Descriptive analysis was used to describe the characteristics of respondents, food consumption patterns, and nutritional adequacy levels by comparing intake results to the Recommended Dietary Allowance (RDA). Furthermore, analytical analysis was conducted using the *Chi-Square (χ^2)* test to determine the relationship between dietary patterns and adolescent nutritional status. The test results were considered significant if the p-value ≤ 0.05 , indicating a relationship between the variables studied.

Table 2. Respondent Characteristics

No	Variables	Category	Frequency (n)	Percentage (%)
1	Gender	Male	13	65%
		Female	7	35%
		Total	20	100%
2	Age	14 years	1	5%
		15 years	10	50%
		16 years	6	30%
		17 years	3	15%
		Total	20	100%

Table 2 presents the demographic characteristics of the respondents based on gender and age. The distribution of respondents by gender showed that the majority were male, accounting for 13 participants (65%), while 7 participants (35%) were female. This indicates that male respondents were more represented in the study sample than female respondents.

Regarding age, the largest proportion of respondents were 15 years old, comprising 10 participants (50%) of the total sample. This was followed by respondents aged 16 years with 6 participants (30%), 17 years with 3 participants (15%), and 14 years with 1 participant (5%). The age distribution demonstrates that most respondents were in the middle adolescent age group, particularly those aged 15 years.

4. RESULTS AND DISCUSSION

4.1. Results

4.1.1. Intake of Teenagers

food recall data on 20 respondents using the Indonesian Food Composition Table (TKPI), it was found that most teenagers have nutritional intake that does not meet the Nutritional Adequacy Intake (AKG).

Table 3. Average Energy Intake of Respondents

Nutrients	Average Intake	Teen AKG	Category
Energy	1,349 kcal	2,100 kcal	Not enough
Carbohydrate	194 g	300 g	Not enough
Protein	61 g	60–65 g	Enough
Fat	43 g	60–70 g	Not enough
Iron	9.7 mg	15 mg	Not enough

Table 4. Distribution of Nutritional Adequacy Levels

Nutrients	Less n (%)	Enough n (%)	More n (%)	Total
Energy	17 (85%)	2 (10%)	1 (5%)	20 (100%)
Carbohydrate	18 (90%)	2 (10%)	0 (0%)	20 (100%)
Protein	12 (60%)	5 (25%)	3 (15%)	20 (100%)
Fat	16 (80%)	3 (15%)	1 (5%)	20 (100%)
Iron	19 (95%)	1 (5%)	0 (0%)	20 (100%)

4.1.2. Food Consumption Patterns

Based on the results of a *24-hour food recall* of 20 respondents, we obtained a picture of the food consumption patterns of adolescents at SMKPP Negeri Kota Bima, which still do not fully meet the principles of balanced nutrition. Most respondents consumed two or three main meals a day, but some respondents still ate irregularly, such as skipping breakfast or only eating twice a day. The most frequently consumed staple food was rice, which was almost always present at breakfast, lunch, and dinner (Lawrance et al. 2022; Nasution, Wahyudi, and Hasanah 2022; Prastia et al. 2023; Sulistiyorini 2024).

For side dishes, respondents tended to consume animal protein such as chicken, fish, and eggs, as well as plant protein such as tofu and tempeh. However, this consumption was not evenly distributed across mealtimes, resulting in suboptimal protein intake for some respondents (Elfita 2015; Karasev et al. 2020; Prihandini, Torizellia, and Nurfitriani 2022).

Vegetable consumption was found among the majority of respondents, but in small amounts and not consumed regularly every day. Meanwhile, fruit consumption was relatively low, with only a few respondents consuming fruits such as bananas, apples, and snake fruit. In addition to main meals, all respondents consumed snacks such as bread, biscuits, chips, and other packaged foods. The frequency of snack consumption was quite high, with some respondents consuming more than once a day (Katnur et al. 2025). Furthermore, they also consumed sweet drinks such as tea and bottled water.

Table 5. Respondents' Food Consumption Patterns

Indicator	Findings
Meal frequency	Mostly 2–3 times/day, some are still irregular
Breakfast	There are still respondents who skip breakfast
Staple food	Rice is consumed by all respondents
Animal protein	Consumed, but not regularly at every meal time
Vegetable protein	Consumed by some respondents (tofu, tempeh)

Consumption of vegetables	Yes, but the number and frequency are still low.
Fruit consumption	Low and irregular
Snack consumption	High (bread, biscuits, chips, packaged foods)
Drink	Some consume sweet drinks

4.1.3. Respondents' Nutritional Status

The results of the Body Mass Index (BMI) measurements showed that the majority of respondents had a normal nutritional status. This indicates that the majority of adolescents are in fairly good nutritional condition. However, there were still some respondents who were in the underweight and obese categories. overweight, which indicates the presence of malnutrition problems in some adolescents.

Table 6. Nutritional Status Based on Respondents' BMI

BMI Category	n	Percentage (%)
Thin	6	30%
Normal	12	60%
Overweight	2	10%
Obesity	0	0%

4.1.4. Relationship between Dietary Patterns and Nutritional Status

To determine the relationship between dietary patterns and respondents' nutritional status, an analysis was conducted using the Chi-Square (χ^2) test. Dietary patterns were categorized into two categories: regular and irregular.

Table 7. Relationship between Diet and Nutritional Status

Dietary habit	Thin (n)	Normal (n)	Overweight (n)	Total
Irregular	5	5	2	12
Regular	1	7	0	8
Total	6	12	2	20

Table 7, Show the chi-square test results showed a p-value of 0.048 ($p < 0.05$), indicating a significant relationship between dietary patterns and adolescent nutritional status. Therefore, it can be concluded that irregular dietary patterns contribute to nutritional problems, both malnutrition and overnutrition. The chi-square test results showed a p-value of 0.048 ($p < 0.05$), indicating a significant relationship between dietary patterns and adolescent nutritional status. Therefore, it can be concluded that irregular dietary patterns contribute to nutritional problems, both malnutrition and overnutrition.

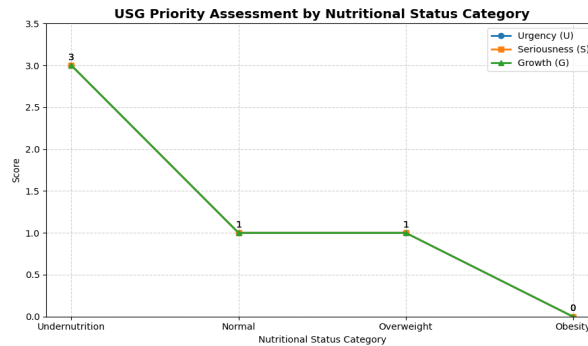


Figure 1. USG GRAPH (Urgency, Seriousness, Growth)

Figure 1 presents the results of the priority analysis of nutritional problems using the USG (Urgency, Seriousness, and Growth) method. The analysis shows that the undernutrition category obtained the highest score for all three assessment criteria, with a score of 3 for Urgency, Seriousness, and Growth. This indicates that undernutrition is considered the most critical nutritional problem, requiring immediate attention due to its high level of urgency, potential health impact, and likelihood of worsening if no intervention is implemented.

In contrast, the normal nutritional status and overweight categories each received a score of 1 across all USG dimensions. These results suggest that these categories are considered lower-priority issues compared to undernutrition, as their impact on public health is relatively less urgent and manageable through routine monitoring and preventive measures.

Meanwhile, the obesity category received a score of 0 for all assessment criteria, indicating that obesity was not identified as a priority nutritional problem among the study population. This finding may reflect the low prevalence or limited impact of obesity within the observed group.

Overall, the USG analysis identifies undernutrition as the highest-priority nutritional issue, emphasizing the need for targeted nutrition interventions, health education, and continuous monitoring to improve nutritional outcomes and prevent adverse health consequences among affected individuals.

Table 8. Distribution of USG Scores Across Nutritional Status Categories

No	Case Categories	U	S	G	U+S+G	Category
1	Malnutrition	3	3	3	9	Top Priority
2	Normal	1	1	1	3	Not a Priority
3	Overweight	1	1	1	3	Not a Priority
4	Obesity	0	0	0	0	Not a Priority

Table 8, explain the results of the USG (Urgency, Seriousness, and Growth) analysis are presented in Table 7. Among the four nutritional status categories evaluated, malnutrition received the highest score, with a total USG score of 9 (Urgency = 3, Seriousness = 3, Growth = 3), and was therefore classified as the top priority problem. This finding indicates that malnutrition represents the most urgent nutritional issue, has significant potential health consequences, and may worsen if appropriate interventions are not implemented promptly.

In contrast, the normal nutritional status and overweight categories each obtained a total score of 3 (1 for each USG component), placing them in the not a priority category. These conditions were considered less urgent and less likely to cause immediate public health concerns within the study population. Similarly, obesity received a total score of 0, indicating that it was not identified as a priority nutritional problem in this assessment.

4.2. Discussion

The study results show that most adolescents at SMKPP Negeri Bima City have inadequate nutritional intake, particularly in energy, carbohydrate, protein, fat, and iron intake. The average energy intake of respondents was below the Recommended Dietary Allowance (RDA), indicating an energy deficit in most respondents. This condition can lead to decreased immunity, impaired growth, and decreased concentration in learning.

These results align with research by (Prihandini et al. 2022; Rinanda and Sarjito 2024) which found that most adolescents have energy and protein intakes that fall short of their needs. This deficiency has the potential to lead to nutritional problems such as chronic energy deficiency (CED).

In terms of consumption patterns, most respondents had irregular eating habits, such as skipping breakfast, eating fewer than three times a day, and low fruit and vegetable consumption. Furthermore, consumption of instant foods and snacks was quite high among respondents. These eating patterns indicate that adolescents tend to choose convenience foods that are high in energy but low in nutrients.

This aligns with research by (Irdiana and Nindya 2017; Khatimah and Avila 2023; Wibowo and Zen 2025), which states that skipping breakfast and consuming low-nutrient foods can affect adolescents' nutritional status. An unbalanced diet can lead to an imbalance between nutrient intake and needs.

Based on Body Mass Index (BMI) measurements, the majority of respondents had normal nutritional status (60%), but there were still some

respondents who were underweight (30%) and overweight (10%). This indicates a dual nutritional problem, namely undernutrition and overnutrition within the same group of adolescents.

The analysis showed a significant relationship between diet and nutritional status ($p < 0.05$). Respondents with irregular diets tended to have abnormal nutritional status, either underweight or overweight. Conversely, respondents with regular diets mostly had normal nutritional status.

This finding aligns with research by (Asykari et al. 2023), which states that dietary patterns and energy and protein adequacy levels are associated with adolescent nutritional status. A good and regular diet can help meet nutritional needs and maintain normal nutritional status.

4.3. CONCLUSION

Although the majority of respondents were classified as having normal nutritional status, the presence of adolescents with underweight and overweight conditions indicates that nutritional problems still exist within the study population. These findings suggest that variations in dietary patterns and nutrient intake may contribute to differences in nutritional status among adolescents. During adolescence, adequate nutrition is particularly important because this stage is characterized by rapid physical growth, hormonal changes, and increased nutritional requirements. Insufficient or excessive nutrient intake can negatively affect growth, development, academic performance, and overall health outcomes.

The results highlight the importance of maintaining a regular, diverse, and balanced diet that meets the nutritional needs of adolescents. Healthy dietary habits, including regular meal consumption and adequate intake of energy, protein, vitamins, and minerals, play a crucial role in supporting optimal nutritional status. Conversely, unhealthy eating behaviors, such as skipping meals, excessive consumption of energy-dense foods, or inadequate nutrient intake, may increase the risk of both undernutrition and overnutrition.

Therefore, it can be concluded that dietary practices are an important determinant of adolescent nutritional status. Efforts to improve nutritional status should focus on promoting healthy eating behaviors through school-based nutrition programs, family support, and community health interventions. In addition, continuous nutrition education is needed to enhance adolescents' knowledge and awareness regarding balanced nutrition, enabling them to make healthier food choices and adopt sustainable dietary habits that support their growth, development, and long-term well-being.

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