World Nutrition Journal |eISSN 2580-7013

ORIGINAL PAPER

Gender, education, eating patterns, and nutritional status among high school students in the tourist area of Bukittinggi, Indonesia

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Received 21 January 2025
Accepted 18 February 2025
Published 28 February 2025

Link to DOI:
10.25220/WNJ.V08.i2.0012

Citation: Taufiqa Z, Maisa B A, Rahman Zam Z S, Rizqillah F, Alem N K, Amril F A. Gender, education, eating patterns, and nutritional status among high school students in the tourist area of Bukittinggi, Indonesia World Nutrition Journal.2025 February 28,8(i2): 97-108.

Abstract

Background: The well-being of high school students in tourist shapes their eating habits and affects their nutritional status, leading to obesity and malnutrition.
Objective: This study aims to examine the association between gender, education, eating patterns, and nutritional status among high school students in tourism areas.
Methods: This cross-sectional study was conducted in October 2023 and included 118 students aged 12–18 years from junior and senior high schools in Bukittinggi, West Sumatra. Respondents were selected through multistage stratified clustered sampling. Data on gender, age, education, and eating patterns which assessed using a food frequency questionnaire classified according to the Guttman scale. Nutritional status was determined based on BMI-for-age WHO z-scores following the Indonesian Minister of Health Regulation. Data were collected via interviews using a questionnaire on the KoboToolbox application and analyzed using Chi-square tests.
Results: Most high school students (89.8%) had poor eating patterns, with 45.8% having a normal BMI-for-age, 34.7% undernourished, and 19.5% overweight or obese. Gender was significantly associated with nutritional status (p=0.007), with thinness more common in boys and normal BMI-for-age more prevalent in girls, while education and eating patterns showed no significant association. However, frequent consumption of sugary drinks was linked to higher rates of overweight and obesity.
Conclusion: There were gender differences in nutritional status among high school students in Bukittinggi, a tourist area, underscoring the need for targeted gender-focused nutrition interventions to address healthier eating patterns in tourism regions.

Keywords: eating pattern, nutritional status, students, tourism area

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Introduction

The well-being of high school students in tourists' area is increasingly importance, as diverse food options, fast food exposure, and cultural influences shape their eating habits and impact their nutritional status.[1,2] Bukittinggi, a popular tourist destination in West Sumatra, Indonesia, is known for its rich food culture, including street food and traditional Minangkabau cuisine, which is high in

fats and carbohydrates. The abundance of food vendors, restaurants, and fast-food establishments in tourist areas may affect the eating patterns of local adolescents, who are in a crucial stage of growth and development.[3,4]

Adolescence is a critical period of physical, cognitive, and emotional development, during which students pay more attention of their body shape, weight, and height.[5] In tourist areas, adolescents are more exposed to unhealthy eating patterns, including frequent snacking, high-calorie food consumption, and irregular meal timing, which can contribute to weight-related issues.[3] Adjusting energy intake based on eating behavior is essential to maintain a healthy nutritional status.[6] Dietary habits formed during this stage can have long-term health effects, making it crucial to monitor and address adolescent nutrition.[7]

The nutritional status of adolescents (ages 5-18) is assessed using Body Mass Index-for-age (IMT/U) z-scores.[8] A z-score above +1 SD indicates increased body fat and health risks[7] while a score below -2 SD is associated with anemia, which impair immunity, concentration, academic performance, fitness, and overall productivity. In girl students, anemia also heightens the risk of maternal mortality, premature births, and low birth weight, contributing to stunting.[9]

Gender and education levels influence the nutritional knowledge and eating behaviors of high school students, affecting their nutritional status. Girl students are more likely to have negative body image perceptions,[10–12] leading to unhealthy eating behaviors such as strict dieting, skipping meals, or disordered eating which can cause nutrient deficiencies.[2] Education also plays a key role in shaping awareness and understanding of balanced nutrition,[2,13] influencing dietary choices and long-term health outcomes.[2]

High school students' eating patterns are also shaped by environmental, social, cultural, religious, and economic factors, particularly in tourism region. Social influences from family, peers, and social media, contribute to their food choices and potential nutritional issues.[14] According to the Global School Health Survey, 95.5% of high school students do not consume vegetables and fruits and 75.7% frequently eat foods with added flavorings.[15] Cultural and religious beliefs may impose dietary restrictions, while economic status affects access to nutritious foods.[2]

Despite growing concern about adolescent nutrition, limited studies have explored the impact of tourism-driven food environments on high school students' eating behaviors, and nutritional status, particularly in Bukittinggi. This research aims to examine the associations between gender, educational level, eating patterns, and nutritional status among high school students in tourists' area, providing insights for targeted nutrition interventions and health promotion strategies.

Methods

This cross-sectional study was conducted in October 2023 in Bukittinggi, a well-known tourist destination in West Sumatra, Indonesia. A total of 118 high school students aged 12–18 years old participated selected using multistage stratified clustered sampling by stratifying based on education level then randomly selecting clusters to ensure proportional representation across gender, education levels, eating patterns, and nutritional status. Total respondents were determined to use the Slovin formula, adjusted for a finite population. Eligible respondents were literate in Bahasa Indonesia while those absent or not enrolled during the study period were excluded. Written informed consent was obtained from all respondents after a full explanation of the study's purpose, and potential implications. Ethical approval was granted by the Research Ethics Committee of Dr. M. Djamil General Hospital, Padang, Indonesia (No.DP.04.03/D.XVI.XI/537/2023).

The study examined nutritional status as the independent variable with while gender, education level and eating patterns as dependent variables. Data collection included demographic information (initials, age, gender, and education) and dietary intake. Adolescents were categorized into three stages: early adolescence (10-13 years), middle adolescence (14-17 years), and late adolescence (18- 21 years).[16] Gender was classified as boy and girls while education level was categorized as junior and senior high school. Dietary intake was

evaluated using the Food Frequency Questionnaire (FFQ), which assessed the consumption of staple foods, side dishes, fiber sources, and snacks. Responses were scored as follows: a score of 50 for 'always' or daily consumption, 25 for 'often' or 4-6 times per week, 15 for 'sometimes' or 1-3 times per week, 10 for 'rarely' or 1-3 times per month, dan 0 for 'never' or less than once per month. Eating patterns were classified based on the Guttman scale, with a score of ≥296.31 indicating a good eating pattern and a score of ≤296.31 indicating a poor eating pattern.[17]

Anthropometric measurements, including weight and height, were conducted by trained research following standardized protocols. Weight was measured using a SECA weighing scale with an accuracy of 0.1 kg, while height was recorded using a calibrated microtoise with an accuracy of 0.1 cm. Nutritional status was determined using Body Mass Index-for-age (IMT/U) z-score which classified into: severely thin (< -3 SD), thin (-3 SD to -2 SD), normal (-2 SD to +1 SD), at risk of overweight (+1 SD to +2 SD), and obese (> +2 SD).[8]

Data were collected via interviews using a questionnaire administered via the KoboToolbox application. Statistical analysis was performed using SPSS Version 20.0. (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as frequencies and proportions for categorical variables and mean±SD for numerical variables. Association between variables were analyzed using Chi-square tests with a significance level set at $p<0.05$.

Results

Characteristics of respondents

This research involved 118 high school students (39% boys, 61% girls) with an average age of 16.92 years. Most were in middle adolescence (53.4%) and attended senior high school (72%). Based on the Gutmann scale, 89.8% had poor eating patterns, with only 10.2% had good eating patterns. In terms of nutritional status, 45.8% had a normal BMI-for-age, while 34.7% were undernutrition (17.8% severely thin, 16.9% thin), and 19.5% were overweight or obese (**Table 1**).

Table 1. Characteristics of respondents

Variable	n (%) or Mean ± SD
Gender	
Boy	46 (39)
Girl	72 (61)
Age (years)	16.92±1.23
Early adolescence (10 to 13)	1 (0.8)
Middle adolescents (14 to 17)	63 (53.4)
Late adolescents (18 to 21)	54 (45.8)
Education level	
Junior high school	33 (28)
Senior high school	85 (72)
Eating pattern (Gutmann scale)	
Good (≥296.31)	12 (10.2)
Poor (<296.31)	106 (89.8)
Nutritional status (BMI-for-age)	
Severely thin (<-3 SD)	21 (17.8)
Thin (-2 SD to -3 SD)	20 (16.9)
Normal (-2 SD to +1 SD)	54 (45.8)
Overweight (+1 SD to +2 SD)	15 (12.7)
Obese (>+2 SD)	8 (6.8)

Table 2 showed respondents' food consumption patterns. White rice, a local staple, was the primary carbohydrate (96.6%), while other sources were eaten more variably, and red rice was rarely consumed (93.2% never). Eggs (28.8%) and poultry, such as chicken and duck (24.6%), were the most common protein sources, with a preference for fried over unfried proteins. Soy products were consumed more often than red meat and fresh seafood, which was rarely eaten (44.9% never). Regarding fiber intake, green leafy vegetables (40.7%) and fresh fruits (28.8%) were frequently consumed, while orange/yellow-colored vegetables and canned vegetables were less common. Snacking habits showed a high intake of packaged snacks like potato chips or popcorn (42.4%), desserts such as cake, ice cream or pudding (37.3%), and sugary drinks (38.8%) while ultra-processed food (e.g., frozen food and canned food) were less frequently consumed (29.7% never).

Table 2. Food consumption of respondents

Food Consumption	n (%)				
	Always	Often	Sometimes	Rarely	Never
Staple food					
White rice	114 (96.6)	3 (2.5)	1 (0.8)	0 (0)	0 (0)
Wheat products	21 (17.8)	7 (5.9)	70 (59.3)	18 (15.3)	2 (1.7)
Tubers	14 (11.9)	7 (5.9)	57 (48.3)	26 (22.0)	14 (11.9)
Red rice	1 (0.8)	0 (0)	3 (2.5)	4 (3.4)	110 (93.2)
Side dishes					
Meat	6 (5.1)	4 (3.4)	53 (44.9)	34 (28.8)	21 (17.8)
Poultry	29 (24.6)	12 (10.2)	65 (55.1)	7 (5.9)	5 (4.2)
Fish, unfried	14 (11.9)	7 (5.9)	43 (36.4)	22 (18.6)	32 (27.1)
Meat and fish, fried	38 (32.2)	21 (17.8)	47 (39.8)	9 (7.6)	3 (2.5)
Fresh seafood	1 (0.8)	4 (3.4)	19 (16.1)	41 (34.7)	53 (44.9)
Eggs	34 (28.8)	13 (11.0)	61 (51.7)	8 (6.8)	2 (1.7)
Dairy Products	41 (34.7)	2 (1.7)	43 (36.4)	16 (13.6)	16 (13.6)
Soy products	39 (33.1)	17 (14.4)	51 (43.2)	5 (4.2)	6 (5.1)
Fiber sources					
Green leafy vegetables	48 (40.7)	11 (9.3)	45 (38.1)	6 (5.1)	8 (6.8)
Orange/yellow-colored vegetables	14 (11.9)	5 (4.2)	59 (50)	26 (22)	14 (11.9)
Canned vegetables	1 (0.8)	1 (0.8)	3 (2.5)	7 (5.9)	106 (89.8)
Fresh fruits	34 (28.8)	13 (11.0)	56 (47.5)	13 (11.0)	2 (1.7)
Snacks					
Packaged snacks	50 (42.4)	9 (7.6)	36 (30.5)	13 (11.0)	10 (8.5)
Unpackaged snacks	35 (29.7)	6 (5.1)	53 (44.9)	14 (11.9)	10 (8.5)
Sugary drinks	34 (28.8)	12 (10.2)	40 (33.9)	20 (16.9)	12 (10.2)
Ultra processed food	10 (8.5)	5 (4.2)	39 (33.1)	29 (24.6)	35 (29,7)
Dessert	44 (37.3)	8 (6.8)	42 (35.6)	14 (11.9)	10 (8.5)

Gender, education level, eating patterns and nutritional status

As presented in **Table 3**, Gender was significantly associated with nutritional status (p = 0.007), with thin being more prevalent among boys (28.3%) than girls (9.7%), while normal weight was more common among girls (55.6%) than boys (30.4%). Age and education level were not significantly associated with nutritional status. Middle and late adolescents had similar distributions, with normal weight being the most common category. Senior high school students had a higher prevalence of severe thin (21.2%) than junior high school students (9.1%). Eating patterns were not significantly related to nutritional status, although most students with poor eating habits fell within the normal BMI-for-age range (46.2%). Students with poor eating patterns had higher rates of thin (16%) and severely thin (16%) classifications. In contrast, those with good eating patterns had lower rates of overweight (0%) and obesity (8.3%) compared to those with poor eating patterns.

Eating patterns based on staple food consumption and nutritional status

Staple food consumption was not significantly associated (p>0.05) with students' nutritional status. **Table 4** showed that white rice, the most consumed staple (6.6% always), was prevalent across all BMI-for-age categories, with the highest proportion in the normal category (45.6%). Students who consumed wheat products and tubers more frequently showed varied nutritional status, but no significant trends were observed. Those who never consumed tubers had a higher proportion in the normal category (71.4%). Red rice was rarely consumed (93.2% never), with most of these students falling within the normal (46.4%) and thin (16.4%) categories.

Table 3. Gender, education level and eating patterns based on nutritional status

Variable	Nutritional Status (BMI-for-Age) (n=118)					*p*
	Severely Thin n (%)	Thin n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	
Gender						**0.007**[c]
Boy	8 (17.4)	13 (28.3)	14 (30.4)	5 (10.9)	6 (13)	
Girl	13 (18.1)	7 (9.7)	40 (55.6)	10 (13.9)	2 (2.8)	
Age						0.659 [c]
Early adolescents	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	
Middle adolescents	13 (20.6)	10 (15.9)	29 (46)	5 (7.9)	6 (9.5)	
Late adolescents	8 (14.8)	10 (18.5)	24 (44.4)	10 (18.5)	2 (3.7)	
Education level						0.296[c]
Junior high school	3 (9.1)	7 (21.2)	16 (48.5)	3 (9.1)	4 (12.1)	
Senior high school	18 (21.2)	13 (15.3)	38 (44.7)	12 (14.1)	4 (4.7)	
Eating pattern (Gutmann scale)						0.610[c]
Good (≥296.31)	3 (25)	3 (25)	5 (41.7)	0 (0)	1 (8.3)	
Poor (<296.31)	17 (16)	17 (16)	49 (46.2)	15 (14.2)	7 (6.6)	

[c]Chi-square

Table 4. Students' eating patterns based on staple food consumption and nutritional status

Eating Patterns of Staple Food	Nutritional Status (BMI-for-Age) (n=118)					*p*
	Severely Thin n (%)	Thin n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	
White rice						
Always	21 (18.4)	20 (17.5)	52 (45.6)	13 (11.4)	8 (7)	0.293[c]
Often	0 (0)	0 (0)	1 (33.3)	2 (66.7)	0 (0)	
Sometimes	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	
Wheat products						
Always	4 (19)	5 (23.8)	11 (52.4)	0 (0)	1 (4.8)	0.872[c]
Often	1 (14.3)	1 (14.3)	3 (42.9)	1 (14.3)	1 (14.3)	
Sometimes	13 (18.6)	11 (15.7)	30 (42.9)	10 (14.3)	6 (8.6)	
Rarely	2 (11.1)	3 (16.7)	9 (50)	4 (22.2)	0 (0)	
Never	1 (50)	0 (0)	1 (50)	0 (0)	0 (0)	
Tubers						
Always	1 (7.1)	6 (42.9)	7 (50)	0 (0)	0 (0)	0.290[c]
Often	2 (28.6)	1 (14.3)	4 (57.1)	0 (0)	0 (0)	
Sometimes	11 (19.3)	8 (14)	21 (36.8)	12 (21.1)	5 (8.8)	
Rarely	6 (23.1)	3 (11.5)	12 (46.2)	2 (7.7)	3 (11.5)	
Never	1 (7.1)	2 (14.3)	10 (71.4)	1 (7.1)	0 (0)	
Red rice						0.490[c]
Always	0 (0)	1 (100)	0 (0)	0 (0)	0 (0)	
Sometimes	2 (66.7)	0 (0)	0 (0)	1 (33.3)	0 (0)	
Rarely	1 (25)	1 (25)	2 (50)	0 (0)	0 (0)	
Never	18 (16.4)	18 (16.4)	51 (46.4)	15 (13.6)	8 (7.3)	

[c]Chi-square

Eating patterns based on side dishes consumption and nutritional status

Table 5 summarized students' side dish consumption patterns in relation to their nutritional status. Meat consumption showed no clear association correlation with BMI-for-age categories (p=0.300), though students who never consumed meat had higher proportions of normal weight (57.1%) and overweight (28.6%). Poultry, a

common protein source, follows a similar pattern (p=0.424), with most students in the normal BMI-for-age category (44.8%). Unfried fish moderate consumption seems to be associated with normal weight (48.8%), and the majority of those who never consumed it were classified as normal weight (46.9%) or overweight (21.9%). Meanwhile, fried meat and fish were frequently consumed across all BMI-for-age categories. Fresh seafood intake was limited, and students who never ate it had a higher proportion of normal weight (47.2%) and overweight (13.2%). Eggs and dairy products show no significant relationship with weight status (p=0.890 and p=0.387, respectively), but the highest proportion of normal-weight adolescents (49.2% for eggs and 54.3% for dairy products) consume them sometimes. Soy product consumption also does not show a strong link to weight status (p=0.623), though those who always or often consume soy products tend to fall within the normal BMI-for-age category (41.5–58.8%).

Eating patterns based on fiber sources consumption and nutritional status

There was no significant association (p>0.05) between fiber source consumption and nutritional status (BMI-for-age) among students (**Table 6**). Green leafy vegetable intake did not show a clear trend, though those who consumed it "always" had the highest proportion of normal-weight individuals (52.8%). Similarly, orange/yellow-colored vegetable consumption varied, with the "sometimes" category having the largest proportion of normal-weight students (42.9%). Canned vegetable consumption was uncommon, with most students in the "never" category, where normal BMI-for-age (40.4%) was the most prevalent. Fresh fruit intake followed a similar pattern, with the highest proportion of normal BMI-for-age (38.5%) among those who consumed it "always."

Eating patterns based on snacks consumption and nutritional status

The findings suggest that there was no significant association between snack consumption and students' nutritional status ($p > 0.05$). Normal-weight students were most prevalent in the "always" category for packaged snacks (48%), sugary drinks (50%), and desserts (54.5%). Unpackaged snacks and ultra processed foods showed no clear pattern. Among those who frequently consumed ultra-processed foods, a notable proportion were classified as severely thin (30%) or thin (20%). Additionally, a higher percentage of overweight and obese adolescents were found among those who consumed sugary drinks frequently (26.4%).

Discussion

A significant association found between gender and nutritional status (p=0.007), suggesting that girls were more likely to have a normal BMI-for-age, while boys exhibit a more diverse distribution, with higher rates of thinness and obesity. This aligns with Haney's study in Bangladesh, which found gender differences in nutritional status among 115 adolescents between 10-19 years.[11]Girls tend to be more concerned about of their food choices,[18] often striving for an ideal body image by restricting intake.[19,20] Sadowska revealed that girls with BMI above the 50th percentile were dissatisfied with their body image, while those whose BMI at or below the 50th percentile tended to feel unattractive due to overestimated their body weight.[12] In contrast, Gaylis found that although boys were more active, they consumed higher calorie foods more frequently than girls who tended to choose salad, vegetables and fruit, contributing to a higher BMI percentile among boys ($p < 0.05$).[18] These differences suggest that gender influences both undernutrition and overnutrition due to varying dietary habits, activity levels, and sociocultural factor.

The comparison of education levels showed revealed that senior high school students had a higher prevalence of overweight and obesity, whereas junior high school students had a higher rate of severely thin. This trend might have reflected changes in nutrition and lifestyle habits as students transition to higher education levels.

Table 5. Students' eating patterns based on side dishes consumption and nutritional status

Eating Patterns of Side Dishes	Nutritional Status (BMI-for-Age) (n=118)					*p*
	Severely Thin n (%)	Thin n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	
Meat (beef, lamb)						
Always	1 (16.7)	2 (33.3)	3 (50)	0 (0)	0 (0)	0.300[c]
Often	1 (25)	0 (0)	3 (75)	0 (0)	0 (0)	
Sometimes	12 (22.6)	10 (18.9)	21 (39.6)	5 (9.4)	5 (9.4)	
Rarely	4 (11.8)	8 (23.5)	15 (44.1)	4 (11.8)	3 (8.8)	
Never	3 (14.3)	0 (0)	12 (57.1)	6 (28.6)	0 (0)	
Poultry (duck, chicken)						
Always	5 (17.2)	5 (17.2)	13 (44.8)	2 (6.9)	4 (13.8)	0.424[c]
Often	0 (0)	2 (16.7)	10 (83.3)	0 (0)	0 (0)	
Sometimes	14 (21.5)	11 (16.9)	24 (36.9)	12 (18.5)	4 (6.2)	
Rarely	1 (14.3)	1 (14.3)	4 (57.1)	1 (14.3)	0 (0)	
Never	1 (20)	1 (20)	3 (60)	0 (0)	0 (0)	
Fish, unfried						0.116[c]
Always	3 (21.4)	3 (21.4)	5 (35.7)	0 (0)	3 (21.4)	
Often	1 (14.3)	0 (0)	6 (85.7)	0 (0)	0 (0)	
Sometimes	8 (18.6)	8 (18.6)	21 (48.8)	5 (11.6)	1 (2.3)	
Rarely	4 (18.2)	4 (18.2)	7 (31.8)	3 (13.6)	4 (18.2)	
Never	5 (15.6)	5 (15.6)	15 (46.9)	7 (21.9)	0 (0)	
Meat and fish, fried						
Always	6 (15.8)	8 (21.1)	16 (42.1)	5 (13.2)	3 (7.9)	0.440[c]
Often	5 (23.8)	2 (9.5)	11 (52.4)	2 (9.5)	1 (4.8)	
Sometimes	9 (19.1)	8 (17)	20 (42.6)	7 (14.9)	3 (6.4)	
Rarely	1 (11.1)	1 (11.1)	6 (66.7)	1 (11.1)	0 (0)	
Never	0 (0)	1 (33.3)	2 (66.7)	0 (0)	0 (0)	
Fresh seafood (scallop, shrimp, crab, octopus)						
Always	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0.450[c]
Often	0 (0)	0 (0)	0 (0)	4 (100)	0 (0)	
Sometimes	4 (20)	0 (0)	11 (55)	3 (15)	1 (5)	
Rarely	9 (22)	9 (22)	13 (31.7)	5 (12.2)	5 (12.2)	
Never	8 (15.1)	11 (20.8)	25 (47.2)	7 (13.2)	2 (3.8)	
Eggs						
Always	9 (27.3)	6 (18.2)	13 (39.4)	4 (12.1)	2 (6.1)	0.890[c]
Often	1 (7.7)	1 (7.7)	7 (53.8)	2 (15.4)	2 (15.4)	
Sometimes	10 (16.9)	11 (18.6)	29 (49.2)	8 (13.6)	3 (5.1)	
Rarely	0 (0)	2 (25)	4 (50)	1 (12.5)	1 (12.5)	
Never	1 (50)	0 (0)	1 (50)	0 (0)	0 (0)	
Dairy Products						
Always	8 (19.5)	9 (21.9)	16 (39)	6 14.6)	2 (4.9)	0.387[c]
Often	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)	
Sometimes	8 (17.4)	6 (13)	25 (54.3)	2 (4.3)	2 (4.3)	
Rarely	4 (25)	2 (12.5)	4 (25)	3 (18.8)	3 (18.8)	
Never	1 (6.3)	2 (12.5)	8 (50)	4 (25)	1 (6.3)	
Soy products						
Always	10 (24.4)	7 (17.1)	17 (41.5)	2 (4.9)	3 (7.3)	0.623[c]
Often	3 (17.6)	2 (11.8)	10 (58.8)	2 (11.8)	0 (0)	
Sometimes	7 (14.6)	9 (18.8)	21 (43.8)	10 (20.8)	4 (8.3)	
Rarely	0 (0)	0 (0)	3 (60)	1 (20)	1 (20)	
Never	0 (0)	3 (50)	3 (50)	0 (0)	0 (0)	

[c]Chi-square

Table 6. Students' eating patterns based on fiber sources consumption and nutritional status

Eating Patterns of Fiber Sources	Nutritional Status (BMI-for-Age) (n=118)					*p*
	Severely Thin n (%)	Thin n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	
Green leafy vegetables						
Always	6 (11.3)	7 (13.2)	28 (52.8)	5 (9.4)	2 (3.8)	0.671[c]
Often	2 (14.3)	3 (21.4)	5 (35.7)	1 (7.1)	0 (0)	
Sometimes	10 (22.7)	9 (20.5)	15 (34.1)	6 (13.6)	5 (11.4)	
Rarely	0 (0)	2 (28.6)	2 (28.6)	1 (14.3)	1 (14.3)	
Never	1 (11.1)	1 (11.1)	4 (44.4)	2 (22.2)	0 (0)	
Orange/ yellow-colored vegetables						
Always	2 (12.5)	4 (25)	4 (25)	3 (18.8)	1 (6.3)	0.652[c]
Often	0 (0)	2 (40)	3 (60)	0 (0)	0 (0)	
Sometimes	13 (20.6)	6 (9.5)	27 (42.9)	8 (12.7)	5 (7.9)	
Rarely	5 (17.9)	6 (21.4)	11 (39.3)	2 (7.1)	2 (7.1)	
Never	1 (7.1)	2 (14.3)	9 (64.3)	2 (14.3)	0 (0)	
Canned vegetables						
Always	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	0.669[c]
Often	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)	
Sometimes	1 (33.3)	1 (33.3)	1 (33.3)	0 (0)	0 (0)	
Rarely	0 (0)	0 (0)	7 (100)	0 (0)	0 (0)	
Never	20 (18.3)	19 (17.4)	44 (40.4)	15 (13.8)	8 (7.3)	
Fresh fruits						
Always	9 (23.1)	5 (12.8)	15 (38.5)	4 (10.3)	1 (2.6)	0.574[c]
Often	1 (6.7)	1 (6.7)	8 (53.3)	2 (13.3)	1 (6.7)	
Sometimes	10 (17.2)	10 (17.2)	21 (36.2)	9 (15.5)	6 (10.3)	
Rarely	1 (7.7)	3 (23.1)	9 (69.2))	0 (0)	0 (0)	
Never	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)	

[c]Chi-square

Table 7. Students' eating patterns based on snacks consumption and nutritional status

Eating Patterns of Snacks	Nutritional Status (BMI-for-Age) (n=118)					*p*
	Severely Thin n (%)	Thin n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	
Packaged snacks (potato chips, popcorn)						
Always	10 (20)	8 (16)	24 (48)	7 (14)	1 (2)	0.659[c]
Often	0 (0)	3 (33.3))	5 (55.6)	1 (11.1)	0 (0)	
Sometimes	6 (16.7)	7 (19.4)	14 (38.9)	4 (11.1)	5 (13.9	
Rarely	2 (15.4)	1 (7.7)	6 (46.2)	2 (15.4)	2 (15.4)	
Never	3 (30)	1 (10)	5 (50)	1 (10)	0 (0)	
Unpackaged snacks (doughnut, French fries, banana fries)						
Always	9 (25.7)	6 (17.1)	14 (40)	6 (17.1)	0 (0)	0.456[c]
Often	0 (0)	1 (16.7)	5 (83.3)	0 (0)	0 (0)	
Sometimes	9 (17)	11 (20.8)	22 (41.5)	5 (9.4)	6 (11.3)	
Rarely	1 (7.1)	1 (7.1)	8 (57.1)	2 (14.3)	2 (14.3)	
Never	2 (20)	1 (10)	5 (50)	2 (20)	0 (0)	
Sugary drinks (soda, coffee, tea)						
Always	3 (8.8)	5 (14.7)	17 (50)	6 (17.6)	3 (8.8)	0.539[c]
Often	1 (8.3)	1 (8.3)	7 (58.3)	1 (8.3)	2 (16.7)	
Sometimes	11 (27.5)	9 (22.5)	12 (30)	4 (10)	4 (10)	
Rarely	1 (5)	4 (20)	11 (55)	3 (15)	1 (5)	
Never	4 (33.3)	1 (8.3)	6 (50)	1 (8.3)	0 (0)	
Ultra processed food (frozen food, canned food)						
Always	3 (30)	2 (20)	3 (30)	2 (20)	0 (0)	0.862[c]
Often	1 (20)	0 (0)	3 (60)	0 (0)	1 (20)	

Eating Patterns of Snacks	Nutritional Status (BMI-for-Age) (n=118)					*p*
	Severely Thin n (%)	Thin n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	
Sometimes	7 (17.9)	8 (20.5)	16 (41)	4 (10.3)	4 (10.3)	
Rarely	4 (13.8)	4 (13.8)	14 (48.3)	6 (20.7)	1 (3.4)	
Never	6 (17.1)	6 (17.1)	18 (51.4)	3 (8.6)	2 (5.7)	
Dessert (cake, ice cream, pudding)						
Always	4 (9.1)	9 (20.5)	24 (54.5)	6 (13.6)	1 (2.3)	0.075[c]
Often	1 (12.5)	1 (12.5)	5 (62.5)	1 (12.5)	0 (0)	
Sometimes	14 (33.3)	7 (16.7)	12 (28.6)	6 (14.3)	3 (7.1)	
Rarely	1 (7.1)	2 (14.3)	6 (42.9)	1 (7.1)	4 (28.6)	
Never	1 (10)	1 (10)	6 (60)	2 (20)	0 (0)	

[c]Chi-square

However, the lack of association between education level and BMI-for-age suggesting that other factors influence students' nutritional status beyond just their academic stage. Despite age and developmental differences, environmental factors had a greater impact[5] Adolescence is a critical growth period, yet dietary behaviors were often shaped by socioeconomic status, peer influence, food availability, and lifestyle choices, rather than by school level alone.[21] Nutritional outcomes depended on overall lifestyle rather than the transition between school levels.[22]

Eating patterns refer to the way individuals fulfill their nutritional needs, manifested in the consumption of various food types and meal frequencies. This study examined staple foods, fiber sources, side dishes, and snacks, with no significant correlation between eating patterns and nutritional status ($p>0.05$). White rice, the dominant staple, was consumed across all BMI-for-age categories, reinforcing previous research that staple food intake alone did not determine nutritional outcomes.[23] Notably, moderate consumption of unfried fish was linked to a higher proportion of normal-weight students, while fried meat and fish were frequently consumed across all BMI categories. This finding aligned with study highlighting an inverse association between boiled seafood intake and overweight/obesity.[24] Gaylis found that overweight/obese teens consumed red meat, processed meat and cheese more frequently than their healthy-weight peers ($p<0.05$).[18] Similarly, Mitchell identified a relationship between BMI and eating behaviors, with teenagers who frequently consumed fast food and engaged in low levels of physical activity being more prone to overweight and obesity.[25]

Snacking habits were also prevalent, with many students frequently consuming salty or sugary snacks.[26] This supported previous research linking high sugar intake to increased obesity risk. Among overweight and obese students, 26.4% frequently consumed sugary drinks, reinforcing concerns regarding their role in weight gain. Ultra-processed food consumption also showed notable trends, with a higher proportion of severely thin and thin students among frequent consumers, possibly due to differences in metabolism, food security, or unbalanced diets. Ultra processed foods became increasingly popular among adolescents due to their accessibility and affordability, and their presence in school environments encouraged frequent snacking. Additionally, these foods were often perceived by students as a means of expressing self-image and modernity.[27]

Based on Gutmann Scale, most respondents had a normal BMI-for-age but exhibited poor eating behaviors. The insignificant relationship between eating patterns and nutritional status may have been attributed to several factors, including high physical activity levels that balanced caloric intake despite poor diets, high adolescent metabolism that allowed for efficient calorie burning, irregular eating habits leading to overall lower caloric intake, genetic predispositions, and other environmental influences (e.g. family dietary habits, peer group, and socioeconomic conditions). Socioeconomic development in tourism region led to changes in eating patterns, reflecting shifts in lifestyle and living standards. Additionally,

psychological factors significantly impacted adolescent eating habits and nutritional status.[28]

The strength of this study included its cross-sectional design with a stratified clustered sampling method, ensuring a diverse representation of students across different education levels. The use of a validated food frequency questionnaire (FFQ) and WHO z-scores for BMI-for-age classification provided reliable measurements. Additionally, data collection through an online system (KoboToolbox) minimized manual errors and streamlined the process. However, the study had limitations. The cross-sectional nature prevented establishing causal relationships between eating patterns and nutritional status. Self-reported dietary data may have introduced recall bias or inaccuracies in food intake reporting. Furthermore, external factors such as socioeconomic status, physical activity, and cultural influences on eating habits were not extensively considered, potentially limiting the comprehensiveness of the findings. Future research could explore other dietary patterns and behaviors that may have a stronger correlation with nutritional status.

Conclusion

The findings highlight the impact of unbalanced eating patterns on students' nutritional status in tourism areas. The availability of processed foods, high-calorie snacks, and sugary drinks in tourist regions may contribute to poor eating patterns among students. Schools and local governments should address these challenges by promoting nutrition education and regulating food availability in and around school environments. Additionally, incorporating gender-focused nutrition education is essential to addressing differences in dietary habits, body image perceptions, and nutritional needs between boy and girl students in tourism regions. This approach can help foster healthier eating habits among high school students.

Conflict of interest

The authors declared no conflict of interest regarding this article.

Acknowledgement

We sincerely thank all members of the Faculty of Medicine at Universitas Negeri Padang for their contribution to community service, which provided the data utilized in this research.

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