



Relationship between Nutritional Knowledge, Healthy Eating Index, and Nutritional Status among University Students

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Abstract. Nutritional status among university students is influenced by various factors, including nutrition knowledge and dietary quality. This study aimed to analyze the relationship between nutrition knowledge, Healthy Eating Index (HEI), and nutritional status based on BMI categories among university students. A cross-sectional study was conducted among 88 university students. Nutrition knowledge was assessed using a structured questionnaire, dietary quality was evaluated using the Healthy Eating Index (HEI), and nutritional status was determined based on BMI categories. Data were analyzed using Chi-square tests to examine the associations between variables. The results showed that no significant association was found between nutrition knowledge and BMI status ($p = 0.893$). In contrast, HEI was significantly associated with BMI categories ($p < 0.001$). The distribution pattern showed that underweight respondents were predominantly classified as having poor HEI (82.5%), respondents with normal BMI had a relatively balanced distribution with many showing good HEI (53.5%), and overweight respondents also showed a high proportion of good HEI (80%). These findings suggest that although HEI is associated with BMI categories, higher HEI does not exclusively correspond to normal BMI. In conclusion, nutrition knowledge was not associated with BMI status, while HEI was significantly associated with BMI categories, indicating that nutritional status is influenced by multiple factors beyond nutrition knowledge and diet quality alone.

Keywords: Nutrition Knowledge; Healthy Eating Index; Body Mass Index; Nutritional Status; Diet Quality; University Students

1. Introduction

Nutritional status is an important indicator of an individual's health condition, particularly among university students who are in a transitional phase toward independence in determining their lifestyle and dietary habits. During this period, students often experience lifestyle changes, including irregular eating patterns, limited time, academic stress, reduced physical activity, and increased consumption of fast food, all of which may affect their nutritional status (WHO, 2021; Brown et al., 2020). These conditions can lead to various nutritional problems, including undernutrition and overnutrition, which may ultimately affect students' health, productivity, and quality of life (Whatnall, 2020).

Nutritional problems among university students remain a concern because this population is vulnerable to imbalanced nutrient intake due to lifestyle changes during college life. Nutritional status is influenced by various factors, including diet quality,

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physical activity, sleep patterns, stress levels, socioeconomic conditions, and nutritional knowledge (Gibney et al., 2019). Nutritional knowledge is often considered one of the factors influencing food choices and eating behavior, as individuals with good nutritional knowledge are expected to apply healthy and balanced dietary practices (Contento, 2016).

However, in practice, good nutritional knowledge does not always translate into healthy eating behavior. Individuals may understand the principles of balanced nutrition, the importance of fruit and vegetable consumption, and the negative effects of foods high in sugar, salt, and fat, but may not necessarily apply this knowledge in their daily lives (Spronk et al., 2014). This suggests that nutritional knowledge alone may not be sufficient to achieve optimal nutritional status, as actual dietary behavior is also influenced by habits, food accessibility, preferences, social environment, and lifestyle factors (Contento, 2016).

One of the indicators used to assess diet quality is the Healthy Eating Index (HEI), which reflects the extent to which an individual's food intake aligns with dietary recommendations. HEI evaluates dietary quality based on the adequacy and balance of intake across various food groups, thereby providing a more realistic picture of actual eating behavior compared to nutritional knowledge alone (Shams-White et al., 2023). Good diet quality is expected to contribute to optimal nutritional status because actual dietary intake is directly related to energy balance and nutrient adequacy in the body. Although both nutritional knowledge and diet quality are considered important factors in shaping nutritional status, previous studies have reported inconsistent findings regarding their associations with nutritional status among university students. Some studies have shown that good nutritional knowledge is not always associated with nutritional status, whereas diet quality assessed using dietary quality indices tends to better reflect actual nutritional status (Scalvedi et al., 2021; Waliyanti et al., 2025).

Based on these considerations, this study was conducted to analyze the relationship between nutritional knowledge and Healthy Eating Index (HEI) with nutritional status among university students, in order to identify which factors play a greater role in determining students' nutritional status and to provide evidence for more effective nutrition-related interventions.

2. Methods

2.1. Study Design and Participants

This study employed a cross-sectional analytical design to examine the relationship between nutritional knowledge, Healthy Eating Index (HEI), and nutritional status among university students. The study was conducted among undergraduate students enrolled at Universitas Negeri Makassar, Indonesia. A total of 88 students participated in this study. Participants were selected based on the inclusion criteria of being active undergraduate students enrolled in the Nutrition and Health Sciences course. Students with incomplete data or who did not meet the study requirements were excluded.

2.2. Data Collection

Data were collected using structured questionnaires and anthropometric measurements.

a. Nutritional Knowledge

Nutritional knowledge was assessed using a structured questionnaire consisting of questions related to balanced nutrition, food sources, nutrient functions, and healthy dietary

practices. The total score was categorized into three levels: poor, moderate, and good nutritional knowledge based on predetermined scoring criteria.

b. Healthy Eating Index (HEI)

Diet quality was assessed using the Healthy Eating Index (HEI) based on food intake data collected using Food Frequency Questionnaire (FFQ). HEI scores were calculated by evaluating participants' intake across food groups and nutrient adequacy according to dietary guidelines. The HEI scores were then categorized into poor, needs improvement, and good diet quality.

c. Nutritional Status

Nutritional status was determined using Body Mass Index (BMI), calculated by dividing body weight in kilograms by height in meters squared (kg/m^2). Body weight was measured using a calibrated digital scale, while height was measured using a stadiometer. BMI was categorized into underweight, normal, and overweight according to WHO classification.

2.3. Statistical Analysis

Data were analyzed using IBM SPSS Statistics. Descriptive statistics were used to summarize participant characteristics and present frequency distributions for nutritional status, nutritional knowledge, and HEI categories. The association between categorical variables was analyzed using the Chi-square test. In addition, the Spearman rank correlation test was used to assess the direction and strength of the relationship between ordinal variables. Statistical significance was determined at a p-value < 0.05 .

3. Results and Discussion

3.1. Results

3.1.1. Characteristics of Respondents

Table 1. Characteristics of Respondents Based on Nutritional Status, Nutrition Knowledge, and Healthy Eating Index

Variable	Category	n	%
Nutritional Status (BMI)	Underweight	40	45.5
	Normal	43	48.9
	Overweight	5	5.7
	Total	88	100
Nutrition Knowledge	Poor	11	12.5
	Moderate	35	39.8
	Good	42	47.7
	Total	88	100
Healthy Eating Index (HEI)	Poor	37	42.0
	Needs Improvement	46	52.3
	Good	5	5.7
	Total	88	100

Table 1 shows a total of 88 university students participated in this study. Based on body mass index (BMI) classification, most respondents had normal nutritional status (48.9%), followed by underweight (45.5%), while only 5.7% were categorized as overweight. Regarding diet quality based on the Healthy Eating Index (HEI), 37.5% of respondents were classified as having poor diet quality, 30.7% required improvement, and 31.8% had good diet quality. These findings indicate that although nearly half of the respondents had normal BMI, a considerable proportion still had poor dietary quality, suggesting that nutritional status may not solely reflect diet quality but may also be influenced by other factors such as physical activity, metabolism, socioeconomic status, and eating behavior patterns.

3.1.2. Association between Nutritional Knowledge and Nutritional Status

Table 2. Association Between Nutrition Knowledge and Nutritional Status (BMI)

Nutrition Knowledge	Underweight n (%)	Normal n (%)	Overweight n (%)	Total	p-value	Spearman r
Poor	5 (12.5)	6 (14.0)	0 (0.0)	11	0.893	-0.012 (p=0.913)
Moderate	15 (37.5)	18 (41.9)	2 (40.0)	35		
Good	20 (50.0)	19 (44.2)	3 (60.0)	42		
Total	40 (45.5)	43 (48.9)	5 (5.7)	88		

Table 2 shows that respondents with good nutrition knowledge were found across all BMI categories. Chi-square analysis indicated no significant association between nutrition knowledge and nutritional status ($p = 0.893$). Spearman correlation also showed a very weak negative and non-significant correlation ($r = -0.012$; $p = 0.913$).

3.1.3. Association between Healthy Eating Index (HEI) and Nutritional Status

Table 3. Association between Healthy Eating Index (HEI) and Nutritional Status (BMI)

HEI Category	Underweight n (%)	Normal n (%)	Overweight n (%)	Total	p-value	Spearman r
Poor	33 (82.5)	0 (0.0)	0 (0.0)	33	<0.001	0.816 (p<0.001)
Needs Improvement	6 (15.0)	20 (46.5)	1 (20.0)	27		
Good	1 (2.5)	23 (53.5)	4 (80.0)	28		
Total	40 (45.5)	43 (48.9)	5 (5.7)	88		

Cross-tabulation analysis showed a clear pattern between HEI and BMI category (Table 3). Among respondents classified as underweight, most had poor HEI scores (82.5%), indicating inadequate dietary quality. In contrast, respondents with normal BMI were predominantly categorized as having good HEI (53.5%), while 80.0% of overweight respondents also had good HEI scores. These findings suggest that poor dietary quality was more commonly observed among underweight individuals, whereas better HEI scores were generally found among respondents with normal or overweight BMI.

Interestingly, some overweight respondents still had good HEI scores. This may indicate that current diet quality does not always reflect long-term nutritional status because

BMI is influenced by cumulative dietary intake, physical activity, genetic predisposition, and metabolic adaptation. Statistical analysis demonstrated a significant association between HEI and BMI category ($p < 0.05$), suggesting that diet quality may contribute to nutritional status among students.

3.2. Discussion

The absence of a significant association between nutrition knowledge and BMI indicates that possessing nutritional knowledge does not necessarily result in differences in body weight status. Nutrition knowledge represents the cognitive component of dietary behavior, but behavior change requires additional factors such as motivation, self-efficacy, food access, economic capability, and environmental support (Contento, 2016). This finding aligns with the review by O'leary et al. (2025) found that although nutrition knowledge is positively related to healthier food intake, the relationship between knowledge and nutritional status is often weak because eating behavior is influenced by multiple psychosocial and environmental determinants. Among university students, knowledge may not automatically translate into healthy eating practices because food choices are also affected by peer influence, academic stress, convenience foods, irregular meal timing, and financial constraints (Aboueldahab et al., 2026). Therefore, the non-significant relationship between nutrition knowledge and BMI in this study suggests that cognitive understanding of nutrition alone may not be sufficient to produce measurable changes in anthropometric indicators.

BMI itself is a multifactorial outcome that reflects long-term energy balance and is influenced by various biological and behavioral determinants, including physical activity, metabolic rate, genetics, hormonal factors, sleep patterns, and lifestyle behaviors (Ng et al, 2025; WHO, 2021). Thus, even individuals with good nutrition knowledge may still experience underweight or overweight conditions due to factors unrelated to their knowledge level. In contrast, HEI was significantly associated with BMI categories ($p < 0.001$), indicating that diet quality was related to nutritional status. However, this relationship should not be interpreted as a simple linear pattern in which higher HEI automatically corresponds to normal BMI. In this study, underweight respondents were predominantly classified as having poor HEI, suggesting inadequate diet quality among this group. Respondents with normal BMI showed a relatively balanced distribution, with a substantial proportion classified as having good HEI. Interestingly, although interpretation should be cautious due to the small number of overweight respondents..

These findings indicate that HEI is significantly associated with BMI categories, but a good HEI score does not exclusively correspond to normal BMI. HEI measures adherence to dietary quality recommendations by assessing adequacy, variety, moderation, and balance of food intake, but it does not directly quantify total caloric excess or long-term energy imbalance (Shams-White et al., 2023). Therefore, an individual may achieve a relatively high HEI score by consuming foods of good nutritional quality while still experiencing overweight if total energy intake exceeds expenditure or physical activity is insufficient.

This interpretation is supported by previous research indicating that obesity and overweight are influenced not only by diet quality but also by energy intake, portion size, sedentary behavior, metabolic efficiency, and environmental factors (Ryan et al, 2021). A person may consume nutrient-dense foods yet still gain weight if caloric intake remains excessive over time. Conversely, underweight status may occur in individuals with poor

dietary adequacy, low energy intake, illness, or metabolic abnormalities, which may also be reflected in poor HEI scores (WHO, 2021).

Research by Petersen et al. (2021) reported that HEI is useful in identifying overall dietary patterns but should not be interpreted as a direct predictor of BMI category in isolation. Among university students, eating behaviors are often unstable due to academic pressure, time constraints, emotional eating, fast-food consumption, and limited financial resources, which may contribute to diverse BMI outcomes despite relatively similar HEI scores (Doak et al., 2023). This may explain why respondents with good HEI were not exclusively found in the normal BMI group in this study.

Overall, the findings suggest that nutrition knowledge may influence food choices, but did not directly relate to BMI status in this study.. HEI was significantly associated with BMI categories, although the observed relationship was complex and not indicative of a straightforward linear pattern. These results highlight the importance of considering nutritional status as a multifactorial outcome influenced by dietary quality, total energy balance, physical activity, metabolic factors, and lifestyle-related determinants rather than nutrition knowledge alone.

Conclusions

Nutrition knowledge was not associated with BMI status, while HEI was significantly associated with BMI categories, although the relationship was not linear. These findings indicate that nutritional status is influenced by multiple factors a, highlighting the need for further research.

Conflicts of Interest

The authors declare no conflict of interest.

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