THE RELATIONSHIP BETWEEN PROTEIN INTAKE, FAT INTAKE, AND SATISFACTION WITH FOOD PROVISION AND THE NUTRITIONAL STATUS OF STUDENTS AT HUSAINIYAH ISLAMIC BOARDING SCHOOL, CICALENGKA

Hubungan antara Asupan Protein, Lemak dan Kepuasan Penyelenggaraan Makan dengan Status Gizi Santri Pondok Pesantren Husainiyah Cicalengka

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ABSTRACT

Students at Husainiyah Islamic Boarding School in Cicalengka rely entirely on meals provided within a closed environment, making their nutrient intake and meal satisfaction important factors that may influence their nutritional status. This study aimed to analyze the association between protein and fat intake, as well as satisfaction with meal services, and the students' nutritional status. This research used a quantitative method with a cross-sectional design, involving 60 students aged 12–18 years selected through total sampling. Dietary intake of protein and fat was assessed using two-day 24-hour food recall, while satisfaction levels were measured using a Likert scale. Nutritional status was evaluated based on BMI-for-age. Data were analyzed using the chi-square test. Findings showed that 30% of participants had inadequate protein intake, and 41.7% had insufficient fat intake, although 73.3% of them had a normal nutritional status. Half of the students expressed satisfaction with the meal service, while the other half were dissatisfied. The statistical analysis indicated a significant relationship (p-value<0.05) between protein and fat intake and nutritional status. However, satisfaction with meal services was not significantly associated with nutritional status. In conclusion, intake of protein and fat significantly correlates with nutritional status, while satisfaction does not.

Keyword: *protein and fat intake; level of satisfaction with meal provision; nutritional status*

ABSTRAK

Santri di Pondok Pesantren Husainiyah Cicalengka bergantung pada makanan yang disediakan dalam lingkungan tertutup, sehingga keseimbangan asupan gizi dan kepuasan terhadap makanan berpotensi memengaruhi status gizi mereka. Penelitian ini bertujuan untuk mengkaji hubungan antara asupan protein dan lemak, serta tingkat kepuasan terhadap penyelenggaraan makan dengan status gizi santri. Penelitian menggunakan pendekatan kuantitatif dengan desain cross-sectional dan melibatkan 60 santri berusia 12–18 tahun yang dipilih melalui total sampling. Asupan protein dan lemak dikumpulkan menggunakan metode food recall 2×24 jam, kepuasan dinilai dengan skala Likert, dan status gizi ditentukan berdasarkan IMT menurut umur. Data dianalisis menggunakan uji chi-square. Hasil menunjukkan bahwa 30% responden mengalami defisit asupan protein dan 41,7% defisit lemak, meskipun 73,3% memiliki status gizi normal. Sebanyak 50% responden menyatakan puas terhadap penyelenggaraan makan dan 50%

tidak puas. Uji statistik menunjukkan adanya hubungan signifikan antara asupan protein (p = 0,000) dan asupan lemak (p = 0,010) dengan status gizi (*p-value* < 0,05). Namun, kepuasan terhadap penyelenggaraan makan tidak menunjukkan hubungan yang signifikan dengan status gizi, sebagaimana ditunjukkan oleh nilai p yang melebihi batas signifikansi (p = 0,113, *p-value* > 0,05). Disimpulkan bahwa asupan protein dan lemak berhubungan secara signifikan dengan status gizi, sedangkan kepuasan makan tidak berhubungan dengan status gizi.

Kata Kunci: asupan protein dan lemak; tingkat kepuasan penyelenggaraan makan; status gizi.

INTRODUCTION

Food service is an integral part of the operational system of Islamic boarding schools. Food service in an educational institution is a nutritional service that aims to provide food for students while they are at school, both in public and private schools, in order to improve their academic performance. Food service in Islamic boarding schools must ensure that the energy and nutrients provided meet the nutritional needs of all students. One of the important foundations in food service is meeting the nutritional needs of consumers (Putri S & Ruhana, 2023).

Islamic boarding schools are one of the educational options for teenagers. Nutritional status is influenced by the adequacy of energy and macro nutrients because food variety facilitates the fulfillment of nutritional needs (Khoerunisa & Istianah, 2021). This intake is very important for teenagers for their daily activities, metabolism, and growth (Putri S & Ruhana, 2023). Protein and fat, as macronutrients, play a vital role in supporting healthy growth and development in adolescents (Ristanti et al., 2024).

Protein is classified as a macronutrient that must be consumed in sufficient amounts because it plays a role in repairing and maintaining body tissues and supporting optimal growth. Meeting protein requirements optimally has a positive impact on the nutritional status of adolescents, particularly in supporting physical development, healthy bone structure, and increased muscle mass (Ristanti *et al*., 2024). In addition to protein, adequate fat consumption can be an alternative to maintain normal nutritional status. Adequate fat intake is part of the nutritional needs of adolescents that are important for optimal growth and development and the prevention of long-term diseases (Afifah *et al*., 2024). In addition to meeting nutritional needs, the provision of meals also aims to achieve

consumer satisfaction. Satisfaction with food is an important indicator of service success because it directly influences students' consumption patterns. High levels of satisfaction usually increase consumption, while dissatisfaction can decrease it (Amalia *et al*., 2023).

Data obtained from Riskesdas in 2013 and 2018 shows that the prevalence of adolescents in the thin category has decreased from 11.1% to 8.1%, consisting of 6.7% in the thin category and 1.4% in the very thin category. Conversely, the prevalence of obesity among adolescents actually increased, from 10.8% to 13.5%, which includes 9.5% overweight and 4% obese. The decline in underweight adolescents was recorded at around 0.73 times, while the increase in adolescent obesity reached around 1.25 times in 2018. Although the prevalence of malnutrition has decreased, the increase in obesity shows the complexity of nutritional problems that still need serious attention.

In line with these conditions, the results of the 2024 Indonesian Nutrition Status Survey (SSGI) also show that nutrition problems in Indonesia are still very complex, marked by the continued existence of underweight toddlers and an increase in the proportion of overweight or obese toddlers. Although the SSGI focuses on the under-five age group, these findings reinforce that young children still face complex nutritional challenges across various age groups, including adolescents.

The Husainiyah Cicalengka Islamic Boarding School provides meals for its students independently using a buffet system with a budget of around Rp7,000 per child per meal (a total of Rp21,000 per day). Food ingredients are purchased daily. A preliminary study indicates that the menu provided does not meet the requirements of a balanced diet according to the "My Plate" guidelines, characterized by limited variety of side dishes (1-3 types) and the absence of fruit at every meal. In addition, the lack of supervision of the buffet system allows students to take uncontrolled portions of food. These conditions can lead to suboptimal protein and fat intake among students, which can have adverse effects on their long-term health and development (Hariati, 2021). Ensuring adequate nutritional intake is crucial for building good health in adolescents and equipping them to live long, healthy, and productive lives

(Heslin & McNulty, 2023). Based on the explanation above, researchers were encouraged to further examine the relationship between protein and fat intake, satisfaction with meals, and the nutritional status of students at the Husainiyah Cicalengka Islamic boarding school.

METHOD

Research design, location, and time

A quantitative approach was applied in this study, using an observational analytical method and a *cross-sectional* design. The study period ran from February to July 2025 at the Husainiyah Cicalengka Islamic Boarding School dormitory, Panenjoan, Cicalengka District, Bandung Regency . This study obtained ethical approval from the Health Research Ethics Committee with number: 4549/UN25.1.10.2/KE/2024.

Sample

This study involved all male and female students at the boarding school aged between 12 and 18 years, with a total of 60 respondents. *Total sampling* technique was applied in this study, where all individuals in the population were used as research subjects, totaling 60 respondents.

Data Collection

This study involved independent variables (protein intake, fat intake, and meal satisfaction) and dependent variables (nutritional status). Intake data were obtained through a 2×24-hour food *recall* covering school days (*weekdays*) and holidays (*weekends*) to describe variations in consumption patterns. Recall data collection was conducted by trained enumerators to ensure accuracy in portion estimation and food item identification. Satisfaction data were obtained using a *Likert* scale (1–5), while anthropometric data were collected using a stadiometer and digital scales. Data collection techniques included menu observation, nutritional intake interviews, satisfaction questionnaire completion, and height and weight measurements.

Data Analysis

The chi-square test is used to analyze data that has been collected statistically. Univariate and bivariate analyses are the preferred methods for data processing. Univariate analysis is intended to describe the

characteristics of respondents, protein and fat intake levels, satisfaction levels with meal arrangements, and nutritional status based on age-specific Body Mass Index (BMI/U). Meanwhile, bivariate analysis aims to assess the significance of the relationship between protein and fat intake and nutritional status, as well as between satisfaction with meal arrangements and nutritional status.

RESULTS AND DISCUSSION

Table 1. Characteristics of Respondents

No.	Indicator	n (%)	Mean ($\bar{x} \pm SD$)
1.	Gender		
	Male	28 (46.7)	
	Female	32 (53.3)	
	Total	60 (100.0)	
2	Age		
	12 years	7 (11.7)	14.58 ± 1.862
	13 years	16 (26.7)	
	14 years	10 (16.7)	
	15 years	6 (10.0)	
	16 years	7 (11.7)	
	17 years	11 (18.3)	
	18 years	3 (5.0)	
	Total	60 (100.0)	
3	Grade		
	Grade 7	16 (26.7)	
	Grade 8	11 (18.3)	
	Grade 9	11 (18.3)	
	Grade 10	7 (11.7)	
	Grade 11	4 (6.7)	
	Grade 12	11 (18.3)	
	Total	60 (100)	

This study involved 60 students aged 12–18 years old who lived in the Husainiyah Cicalengka Islamic boarding school and were studying at the MTs and MA levels as research subjects. Information about the age, gender, and grade level of the respondents in the Islamic boarding school environment is shown in Table 1, which displays the respondent characteristics data. The characteristics of the sample based on gender show that most of the respondents (53.3%) were female, with the age range of respondents varying from 12 to 18 years old. The majority of respondents were in the 14.58 age range. Respondent characteristics based on grade show a distribution from grades 7-

12, with the highest number in grade 7 (26.7%).

Table 2. Overview of Protein and Fat Intake Categories

No.	Indicator	n (%)	Mean (x̄ ± SD)
1.	Protein Intake Category		
	Severe deficiency	18 (30.0)	
	Moderate deficiency	8 (13.3)	
	Mild deficit	4 (6,7)	
	Normal	12 (20.0)	37.0 ± 9.9
	More	18 (30.0)	
	Total	60 (100.0)	
2	Fat Intake Category		
	Severe Deficiency	25 (41.7)	
	Moderate deficit	3 (5.0)	
	Mild Deficit	4 (6.7)	
	Normal	13 (21.7)	48.4 ± 15.4
	More	15 (25.0)	
	Total	60 (100)	

Referring to the data presented in Table 2, a small proportion of respondents (30%) experienced a severe deficit in protein intake, with an average intake of 37.0 grams. A similar intake was also seen in fat intake, where nearly half of the respondents (41.7%) experienced a severe deficit, with an average fat intake of 48.4 grams.

The high proportion of students experiencing protein and fat intake deficits reflects the suboptimal implementation of meals in Islamic boarding schools. Based on interviews, limited food supplies, a non-standardized serving system, and weak supervision contribute to low nutritional intake. Students' preference for low-nutritional snacks and the habit of skipping meals further exacerbate the level of daily intake adequacy.

This intake deficit can also be explained by the absence of portion standards in food provision. In line with the findings of Nurlabibah *et al*. (2023), insufficient portions of staple foods and side dishes are the main causes of low protein and fat intake. The absence of portion standards has an impact on the uneven distribution of nutrients among all students, especially in a buffet system that is highly dependent on portion control (Hartati *et al*., 2023).

In addition, food management is carried out by parties who do not have a background in nutrition education, so that important elements such as periodic menu

planning, standard recipes, and calculation of nutrient requirements cannot be implemented properly. This condition is in line with the findings of Roziana & Fitriani (2021), which emphasize that the absence of nutrition personnel causes meal provision to not meet

the principles of nutritional adequacy and quality. Improvements in the management system and nutrition education for students are needed to increase overall nutritional adequacy.

Table 3. Overview of Respondents' Nutritional Status Categories

Indicator	n (%)
Nutritional Status	
Malnutrition	0
Substandard nutrition	3 (5.0)
Good nutrition	44 (73.3)
Overweight	8 (13.3)
Obesity	5 (8.3)
Total	60 (100.0)

Based on Table 3, the majority of respondents (73.3%) had good nutritional status and 5.0% were classified as malnourished, indicating that most students were in relatively optimal nutritional condition, given the importance of nutritional status for adolescent health and development (Garcia-Iborra et al., 2023). This condition is inseparable from the role of meal provision in Islamic boarding schools, which provide food regularly every day, thereby contributing to maintaining the nutritional balance of students. Although the measurements were taken two weeks after the semester break and eating patterns at home could potentially affect nutritional status, the recall data

showed that when at home, students generally ate three meals a day, consumed fruit more often, and obtained a more varied nutritional composition (energy, animal and plant protein, vegetables, and fruit). Thus, the nutritional status of students is the result of a combination of daily consumption at the boarding school and more varied eating habits at home, both of which play a role in maintaining good nutritional status.

The nutritional intake consumed by respondents today is an important indicator for predicting their nutritional status in the future. In other words, good nutritional status in respondents today does not guarantee that it will be maintained if they do not maintain

their nutritional intake regularly and continuously (Limboto *et al.*, 2024). Adolescence has a complexity equivalent to childhood due to the interaction between puberty, social roles, and neurocognitive function development. Furthermore, living conditions and the environment also play an important role in growth, with nutrient intake as the main factor. Protein and fat are also very important for adolescents, especially students, for brain development and concentration (Azrimaidaliza *et al.*, 2024).

Table 4. Overview of Satisfaction Categories for Meal Service

Indicator	n (%)
Not Satisfied	30
Satisfied	30 (50.0)
Total	60 (100.0)

Table 4 presents data on the satisfaction of respondents in Islamic boarding schools with the quality of the dishes, showing an even distribution, with half of the respondents (50%) expressing satisfaction and the other half (50%) expressing dissatisfaction.

Each respondent has different preferences. Respondents who expressed satisfaction generally appreciated several aspects, one of which was the taste and appearance of the food, which was considered to be in line with the respondents' tastes. Although it did not meet the standards recommended by the Indonesian Ministry of Health, it was considered satisfactory. The appearance and taste of food are crucial factors that can influence the level of satisfaction of respondents with the food services they receive (Mariasih *et al.*, 2023).

Other respondents who expressed dissatisfaction cited the very limited quality and variety of the menu, which tended to be monotonous and lacking in variety, as well as the unavailability of fruit at every meal. The lack of menu variety provided by the boarding school's meal service made respondents feel bored and unwilling to consume the food that was served, which affected their assessment of the meal service provided by the boarding school (Wiyanti *et al.*, 2023). Consumer assessment of food service can be influenced by several factors, namely food taste, service professionalism, timeliness of serving, food quality, food temperature, and the attitude of the serving

staff (Rochmawati N *et al*, 2022).

Table 5. Relationship between Protein and Fat Intake and Nutritional Status

Intake	Nutritional Status					*P-Value*
	Malnutrition	Substandard nutrition	Good nutrition	Overweight	Obesity	
	n (%)	n (%)	n (%)	n (%)	n (%)	
Protein Intake						
Severe deficiency	0	0 (0.0)	7 (38.9)	6 (33.3)	5 (27.8)	
Moderate deficit	0	0 (0.0)	6 (75.0)	2	0 (0.0)	
Mild deficit	0	0 (0.0)	4 (100.0)	0	0 (0.0)	0.000
Normal	0 (0.0)	0 (0.0)	12 (100.0)	0 (0.0)	0 (0.0)	
More	0 (0.0)	3 (16.7)	15 (83.3)	0 (0.0)	0 (0.0)	
Total	0 (0.0)	3 (5.0)	44 (73.3)	8 (13.3)	5 (8.3)	
Fat Intake						
Severe Deficit	0 (0.0)	1 (4.0)	12 (48.0)	7 (28.0)	5 (20.0)	
Moderate deficit	0	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)	
Mild deficit	0	0 (0.0)	4 (100.0)	0	0 (0,0)	0.010
Normal	0 (0.0)	1 (7.7)	12 (92.3)	0 (0.0)	0 (0.0)	
More	0 (0.0)	1 (6.7)	14 (93.3)	0 (0.0)	0 (0.0)	
Total	0 (0.0)	3 (5.0)	44 (73.3)	8 (13.3)	5 (8.3)	
Satisfaction with Meal Service						
Not satisfied	0	1 (3.3)	20 (66.7)	7 (23.3)	2 (6.7)	
Satisfied	0 (0.0)	2 (6.7)	24 (80.0)	1 (3.3)	3 (10.0)	0.113
Total	0 (0.0)	3 (5.0)	44 (73.3)	8 (13.3)	5 (8.3)	

The results of the bivariate analysis in Table 5 using the *chi-square* test show the relationship between protein and fat intake and nutritional status. Protein intake and fat intake are significantly related (*p-value* < 0.05) to nutritional status, so the hypothesis is rejected and the null hypothesis is accepted. This is supported by the fact that respondents with normal protein and fat intake are in good nutritional status (100.0%) and (92.3%).

The results of the study indicate that protein and fat intake are significantly associated (*p-value* < 0.05) with nutritional status. The findings in this study are consistent with the results of other studies showing that protein and fat intake have a significant relationship (*p-value* < 0.05) with nutritional status (Herawati *et al*., 2023; Febytia & Dainy, 2022). The implementation of a buffet system allows respondents to freely choose and take their own side dishes, both animal protein sources (such as fish,

meat, eggs, and chicken) and plant-based protein (such as tofu, tempeh, and nuts), as well as fat sources, according to their individual tastes and needs. Thus, respondents have greater access to a variety of protein and fat sources (Herdiansyah *et al*., 2024).

Protein, especially from animal sources rich in macronutrients and essential amino acids, is crucial for growth, immunity, and body structure development, and is more easily absorbed by the body, thereby contributing to optimal nutritional status

(Ilfada *et al*., 2024). Balanced and varied fat consumption in daily meals and snacks in the pesantren environment also contributes to meeting the body's needs for essential fatty acids and fat-soluble vitamins, which are important for optimal nutritional status (Periselo *et al*., 2024). Furthermore, the body has mechanisms to utilize existing energy reserves, so that a deficit in protein and fat intake within certain limits does not immediately have a negative impact on nutritional status (Rani *et al*., 2021).

Table 6. Relationship between Satisfaction with Meal Provision and Nutritional Status

Meal Service Satisfaction	Nutritional Status					P-Value
	Malnutrition	Substandard nutrition	Good nutrition	Overweight	Obesity	
	n (%)	n (%)	n (%)	n (%)	n (%)	
Not satisfied	0 (0.0)	1 (3.3)	20 (66.7)	7 (23.3)	2 (6.7)	0.113
Satisfied	0 (0.0)	2 (6.7)	24 (80.0)	1 (3.3)	3 (10.0)	
Total	0 (0.0)	3 (5.0)	44 (73.3)	8 (13.3)	5	

Other analysis results in Table 6 show that there is no significant relationship (*p-value* > 0.05) between satisfaction with meal service and nutritional status, so the hypothesis is rejected and accepted. This means that the level of satisfaction with meal service does not determine nutritional status. The dissatisfaction expressed by a small number of respondents was due to the lack of taste quality and menu variety, and quite a few respondents also complained about the

lack of fruit options in the menu served, resulting in dissatisfaction with the boarding school meal service. The variety of food menus in an institutional meal service greatly affects the level of satisfaction of its consumers, because when the menu served lacks variety, this can cause a decrease in consumers' appetite (Putra *et al*., 2021). One of the key elements that determine consumer satisfaction is taste quality. Food with good taste and attractive presentation can

encourage consumers to finish their food and feel satisfied with the dish (Nur'ain *et al*., 2024).

In addition to menu variety and taste quality, there are other factors that can affect the level of satisfaction, such as the timeliness of food distribution, the appearance of staff, the cleanliness of equipment, and halal factors, which are currently worthy of attention (Handriani *et al*., 2023: Rochmawati *et al*., 2022). The satisfaction of food service is considered to be of good quality if the food served to consumers has superior taste, attractive presentation and appearance, which can stimulate the appetite of each consumer and have an effect on nutritional intake, which then has an indirect impact on nutritional status (Velawati *et al*., 2021).

The findings of this study are in line with a previous study conducted by Rohmah (2023), which stated that the level of satisfaction with meal service is not significantly related to nutritional status. The factor behind this is that good nutritional status is not only obtained from consuming food provided by the boarding school, but can also be obtained from canteens or outside the boarding school environment, thus fulfilling

nutritional needs and resulting in good nutritional status. The meals organized by the Islamic boarding school are managed by the boarding school itself and are managed as well as possible for the respondents. The meals organized at the Islamic boarding school are served buffet style, so many of the students take inappropriate or even excessive portions, causing an imbalance between nutritional intake and needs.

This study has several limitations that need to be considered. The measurement of intake using a 2×24-hour *recall* still depends on the respondents' ability to remember the food they consumed, which has the potential to cause inaccuracies. The *recall* data also does not fully reflect the long-term eating patterns of the students. In addition, menu monitoring at the boarding school was not carried out every day, so there may be differences between the food provided and what was actually consumed. This study also only describes conditions at a single point in time, so it cannot determine how changes in eating patterns or meal arrangements over time affect nutritional status. These limitations should be taken into consideration in future studies, which should use more frequent intake measurements and more

comprehensive menu monitoring.

CONCLUSION

The protein and fat intake of most respondents was at the same level, classified as severely deficient. Despite nutritional deficiencies, the measurement results showed that the nutritional status of most respondents was classified as good. Assessments of satisfaction with the meals provided by this Islamic boarding school were evenly divided, with half of the respondents expressing satisfaction and the other half expressing dissatisfaction.

There is a clear significant relationship between protein and fat intake and nutritional status. In contrast, the analysis shows that satisfaction with meal arrangements is not significantly related to nutritional status. Based on these findings, efforts are needed to improve meal arrangements in Islamic boarding schools, particularly by improving the quality and adequacy of protein and fat sources in the daily menu. The development of more standardized menus, clear portion control, and education for students on food selection are also recommended to maintain optimal nutritional intake. These findings also indicate that the evaluation of meal service should not only focus on satisfaction, but also on the quality of the nutritional composition received by students.

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