

Nutritional Evaluation of Menus Regarding Nutritional Adequacy for Students at Al-Bahjah Islamic Boarding School in Cirebon Regency

Sholichin^{1*} Alina Hizni² Diyah Sri Yuhandini³ Dewi Vimala⁴

^{1,2,3,4}Nutrition Department, Health Polytechnic of the Ministry of Health Tasikmalaya

*Corresponding author: sholichin@dosen.poltekkestasikmalaya.ac.id

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Abstract

Background: Islamic boarding schools are Islamic-based educational institutions that provide daily meals for students. Al-Bahjah Islamic Boarding School serves approximately 4,500 meals per day. **Objective:** This study aimed to evaluate the nutritional content of meals provided in relation to students' nutritional adequacy. **Method:** This quantitative descriptive observational study used a cross-sectional approach and was conducted from May to October 2025 at Al-Bahjah Islamic Boarding School, Cirebon Regency. Respondents included the head of the kitchen, food processing staff, and servers. Data on the menu provided to students—consisting of main meals without snacks—was collected by weighing the portions of food they were to consume, and was then analysed using the 2020 Indonesian Food Composition Tables. Nutritional adequacy standards were based on the Regulation of the Minister of Health No. 28 of 2019, according to students' age and gender. The adequacy level was determined by comparing the menu nutrient content with daily nutritional requirements. **Results:** The average nutritional content of meals served to students was 1,605 kcal of energy, 57 g of protein, 40 g of fat, and 249 g of carbohydrates. The average nutritional adequacy requirement was 2,183 kcal energy, 63 g protein, 73 g fat, and 322 g carbohydrates. Consequently, the energy adequacy level reached 74% (insufficient), protein 89% (insufficient), fat 56% (very insufficient), and carbohydrate 77% (insufficient). **Conclusion:** The meals provided at the Al-Bahjah Islamic boarding school do not yet meet the students' nutritional needs as it does not include snacks. It is therefore recommended that snacks be provided to ensure an adequate daily intake of nutrients.

INTRODUCTION

Background

Islamic boarding schools are Islamic-based educational institutions (Fitri & Ondeng, 2022). One of the Islamic boarding schools in Indonesia is Al-Bahjah Islamic Boarding School in Cirebon Regency, West Java. Al-Bahjah Islamic Boarding School has many branches spread across several provinces in Indonesia. At the Al-Bahjah Islamic Boarding School Centre, there are around 1,500 students and formal educational institutions at the primary school, junior high school, and senior high school levels. Al-Bahjah Islamic Boarding School provides meals for students on a self-managed basis, for breakfast, lunch, and dinner. Therefore, in terms of providing meals for students, a minimum of 4,500 portions is required per day. Therefore, it is necessary to evaluate the menu served to determine whether it meets the nutritional needs of the students or not.

Santri are generally in the 13-18 age group and are not immune to nutritional problems such as anaemia and underweight. A study of santri in junior high school and senior high school at a boarding school in West Java Province found that 36.1% of santri (115 out of 319 respondents) suffered from anaemia and underweight, and 83.5% of santri did not eat breakfast regularly (Rimbawan et al., 2023). These nutritional problems are caused by the low level of nutritional knowledge among students, which results in low nutritional intake. In addition, these nutritional problems can also be caused by the fact that the menus provided by the food management for students do not meet their nutritional needs. Nutritional problems that commonly affect adolescents, apart from malnutrition and anaemia, are eating disorders (anorexia and bulimia nervosa) and obesity (Susetyowati, 2017).

Issues to be Studied

Al-Bahjah Islamic Boarding School does not yet have a nutritionist, whose role is not only to provide nutrition education for students and food processing staff, but also to improve understanding, attitudes, and positive behaviour among both students and food processing staff in providing nutritious and healthy food, which will ultimately have an impact on the nutritional status of students. The nutritional status of students is influenced by their nutritional intake. Therefore, the nutritional status of students needs special attention, as most students are adolescents who are experiencing a growth spurt. However, does the nutritional content of the menu served meet the nutritional needs of students at the Al Bahjah Islamic Boarding School in Cirebon Regency?

Specific Objectives

The specific objective of this research is

1. To analyse the nutritional content of the menu served to students at the Al Bahjah Islamic Boarding School in Cirebon Regency.
2. To analyse the nutritional adequacy of students at the Al Bahjah Islamic Boarding School in Cirebon Regency.
3. To analyse the level of nutritional adequacy of the menu served to students at the Al Bahjah Islamic Boarding School in Cirebon Regency.

Urgency of Research

This study aims to evaluate the nutritional content of the menu served to assess the nutritional adequacy of students at the Al Bahjah Islamic Boarding School in Cirebon Regency. If the nutritional needs of students are not being met, then the institution's food service system needs to be improved in order to support the nutritional needs of students so that they can live healthy and productive lives while pursuing their studies.

METHOD

Type and Design of Research

This quantitative research uses a descriptive observational method with a cross-sectional approach to describe the nutritional adequacy of the menu served to students at the Al-Bahjah Islamic Boarding School in Cirebon Regency.

Time and Place of Research

This research was conducted from May to October 2025. The location of the research was at Al-Bahjah Islamic Boarding School in Cirebon Regency.

Respondents

The respondents in this study were food managers for students, consisting of kitchen managers, food processing staff, and waiters. Respondents were interviewed about the menu and food portions served to students. The data obtained relates to an evaluation of the meals provided to students, not those actually consumed by them. The data was collected over a 10-day meal

cycle comprising three main meals (breakfast, lunch, and dinner) with no snacks (food eaten between meals). This was because the kitchen did not provide or serve any snacks.

Data Collection and Analysis Techniques

The data collected and analysed consisted of:

1. The nutritional content of the menus served to students was obtained by weighing the food served, then analysing its nutritional content using the 2020 Indonesian Food Composition Table (IFCT) (Kementerian Kesehatan Republik Indonesia, 2020). The formula for calculating nutritional content is as follows:

$$\text{Nutritional Content} = \frac{\text{Food Weight}}{100} \times \text{IFCT Nutritional Content} \times \frac{\text{Edible Part of Food}}{100}$$

2. Nutritional adequacy for santri, obtained from Regulation of the Minister of Health of the Republic of Indonesia Number 28 of 2019 (Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2019 Tentang Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia, 2019) about the recommended dietary allowance (RDA) based on age and gender.
3. The nutritional adequacy of the menu served is obtained by comparing the nutritional content of the menu served with the daily nutritional requirements.

$$\text{Nutritional Adequacy Level} = \frac{\text{Nutritional Content of the Served Menu}}{\text{Recommended Dietary Allowance}} \times 100\%$$

Energy Adequacy Level (EAL), according to Siswanto et al. (2014), is classified into:

- a. Excessive, if EAL $\geq 130\%$
- b. Good, if EAL 100 - 130%
- c. Inadequate, if EAL 70 - < 100%
- d. Very Inadequate, if EAL < 70%

The adequacy level of macronutrients (ALM) (protein, fat, carbohydrates) according to Siswanto et al. (2014) is classified as follows:

- a. Excessive, if ALM $\geq 120\%$
- b. Good, if ALM 100 - 120%
- c. Inadequate, if ALM 80 - < 100%
- d. Very Inadequate, if ALM < 80%

RESULTS AND DISCUSSION

Al-Bahjah Islamic Boarding School is an Islamic educational institution established on 10 January 2010. It provides formal education at the primary school, lower secondary school, and upper secondary school levels, integrating the national curriculum with education in the Qur'an, memorisation, morals, Arabic, and English. Al-Bahjah Islamic Boarding School is headquartered in Sendang Village, Sumber District, Cirebon Regency, West Java, and has branches in several regions across Indonesia.

The Al-Bahjah Islamic Boarding School centre has a self-managed kitchen that provides meals for its students, not only for those at the central boarding school but also for students at branch boarding schools located near the central boarding school. Every day, the Al-Bahjah Islamic boarding school kitchen prepares food three times a day, with each preparation serving 3,000 portions. The cooking schedule for breakfast is from 01:30 to 03:30 AM, the cooking schedule for lunch is from 06:30 to 10:30 AM, and the cooking schedule for dinner is from 11:30 AM to 3:30 PM. The students' meal schedule is as follows: breakfast from 05:30 to 06:45 AM, lunch from 11:40 AM to 12:10 PM, and afternoon meal from 04:45 to 05:30 PM. Meal schedules may change depending on certain conditions. Dining areas are separated between male and female students, and further divided according to their educational levels.

1. Nutritional Content of Served Meals

The nutritional content of the analysed menu consists of a 10-day cycle with three main meals (breakfast, lunch, dinner) without snacks (between-meal foods). The nutritional content of the menu served per day for consumption by students can be seen in Table 1. Based on Table 1, it can be seen that the average nutritional content served by students is 1605 kcal of energy, 57 g of protein, 40 g of fat, and 249 g of carbohydrates.

Table 1. Nutritional Content of Daily Menu

Education Level	Age Group	Energy	Protein	Fat	Carbohydrates
		kcal	g	g	g
Primary School Boys	10 - 12 years old	1519	47	41	237
Primary School Girls	10 - 12 years old	1262	46	32	193
Junior High School Boys	13 - 15 years old	2048	74	49	323
Junior High School Girls	13 - 15 years old	1425	50	36	222
Senior High School Boys	16 - 18 years old	2045	71	49	322
Senior High School Girls	16 - 18 years old	1331	52	36	197
Average		1605	57	40	249

The analysis of the nutritional content of the meals served was carried out based on a 10-day menu cycle comprising three main meals. The results showed that the average nutritional content of the meals served to the students was 1,605 kcal of energy, 57 g of protein, 40 g of fat, and 249 g of carbohydrates. When compared with the findings of a study conducted by Fitriyani and Sholichin (2025) at the Al-Hikmah Islamic boarding school, the energy content of meals served to students at the Al-Bahjah Islamic boarding school was lower than that for students at the Al-Hikmah Islamic boarding school (1,941 kcal). The protein content of meals served to students at the Al-Bahjah Islamic boarding school, Bahjah, is higher than that of students at Al-Hikmah Islamic Boarding School (51.9 g). The fat intake for students at Al-Bahjah Islamic Boarding School is lower than that of students at Al-Hikmah Islamic Boarding School (62.9 g), and the carbohydrate intake for students at Al-Bahjah Islamic Boarding School is lower than that of students at Al-Hikmah Islamic Boarding School (286.8 g). The nutritional data for Al-Bahjah Islamic Boarding School differ from those for Al-Hikmah Islamic Boarding School. The difference in the data from Al-Bahjah Islamic Boarding School is that it was collected from both male and female students at elementary school, secondary school, and high school, whereas the data from Al-Hikmah Islamic Boarding School was collected from female students at lower secondary and upper secondary levels.

The findings from the study at Al-Bahjah were lower than those of the 2014 Total Diet Survey (TDS). The energy intake for students at the Al-Bahjah Islamic boarding school was lower than the 2014 TDS results (energy intake for adolescents aged 13–18 years was 2,350 kcal). The protein intake for students at the Al-Bahjah Islamic boarding school was lower than the 2014 TDS results (protein intake for adolescents aged 13–18 years was 67.0 g). The fat intake for students at the Al-Bahjah Islamic boarding school was lower than the 2014 TDS results (fat intake for adolescents aged 13–18 years was 56.8 g). The carbohydrate intake for students at Al-Bahjah Islamic Boarding School was lower than the 2014 TDS results (carbohydrate intake for adolescents aged 13–18 years was 244.2 g) (Siswanto et al., 2014). The findings of this study focus on the daily nutritional content served at main meals, excluding snacks purchased by students from the canteen, at both the Al-Bahjah and Al-Hikmah Islamic boarding schools. This constitutes a limitation of the research methodology as it does not take snacks into account; consequently, the level of nutritional adequacy achieved will be lower than that recommended.

Santri are generally adolescents who have completed junior high school and senior high school, although there are also younger santri who are still in primary school. Adolescence is

a transitional period from childhood to adulthood, characterised by many changes in muscle mass, body fat, and hormones. These changes affect their nutritional needs. During adolescence, the body undergoes rapid physical changes (growth spurt), including height growth, changes in body composition, and rapid brain development. Therefore, optimal nutrition is essential to support these biological processes so that adolescents can grow and develop well, physically, mentally, and socially (Rizal et al., 2025; Sholichin et al., 2025).

Nutrients for adolescents play a very important role in supporting physical, mental, and emotional development. A balanced diet supports the physical growth of adolescents, including bone, muscle, and height development. Nutrients such as protein, calcium, and vitamin D are essential for bone formation and strengthening. Nutrients also affect brain development, especially in the formation of neural connections that support intelligence. Therefore, nutrients such as omega-3 fatty acids, iron, vitamin B, and folate are needed for brain development and cognitive function. Nutrients such as vitamin A, vitamin C, zinc, and selenium also play a role in the immune system in fighting infections and maintaining the balance of the immune system (Rizal et al., 2025).

Malnutrition in adolescence can lead to impaired growth and development, ultimately reducing productivity among young people and increasing the risk of degenerative diseases in later life (Nurdiani et al., 2021). Without proper nutrition, adolescents' physical growth will be stunted, and they will not be able to reach their optimal height or physical strength. Nutritional deficiencies during critical periods of brain development can impair adolescents' learning, memory, and concentration abilities. Nutritional deficiencies can also weaken the body's resistance and make it more susceptible to infection or disease (Rizal et al., 2025).

2. Daily Nutritional Requirements for Boarding School Students

Nutritional requirements for boarding school students are differentiated according to gender and age. Referring to Regulation of the Minister of Health of the Republic of Indonesia Number 28 of 2019 concerning Recommended Nutritional Requirements for Indonesians, the nutritional requirements for boarding school students can be seen in Table 2. Based on Table 2, the average nutritional adequacy for males and females aged 10–18 years is 2183 kcal of energy, 63 g of protein, 73 g of fat, and 322 g of carbohydrates.

Table 2. Daily Nutritional Adequacy for Boarding School Students

Gender	Age Group	Education Level	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrate (g)
Male	10 – 12 years old	Primary school	2000	50	65	300
	13 – 15 years old	Junior High School	2400	70	80	350
	16 – 18 years old	Senior High School	2650	75	85	400
Female	10 – 12 years old	Primary school	1900	55	65	280
	13 – 15 years old	Junior High School	2050	65	70	300
	16 – 18 years old	Senior High School	2100	65	70	300
Average			2183	63	73	322

Source: Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2019 (Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2019 Tentang Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia, 2019)

The nutritional requirements for boarding school students refer to Regulation of the Minister of Health of the Republic of Indonesia Number 28 of 2019. The nutritional requirements for boarding school students aged 10–18 years are 2,000–2,650 kcal for males and 1,900–2,100 kcal for females, protein of 50–75 g for males and 55–65 g for females, fat of 65–85 g for males and 65–70 g for females, and carbohydrates of 300–400 g for males and 280–300 g for females. The average nutritional adequacy for ages 10–18 for both males and females is 2,183 kcal of energy, 63 g of protein, 73 g of fat, and 322 g of carbohydrates. These average values were calculated based on the nutritional content of the meals served to male

and female students at various levels of education, ranging from elementary school through to secondary school and high school. The energy adequacy for ages 10–18 is higher than the average energy adequacy for the Indonesian population (2100 kcal per person per day), and the average protein adequacy for ages 10–18 is also higher than the average protein adequacy for the Indonesian population (57 grams per person per day) (Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2019 Tentang Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia, 2019). Adolescence is a period of very rapid growth and development, during which the need for energy, protein, and micronutrients increases to support linear growth, sexual maturation, brain development, and physical activity (Norris et al., 2022).

The above nutritional adequacy is the average requirement of certain nutrients that must be met every day for almost everyone, differentiated according to age, gender, level of physical activity, and physiological condition, to live healthily (Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2019 Tentang Angka Kecukupan Gizi Yang Dianjurkan Untuk Masyarakat Indonesia, 2019). Age is a factor; children and adolescents require more nutrients for growth and development because they experience growth spurts. Gender is also a factor; men require more nutrients than women because they have more muscle mass and are more physically active in their daily lives. Physical activity level: the more active a person is, the greater their nutritional needs for those activities. Physiological condition: nutritional needs increase if a person is sick or injured to speed up the healing and recovery process (Hizni, 2017).

Nutritional fulfilment for students should be based on the Balanced Nutrition Guidelines, which are daily food arrangements that contain nutrients in types and amounts appropriate to the body's needs, taking into account the principles of food diversity, physical activity, clean living behaviour, and regular weight monitoring to maintain a normal weight to prevent nutritional problems. Adolescents are a transitional age group from children to young adults. Important conditions that affect the nutritional needs of this group are rapid growth, entering puberty, snacking habits, menstruation, and attention to physical appearance and body image in adolescent girls. Thus, calculations of nutritional needs for this group must take these conditions into account (Peraturan Menteri Kesehatan Republik Indonesia, 2014).

3. Daily Nutritional Adequacy Level of Boarding School Students

The nutritional adequacy level of male and female boarding school students differs. The nutritional adequacy levels of students are presented in Table 3. Based on Table 3, the energy adequacy level of students is 74% (insufficient), the protein adequacy level is 89% (insufficient), the fat adequacy level is 56% (very insufficient), and the carbohydrate adequacy level is 77% (insufficient).

Energy and Nutrients		Value
Energy	Energy Content of the Served Menu (kcal)	1605
	Energy Adequacy (kcal)	2183
	Energy Adequacy Level (%)	74
	Energy Adequacy Level Category	Inadequate
Protein	Protein Content of the Served Menu (g)	57
	Protein Adequacy (g)	63
	Protein Adequacy Level (%)	89
	Protein Adequacy Level Category	Inadequate
Fat	Fat Content of the Served Menu (g)	40
	Fat Adequacy (g)	73
	Fat Adequacy Level (%)	56
	Fat Adequacy Level Category	Very Inadequate

Carbohydrate	Carbohydrate Content of the Served Menu (g)	249
	Carbohydrate Adequacy (g)	322
	Carbohydrate Adequacy Level (%)	77
	Carbohydrate Adequacy Level Category	Inadequate

The energy adequacy level of Al-Bahjah boarding school students is 74% (insufficient), the protein adequacy level is 89% (insufficient), the fat adequacy level is 56% (very insufficient), and the carbohydrate adequacy level is 77% (insufficient). Fitriyani & Sholichin (2025) at Al-Hikmah Islamic Boarding School, the level of energy adequacy of students at Al-Bahjah Islamic Boarding School was lower than that of students at Al-Hikmah Islamic Boarding School (92.6%, insufficient), the level of protein adequacy of students at Al-Bahjah Islamic Boarding School was higher than that of students at Al-Hikmah Islamic Boarding School (79.7%, insufficient), the level of fat adequacy of students at Al-Bahjah Islamic Boarding School was lower than that of students at Al-Hikmah Islamic Boarding School (88.1%, insufficient), and the level of carbohydrate adequacy of students at Al-Bahjah Islamic Boarding School was lower than that of students at Al-Hikmah Islamic Boarding School (95.5%, insufficient). However, the energy adequacy level and protein adequacy level of students at Al-Bahjah Islamic Boarding School are better than the energy adequacy level (72.3%, insufficient) and protein adequacy level (89.5%, insufficient) found in the 2014 total diet survey of adolescents (aged 13-18 years) (Siswanto et al., 2014).

The level of nutritional adequacy has a direct effect on nutritional status. Nutritional status refers to a person's health condition, which is influenced by the quality and quantity of nutritional intake (UNICEF, 2021). Good nutritional status is achieved when the body receives a balanced intake of nutrients, including carbohydrates, proteins, fats, vitamins, and minerals in the right amounts according to the body's needs. If adolescents experience a deficiency in one or more essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals, it will hinder their physical growth and development. In cases of severe malnutrition, there is a risk of serious health problems such as anaemia, stunted growth, and decreased immunity. Adolescents may also experience overnutrition due to calorie intake exceeding the body's needs, which can lead to excess fat storage. Adolescents who are overnourished, especially those who are obese, are at high risk of various health problems such as type 2 diabetes, hypertension, and other metabolic disorders. In addition, obesity in adolescents can also cause psychological problems such as low self-esteem and an increased risk of mental disorders (Rizal et al., 2025).

CONCLUSIONS AND RECOMMENDATIONS

The average nutritional content of meals served to students is 1605 kcal of energy, 57 g of protein, 40 g of fat, and 249 g of carbohydrates. The average nutritional adequacy of students is 2183 kcal of energy, 63 g of protein, 73 g of fat, and 322 g of carbohydrates. Thus, the level of energy adequacy for students is 74% (insufficient), the level of protein adequacy is 89% (insufficient), the level of fat adequacy is 56% (very insufficient), and the level of carbohydrate adequacy is 77% (insufficient). These results indicate that the nutritional value provided by the meals served does not yet meet the students' nutritional requirements, as no snacks are included. It is therefore recommended that snacks be included to ensure adequate daily nutritional intake.

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