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Evaluation of Menu Nutrition Towards the Nutritional Adequacy of Female Teenage Santri in Pesantren Tahfidz Qur'an Terpadu Al-Hikmah Cirebon

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Abstract.
Background. Al-Hikmah Cirebon Integrated Qur'an Tahfidz Boarding School is one of the pesantrens that implements a self-managed food system, producing 3,000 servings of food daily.
Aims. The study aimed to analyze the level of nutritional adequacy of the meals served, employing a descriptive observational study with a cross-sectional design. The study population was 516 female students from Junior High School and Madrasah at Al-Hikmah Cirebon Integrated Qur'an Tahfidz Pesantren, and the sample was the entire population.
Methods. Data collection was done through interviews and the food weighing method. The results showed that the average content of energy and macronutrients in the daily food menu served to female students of Pesantren Al-Hikmah Cirebon contained 1923 kcal of energy, 51.8 g of protein, 61.6 g of fat, and 285 g of carbohydrates. The nutritional adequacy of female students per day refers to the Nutritional Adequacy Rate, as per the Regulation of the Minister of Health Number 28 of 2019, which is 2075 kcal/h for energy, 65 g/h for protein, 70 g/h for fat, and 300 g/h for carbohydrates.
Result. The results showed that the level of nutritional adequacy of the daily food menu served with 92.6% of energy (less), 79.7% of protein (less), 88.1% of fat (less), and 95% of carbohydrates (less).
Conclusion. Deficiencies in nutritional fulfillment can be met from the students' snacks or other foods outside the meal menu served by the pesantren.
Implementation. It is necessary to prepare a menu that is in accordance with the nutritional needs of the students.

Keywords: Food Organisation, Level of Nutritional Adequacy, Nutritional Adequacy, Pesantren, Santri

INTRODUCTION

Food is one of the primary human needs. Therefore, food organization is essential, both in the family environment and outside it (Dias, 2019). Food organization is a food management activity with a specific purpose for many people (Widyastuti & Pramono, 2014). Saputri and Bakri (2019) stated that the implementation of institutional or mass food is carried out to meet consumer needs for quality food, good taste, and nutritional requirements, and to ensure safety when consumed.

Food operations can be categorized into two main types: commercial and non-commercial. One of the non-commercial food organizations is the provision of food in dormitories. A dormitory food service is a facility that provides meals to a specific group of people residing in the dormitory. The government or community participation manages the characteristics of food provision for dormitories, nutritional standards are adjusted according to the needs of the group in the dormitory and adjusted to existing resources and can function commercially which takes into account the profit and loss of the institution, the frequency of meals 2-3 times a day with or without interludes, the number served is fixed, the type of food service depends on the dormitory regulations and the purpose of providing food is more directed at achieving the health status of residents (Saputri & Bakri, 2019).

The organization of meals by the institution itself is known as self-management. The activity of organizing meals can be carried out by other parties, such as utilizing catering services. One of the non-commercial food organizations is the food organization in boarding schools. The dormitory food serves several age groups, one of which caters to the teenage age group. Adolescents are future leaders, prospective workers who will become the backbone of national productivity, as well as prospective mothers who will enter their reproductive years between 20 and 30 and give birth to the next generation, and are key to child care in the future. Therefore, the quality of adolescents needs special attention, such as adequate nutritional intake to support their growth (Saputri & Bakri, 2019).

The Nutrient Adequacy Rate is the average daily intake of nutrients for all individuals, categorized by age group, gender, body size, and physical activity level, to achieve optimal health status. The benefits of the RDA are as a reference in assessing nutritional adequacy, as a reference in preparing daily food menus including food planning in institutions, as a reference for calculations in regional and national food supply planning, as a reference for nutrition education and as a reference for food labels that include nutritional value information (Pritasari, 2017). The use of AKG in this case is as a reference for assessing

nutritional adequacy in the provision of food in Islamic boarding schools (Sholichah & Syukur, 2020).

The results of observations at the Al-Hikmah Cirebon Integrated Qur'an Tahfidz Pesantren have shown that a self-managed food delivery system has been implemented. Every day, the kitchen staff produces 3,000 servings of food for students and employees. However, the pesantren does not have a nutritionist, so the level of nutritional adequacy of the meals provided has not been monitored. Therefore, the study aimed to analyze the nutritional content of the available menu for adolescent female students, assess the nutritional adequacy of adolescent female Santri, and evaluate the nutritional content of the menu against the nutritional adequacy level of students at the Al-Hikmah Cirebon Integrated Qur'anic Tahfidz Pesantren.

LITERATURE REVIEW

Boarding

Pesantren is a place where every moment is filled with positive and productive daily activities of students. Pesantren plays a crucial role in shaping Santri as a positive role model for the community. The tasks and activities of a Santri are not easy, but rather quite heavy and require optimal energy, one of which is memorizing the Qur'an. Nutritional intake has a significant impact on students' ability to memorize, in addition to affecting their overall health and growth. The brain is one part of the body that plays a role in the process of remembering and memorizing. The human brain requires protein, essential fatty acids, and various vitamins and minerals to multiply nerve cells, facilitate nerve transmission (through neurotransmitters), and perform various activities related to other brain functions (Sholichah & Syukur, 2020).

Teen Nutrition Adequacy

The World Health Organization (WHO) defines adolescence as the period between 10 to 19 years of age, while the United Nations (UN) categorizes adolescents as young people aged 15-24 years (Proverawati, 2011). Adolescents are a group of people aged 10 to 19 years (Sulistyoningsih, 2021). Adolescents require nutritional adequacy that differs from that of other age groups.

The Nutrient Adequacy Score, according to the Regulation of the Minister of Health Number 28 of 2019, is a value that shows the average need for specific nutrients that must

be met every day for almost all people with specific characteristics, including age, gender, level of physical activity, and physiological conditions, for a healthy life. The following is the Nutrient Adequacy Rate (NAR) for adolescent girls according to age group:

Table 1. Adolescent Girls' Nutritional Adequacy

Age Group	Weight (kg)	Height (cm)	Energy	Protein	Fat	Carbohydrates
10-12 years	38	147	1900	55	65	280
13-15 years	48	156	2050	65	70	300
16-18 years	52	159	2100	65	70	300

Source: Regulation of the Minister of Health Number 28 of 2019

Energy is a result of the metabolism of carbohydrates, proteins, and fats. Energy serves as a powerful substance for metabolism, growth, temperature regulation, and physical activity. Excessive energy will be stored in the form of glycogen as a short-term energy reserve and in the form of fat as a long-term reserve (Wibowo, 2011). One important factor to consider when determining the energy needs of adolescents is physical activity. Broadly speaking, adolescent boys require more energy than adolescent girls. The energy adequacy for female adolescents is lower than that of male adolescents, which is 1900-2250 kcal/hr (Susetyowati, 2017).

Protein requirements increase during adolescence due to the rapid growth and development that occur during this stage. Protein can replace energy as a source of energy if energy intake is insufficient. The recommendation for daily protein adequacy in adolescent girls, based on the AKG in Regulation of the Minister of Health Number 28 of 2019 concerning Recommended Nutritional Adequacy Rates for the Indonesian People, is 55-60 g/day, influenced by gender and age. Based on body weight, the protein requirement for adolescent boys and girls aged 11-14 years is 1 g/kg body weight. Between the ages of 15 and 18 years, the requirement for adolescent boys drops to 0.9 g/kg body weight (BW) and for girls to 0.8 g/kg BW. Protein intake is recommended from high-quality protein sources, such as foods with a high biological value. This is obtained from animal protein sources compared to vegetable protein because the composition of essential amino acids is better in terms of quantity and quality (Susetyowati, 2017).

Fat is a food substance that is important for maintaining the health of the human body. Additionally, fat is a more effective source of energy than carbohydrates and protein. One gram of fat produces 9 kcal, while 1 gram of carbohydrate and protein each produces

only 4 kcal (Almatsier, 2004). Fat consumption is limited to no more than 25% of total daily energy, or a maximum of three tablespoons of cooking oil per day for cooking meals. The Ministry of Health of the Republic of Indonesia recommends that no more than one piece of food should be fried per meal per day. Excessive consumption of fat can lead to the formation of fat deposits that, over time, may block blood vessels, particularly in the heart arteries, which can then compromise heart health. Lack of fat intake can also result in inadequate energy intake. Restrictions on consumption, especially of animal fats, lead to low iron and zinc intake, as animal foods are significant sources of these nutrients (Susetyowati, 2017). Carbohydrates are the primary source of energy for bodily activities. Thus, fulfilling carbohydrate needs is recommended at 50-60% of total daily energy needs (Susetyowati, 2017).

Institutional Food System

Food administration is a series of activities ranging from menu planning to the distribution of food to consumers, including recording, reporting, and evaluation activities aimed at achieving optimal health status. Institutional and industrial food administration is an integrated program consisting of planning, procurement, storage, processing of foodstuffs, and serving food on a large scale (mass) as well as the procurement of equipment and methods needed to achieve fully coordinated goals using service, maximum quality, and reasonable cost control in an institution or industry. Food that can be consumed must undergo proper processing techniques. Food administration is carried out not only in hospitals, but also in other institutions such as hotels, orphanages, pilgrimage dormitories, and other dormitories, as well as in general and special catering services (Rotua, 2015).

The implementation of institutional or mass food is carried out to meet consumer needs for quality food, good taste, nutritional needs, and safety when consumed (Saputri & Bakri, 2019). Rotua (2015) revealed that basically, the organization of institutional food consists of 3 types, namely: 1) The implementation of profit-oriented institutional meals (commercial), such as restaurants, snacks, bars, cafeterias, and catering, 2). Service-oriented (non-commercial) institutions such as dormitories, orphanages, hospitals, companies, community institutions, schools, and others, 3). Semi-commercial institutional food, not only for commercial purposes but also for social purposes (underprivileged communities).

METHODS

Descriptive observational research with a cross-sectional study design. The study was conducted in May 2023 at Al-Hikmah Islamic Boarding School, Cirebon, West Java. The population in this study was all female students in Junior High School and Senior High School, totaling 516 students. The sample in this study was all students who became the population, with details of the number of students as follows:

Table 2. Number of female students in Al-Hikmah Cirebon Junior and Senior High School

Class	Age (years)	Total
Grade VII	13	91
Grade VIII	14	102
Grade IX	15	101
Grade X	16	73
Grade XI	17	91
Grade XII	18	58
Total		**516**

Source: Data on the number of junior and high school students at Al-Hikmah Cirebon in the academic year 2022/2023

The types of data collected were primary data and secondary data. The primary data collected are the weights of food ingredients in the form of Household Measures, obtained through food weighing and direct observation in the kitchen. The secondary data included the Nutrition Adequacy Rate List from the Regulation of the Minister of Health of the Republic of Indonesia Number 28 of 2019 concerning Recommended Nutrition Adequacy Rates for Indonesian Communities, data on the identity of students (name, gender, and date of birth) from the administrative department, and the menu cycle obtained from the head of the kitchen.

Data on the nutritional content of the menu served to students was calculated using the formula according to Hardinsyah and Briawan (1994) as follows:

$$\text{Nutritional content} = \frac{\text{Food Weight}}{100} \text{ x Nutritional Content per 100 g x } \frac{\text{Edible Parts}}{100}$$

Furthermore, the nutritional adequacy level of the available menu nutrition is calculated using the formula according to Indriani (2015) in Ayesha et al (2020) as follows:

$$\text{Nutrition Adequacy Level} = \frac{\text{Nutritional Content of Available Menus}}{\text{Nutrient Adequacy Rate}} \text{ x } 100\%$$

The level of nutritional adequacy is classified according to Siswanto (2014) as follows:

Table 3. Energy and Macronutrient Adequacy Levels

Nutrition Adequacy Level	Energy	Macronutrients
More	≥ 130%	≥ 120%
Good	100 - 130%	100 – 120%
Less	70 - < 100%	80 - < 100%
Very Less	< 70%	< 80%

DISCUSSION

General Description Pesantren Tahfidz Qur'an Terpadu Al-Hikmah Cirebon was established on 20 July 1998 and is committed to producing a generation of Qur'anic and Dai Rabbani. Al-Hikmah Cirebon Integrated Qur'an Tahfidz Boarding School offers three main programs: Qur'anic Tahfidz, English and Arabic foreign language studies, and Tarbiyah. This pesantren has a Junior High School and Senior High School, which combine the national curriculum with the pesantren curriculum. In July 2014, the building of Pesantren Al-Hikmah Cirebon was divided into boys' and girls' sections. The girls' dormitory is located in Bobos Village, while the boys' dormitory is located in Balad Village. However, the pesantren kitchen is still centered on the girls' dormitory. The kitchen division consists of 15 people, divided into three shifts. The meal menu is distributed three times a day (morning, afternoon, and evening) and served in a buffet style.

The vision of Pesantren Tahfidz Qur'an Terpadu Al-Hikmah Cirebon is to become the largest Islamic educational institution in producing a generation of Quranic scholars and Da'i Rabbani. The mission to achieve this vision involves transferring knowledge, instilling Islamic values through the practice of Tahsin (correct and good reading), Tafhim (Understanding), Tahfidz (Memorization), and Tathbik (Application) of the Al-Quran in everyday life, and promoting da'wah towards an Islamic society.

Nutritional Availability of Daily Meal Menu

Based on the calculation of the nutritional availability of the Santri menu for 3 days, the average values are 1941 kcal for energy, 51.9 grams for protein, 62.9 grams for fat, and 286.8 grams for carbohydrates.

Table 4. Nutritional Availability of Santri Meals per Day

São	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrate (g)
1	1708	49,6	43	273,1
2	2209	56,3	67,5	339,8
3	1906	49,8	78,3	247,5
Average	1941	51,9	62,9	286,8

Source: processed data

The average content of energy and macronutrients in the daily meal menu served at Pesantren Al-Hikmah Cirebon is 1941 kcal of energy, 51.9 grams of protein, 62.9 grams of fat, and 286.8 grams of carbohydrates. The presentation of energy, protein, fat, and carbohydrates in the daily meal menu is lower than the daily nutritional adequacy rate. This is because the meal menu served is different from the established menu cycle. When viewed from the established menu cycle, the amount of nutrients has fulfilled the nutritional adequacy of the Santri for a day.

Based on the results above, when compared to previous research conducted by Dias (2019), the nutritional content of the menu served at Pesantren Al-Hikmah Crebon is lower than that of the menu served at the Kadipaten State Forestry Vocational High School (SMK) in Majalengka Regency. According to the results of Dias's research (2019), the daily energy intake was 2203 kcal, 72.4 g protein, 46.1 g fat, and 363.5 g carbohydrates.

Nutritional Adequacy of Santri for a Day

The nutritional adequacy of students, as determined by the Nutritional Adequacy Rate, is presented in Table 5, based on Regulation of the Minister of Health Number 28 of 2019. Based on Table 5, it is known that the average energy adequacy is 2075 kcal, 65 grams of protein, 70 grams of fat, and 300 grams of carbohydrates.

Table 5. Nutritional Adequacy Rate of Female Infantry Eaters a Day

Age	Education	Weight (kg)	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrate (g)
13-15 years	Junior High School	48	2050	65	70	300
16-18 years	Senior High School	52	2100	65	70	300
Average		50	2075	65	70	300

Source: Regulation of the Minister of Health Number 28 of 2019

The nutritional adequacy of female Santri per day refers to the Nutritional Adequacy Rate, as specified in Regulation of the Minister of Health Number 28 of 2019, for the average

age groups of 13-15 years and 16-18 years, with female gender, as shown in Table 6. It was determined that the average daily energy adequacy was 2075 kcal, daily protein intake was 65 grams, daily fat intake was 70 grams, and daily carbohydrate intake was 300 grams. With this nutritional adequacy rate, it is expected to support the optimal growth and development of students.

Nutritional Adequacy Level of Santri for a Day

The level of nutritional adequacy of the daily menu involves comparing the availability of menu nutrients with nutritional adequacy and categorizing the fulfillment of nutritional adequacy for a day based on categories, as described by Siswanto (2014).

Table 6. Nutrition Adequacy Level of Daily Santri

Nutrients	Value
Energy	
Energy Availability of a Day's Menu *	1941 kcal
Daily Energy Adequacy **	2075 kcal
Daily Energy Adequacy Level *	93,5 %
Energy Adequacy Level Category *	Less
Protein	
Protein Availability of a Day's Menu *	51.9 g
Daily Protein Adequacy **	65 g
Daily Protein Adequacy Level *	79,9 %
Protein Adequacy Level Category *	Less
Fat	
Fat Availability of a Day's Menu *	62.9 g
Daily Fat Adequacy **	70 g
Daily Fat Adequacy Level *	89,9 %
Fat Adequacy Level Category *	Less
Carbohydrate	
Carbohydrate Availability of a Day's Menu *	286.8 g
Daily Carbohydrate Adequacy **	300 g
Daily Carbohydrate Adequacy Level*	95,6 %
Carbohydrate Adequacy Level Category *	Less

Source: *processed data, **Regulation of the Minister of Health Number 28 of 2019

The results showed that the level of nutritional adequacy of the 3-day menu cycle was lower in energy (93.5%), protein (79.9%), fat (89.9%), and carbohydrates (95.6%). This is slightly different from research conducted by Dias (2019), which showed that the level of energy adequacy was lower (91.8%), protein was adequate (115.9%), fat was very low (57.66%), and carbohydrates were adequate (110.1%). When compared to this study, the

difference lies in the level of adequacy in fulfilling protein, fat, and carbohydrate needs. Where the level of protein and carbohydrate adequacy in the Dias (2019) study was better, the level of fat adequacy was the opposite. The presentation of the meal menu in the study was carried out four times a day, namely in the morning, interlude, afternoon, and evening. The provision of interludes also helps maintain the level of energy and other nutrients.

The content of macronutrients in the daily meal menu served at Al-Hikmah Cirebon Islamic Boarding School still does not meet the recommended nutritional adequacy rate as stipulated in the Regulation of the Minister of Health Number 28 of 2019 concerning Recommended Nutritional Adequacy Rates for the Indonesian People. This is because the meal menu served does not align with the established menu cycle. Additionally, the meal menu served is less varied, and the side dishes offered are less diverse. However, these deficiencies can be fulfilled with nutrients derived from Santri snacks or other foods not included in the meal menu served by the pesantren.

The level of energy fulfillment that is lacking is due to an imbalance between other nutrients and the lack of carbohydrates and protein in the daily menu served at Pesantren Al-Hikmah Cirebon. This can lead to anemia, suboptimal organ development, and reduced physical growth, which can impact the productivity of an adolescent (Waryana, 2010).

The level of protein fulfillment is lower due to the lack of protein side dishes on the menu. One example is that at some meals, there are no vegetable protein side dishes, resulting in a nutrient imbalance. The lack of fat fulfillment is due to the lack of serving foods that contain fat, such as mackerel, sardines, and fruits that are high in fat.

CONCLUSION

Al-Hikmah Cirebon Islamic Boarding School is divided into boys' and girls' sections. The female dormitory is located in Bobos Village, while the male dormitory is located in Balad Village. However, the pesantren kitchen is still centered on the female dormitory. The kitchen division consists of 15 people, divided into three shifts. Meal distribution is conducted three times a day (morning, afternoon, and evening) and served in a buffet style.

The average energy content and macronutrients in the daily meal menu served at Pesantren Al-Hikmah Cirebon contain 1941 kcal of energy, 51.9 grams of protein, 62.9 grams of fat, and 286.8 grams of carbohydrates. The nutritional adequacy of female Santri per day refers to the Nutritional Adequacy Rate (AKG) according to the Regulation of the

Minister of Health Number 28 of 2019, namely daily energy of 2075 kcal, daily protein of 65 grams, daily fat of 70 grams, and daily carbohydrates of 300 grams. The results showed that the level of nutritional adequacy of the 3-day menu cycle was lower in energy (93.5%), protein (79.9%), fat (89.9%), and carbohydrates (95.6%).

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