Amerta Nutrition
e-ISSN: 2580-1163 (Online)
p-ISSN: 2580-9776 (Print)
Camila et al. | Amerta Nutrition Vol. 7 Issue 2SP (December 2023). 107-117

RESEARCH STUDY
English Version

OPEN ACCESS

Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta

Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan

Faiza Camila[1], Nur Intania Sofianita[1]*, Iin Fatmawati[1], Ibnu Malkan Bakhrul Ilmi[1]

[1]Program Studi Gizi, Fakultas Ilmu Kesehatan, Universitas Pembangunan Nasional "Veteran" Jakarta, Depok, Indonesia

ARTICLE INFO

Received: *15-09-2023*
Accepted: *21-12-2023*
Published online: *31-12-2023*

Correspondent:
Nur Intania Sofianita
intania@upnvj.ac.id

DOI:
10.20473/amnt.v7i2SP.2023.107-117

Available online at:
https://e-journal.unair.ac.id/AMNT

Keywords:
Daily Intake, Application of Balanced Nutrition, Santri, Nutritional Status

ABSTRACT

Background: Nutritional intake problems are common among santries due to a lack of varied balanced nutritional menus, which impacts nutritional status. As a result, menu modifications are required to improve santries nutritional status.
Objectives: Creating a balanced nutritional menu and understanding the relationship between daily intake and nutritional status of the santries.
Methods: Using mixed methods quantitatively and experimentally. The research subjects used a quota sampling of 25 santries as well as untrained panelists and 15 semi-trained panelists, namely nutrition students who were experienced in organoleptic testing. Intake data from 2x24 hour food recall and nutritional status data from anthropometric measurements. The development of a balanced nutritional menu is adjusted to the results of monitoring and filling out questionnaires regarding preferences for food ingredients. Data analysis uses the Spearman test to determine the relationship between variables.
Results: There is a relationship between energy intake (p-value = 0.050), protein intake (p-value = 0.005), and fat intake (p-value = 0.018) and student nutritional status; however, there is no relationship between carbohydrate intake (p-value = 0.188). The santries's fiber intake is still below the Nutritional Adequacy Rate, and the rainbow tofu hotpot is the result of developing a balanced nutritional menu that the santries enjoy the most.
Conclusions: The nutritional status of santries's related to their energy, protein, and fat intake. There is no link between carbohydrate intake and student nutritional status. "Rainbow Tofu Hotpot" is a nutritionally balanced menu that santries prefer in terms of color, taste, aroma, and texture.

INTRODUCTION

A common problem among "santri" (student in islamic boarding school) is the imbalance between food intake and nutrient supply in the body. Nutrition intake in adolescents contributes to more optimal growth and development [1]. The implementation of a diet with balanced nutrition through a varied and diverse menu is a way to increase appetite and can optimize nutritional status in teenagers. The foods served should be varied and rich in both macronutrients and micronutrients[2]. Unhealthy foods intake, insufficient intake and inappropriate intake will affect the health and nutritional status of adolescents [3]. A normal nutritional state can be achieved if the body continues to receive sufficient nutrients and use these nutrients effectively, thus supporting physical development, brain capacity and body tissue function[4]. The application of balanced nutrition is a way to optimize nutritional status in adolescents. The process of achieving balanced nutrition is focused on the 10 Pedoman Gizi Seimbang messages (PGS) covered in the 4 Nutritional Pillars of the Pedoman Umum Gizi Seimbang (PUGS)[5].

Nutritional status is a description of the relationship between food intake and the nutritional requirements necessary to support the body's metabolism[6]. TThe nutritional status of adolescents aged 10 to 18 years can be assessed using the Body Mass/Age Index (BMI/Age) method, categorizing individuals into groups such as very thin, thin, normal, overweight, and obese[7]. According to the Basic Health Research Data (RISKESDAS) of 2018, the nutritional status of adolescents aged 13 to 15 years showed a prevalence 25.7% of short, 8.7% of thin and 16% of obese.[8] Based on national nutrition monitoring data for 2017, it was found that the prevalence of adolescents aged 12-18 with a very low nutritional status was 1.2%, thin 3.5%, normal 75.8%, overweight 15.1% and obese 4.3%[9]. Nutritional status can be directly influenced by food intake and physical activity. Based on Titis Citra research in 2023, it shows that 48.5% of teenagers with undernutrition status have

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

less daily intake.[10]. According to Almatzier in 2009, it stated that nutritional status can describe the human body's balance between food and nutrient intake[11]. According to Abdullah's study of 2022, it shows that as much as 10% of the nutritional status of santries in many islamic boarding schools has undernutrition status and obesity[12].

Based on preliminary studies, it shows that the islamic boarding school has not fully implemented balanced nutrition at every mealtime, and the meals served are less varied. This is because the worker does not have a daily menu cycle. In addition, the food consumed by each teenager has different quantities or portions according to the teenager's preferences. So it is necessary to develop a menu based on the principle of balanced nutrition that has a good and healthy taste in order to be able to optimize the daily intake of nutrients for performing daily activities, as well as the importance of studying the relationship between daily intake and the nutritional status of the teenage santries.

METHODS

This research uses a mixed-methods design, namely a combination of qualitative and quantitative methods (experiment). The mixed method aims to expand research by combining several research methods[13]. The population of this study were all santries at Islamic Boarding School X, located in South Jakarta. The variables in this study were daily intake consisting of energy intake, protein intake, fat intake, carbohydrate intake, fiber intake, and nutritional status (BMI/Age). The total sample was 25 people using the quota sampling method, with the aim of taking a small number of samples from a small population[14]. The inclusion criteria for respondents in this study were teenage santries aged 10-19 years, teenagers cared for by an Islamic boarding school. The exclusion criteria in this study were teenage santries who had obstacles when collecting data, including teenage santries with special needs, teenage santries who were or had a history of certain diets, and teenage santries who were or had a history of fasting two days before data collection.

Nutritional status data was collected from the results of direct anthropometric measurements, namely measuring body height using a microtoise and body weight using a digital scale. Data on the nutritional status of teenage santries is classified based on nutritional status based on Body Mass Index (BMI) divided by Age (BMI/Age) into the following categories: undernutrition (< -3 SD), malnutrition (-3 SD to -2 SD), normal (-2 SD to +1 SD), overweight (+1 SD to +2 SD), and obesity (> +2 SD)[15]. Daily intake interview using 2x24h food recall, which will be classified based` on the Nutritional Adequacy Rate (NAR) according to the Widyakarya Nasional Pangan dan Gizi 2004, including less daily intake (<80% NAR), normal daily intake (80-110% NAR), and more daily intake (> 110% NAR)[16].

Data on the development of menu modifications was obtained from collecting data describing respondents' favorite foods using a food ingredient preference level form and interviews with the food procurement system for developing menu modifications for 1 week/7 days. The statistical analysis used to determine the relationship between variables is using the Shapiro-Wilk test, which aims to test the normality of the data; the results obtained are p values <0.005 so that the distribution of this research data is not normal, and then continuing with the Spearman test, which aims to see the relationship between variables. As well as statistical analysis used to develop a balanced nutritional menu for teenage santries using organoleptic tests on 15 semi-trained panelists (panelists who have received the material or taken part in previous organoleptic tests from university students majoring in nutrition) and 25 untrained panelists (panelists who have never received the material or have never taken part in organoleptic tests before, from teenage santries at Islamic boarding school X) with data collection using a Likert scale. The provisions for the number of panelists in this study are based on food technology books on practical theory and application, which recommend a number of semi-trained panelists for organoleptic tests of 5-15 panelists and a recommended number of untrained panelists of 25-100 panelists[17].

The stages in developing menu modifications are: monitoring the menu at the research location for one week, which is useful for finding out what menus the Islamic boarding school serves every day; then testing the level of preference for food ingredients based on a list of available food ingredients or frequently used food ingredients used by Islamic boarding schools After that, prepare a one-week menu cycle based on balanced nutrition. Then three menus are selected in the menu cycle for organoleptic testing on semi-trained panelists, and then the menu most liked by semi-trained panelists will be used for organoleptic testing on untrained panelists. Therefore, the results of the organoleptic tests of untrained panelists will be used as a reference to answer the objectives of the research in developing modifications to a balanced nutritional menu that is preferred by teenage santries. This research has been approved by the Health Research Ethics Committee of the Pembangunan Nasional "Veteran" Jakarta University with number 77/IV/2023/KEPK.

RESULTS AND DISCUSSION

An overview of the characteristics of teenage santries, including age, gender, nutritional status, and daily intake, is presented in Tables 1 and 2. Apart from that, bivariate analysis was also carried out regarding the analysis of the relationship between daily intake and nutritional status in Table 3. An explanation of the research results related to the development of modified balanced nutritional menus is in Tables 4 to 8, starting from monitoring the Islamic boarding school menu for 1 week, food ingredient preferences, the Islamic boarding school menu cycle, a semi-trained panelist hedonic test, the hedonic test of rainbow tofu hotpot as the menu most liked by santries, as well as an explanation regarding the food procurement system at the Islamic boarding school.

Characteristics of Adolescent Santri

Characteristics of teenage santries include age and gender. Anthropometric measurements are the result of calculating body height and weight to obtain the

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

nutritional status value of the respondent.

Table 1. Description of the Characteristics of Adolescent Santri

Variable	n	%
Age		
Early Adolescence (10 - 14 years)	17	68
Late Teenagers (15 - 19 years)	8	32
Total	25	100
Gender		
Man	14	56
Woman	11	44
Total	25	100
Nutritional Status		
Undernutrition (-3 SD sd -2 SD)	12	48
Normal (-2 SD sd +1 SD)	8	32
Overweight (+1 SD sd +2 SD)	3	12
Obesity (> +2 SD)	2	8
Total	25	100

Table 1 shows that the majority of teenage santries in this study fell into the category of early adolescence (68%), were male (56%), and had undernutrition status (48%). In the nutritional status section of adolescents, it shows that the majority have undernutrition status. This is related to Abdullah's research in 2022, which found that the nutritional status of high school students was mostly caused by undernutrition and obesity[12].

Daily Intake of Adolescent Santri

Adolescents' daily intake levels consist of energy, protein, fat, carbohydrate and fiber intake. These results were obtained from direct interviews with 2x24 hour food recall. This 2x24 hour food recall interview was conducted on weekdays and weekends. Calculation of nutritional value uses the 2019 Indonesia's Food Composition Table (IFCT) which will then be classified based on the 2019 Nutrition Adequacy Rate (NAR).

Table 2. Daily Intake Overview

Variable	n	%	Mean
Energy (calories)			
Less Daily Intake (<80% NAR)	14	56	1757.00
Normal Daily Intake (80 - 110% NAR)	7	28	
Over Daily Intake (>110% NAR)	4	16	
Total	25	100	
Protein (grams)			
Less Daily Intake (<80% NAR)	7	28	57.77
Normal Daily Intake (80 - 110% NAR)	14	56	
Over Daily Intake (>110% NAR)	4	16	
Total	25	100	
Fat (grams)			
Less Daily Intake (<80% NAR)	10	40	68.81
Normal Daily Intake (80 - 110% NAR)	8	32	
Over Daily Intake (>110% NAR)	7	28	
Total	25	100	
Carbohydrate (grams)			
Less Daily Intake (<80% NAR)	17	68	232.58
Normal Daily Intake (80 - 110% NAR)	6	24	
Over Daily Intake (>110% NAR)	2	8	
Total	25	100	
Fiber (grams)			
Less Daily Intake (<80% NAR)	25	100	4.60
Normal Daily Intake (80 - 110% NAR)	0	0	
Over Daily Intake (>110% NAR)	0	0	

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

Variable	n	%	Mean
Total	25	100	

Table 2 shows that the majority of santries's daily consumption is in the deficient category, this is in line with Abdullah's research in 2022 on 72 students, with the results that the students' total daily consumption was not enough energy, protein, fat, and carbohydrates[12]. Table 2 shows that the majority of students' daily consumption is in the deficient category, this is in line with Abdullah's research in 2022 on 72 students, with the results that the students' total daily consumption was not enough energy, protein, fat, and carbohydrates[18]. The lack of daily intake among teenagers is because the menu served by the Islamic boarding school is less varied in terms of ingredients and taste. Therefore, teenagers tend to consume food from outside more often, which, of course, is not guaranteed to be safe, clean, and healthy. This will have an impact on the santries daily intake not being fulfilled, and if it occurs over a long or prolonged period of time, it will cause malnutrition and reduce the santries productivity. In line with Faradilla's 2020 study, which stated that providing the same food every day will result in eating less due to boredom[19].

Relationship between Daily Intake and Nutritional Status of Student

Daily intake is obtained from a 2x24-hour food recall, which is classified based on the Nutrition Adequacy Rate (NAR) 2019. Nutritional status is obtained from direct measurements, including body height and weight, which will be interpreted based on the classification of nutritional status according to BMI/Age (Indonesia's Minister of Health Regulation Number 2 of 2020). Next, the intake variable was linked to nutritional status using the Spearman test to see the p-value and the direction of the relationship from the r value.

Table 3. Relationship between Daily Intake and Nutritional Status

Daily Intake	Nutritional Status								Total		*p - value*	*r*
	Undernutrition		Normal		Overweight		Obesity					
	n	%	n	%	n	%	n	%	n	%		
Daily Energy Intake												
Less	9	36.0	3	12.0	1	4.0	1	4.0	14	56	0.050*	0.396
Normal	3	12.0	3	12.0	0	0.0	1	4.0	7	28		
Over	0	0.0	2	8.0	2	8.0	0	0.0	4	16		
Total	12	48	8	32	3	12	2	8	25	100		
Daily Protein Intake												
Less	6	24.0	1	4.0	0	0.0	0	0.0	7	28	0.005*	0.546
Normal	5	20.0	5	20.0	1	4.0	1	4.0	14	56		
Over	1	4.0	2	8.0	2	8.0	1	4.0	4	16		
Total	12	48	8	32	3	12	2	8	25	100		
Daily Fat Intake												
Less	7	28.0	0.018	0.471	1	4.0	0	0.0	10	40	0.018*	0.471
Normal	5	20.0	1	4.0	0	0.0	2	8.0	8	32		
Over	0	0.0	5	20.0	2	8.0	0	0.0	7	28		
Total	12	48	8	32	3	12	2	8	25	100		
Daily Carbohydrate Intake												
Less	10	40.0	4	16.0	1	4.0	2	8.0	17	68	0.188	0.272
Normal	2	8.0	3	12.0	1	4.0	0	0.0	6	24		
Over	0	0.0	1	4.0	1	4.0	0	0.0	2	8		
Total	12	48	8	32	3	12	2	8	25	100		
Daily Fiber Intake												
Less	12	48.0	8	32.0	3	12.0	2	8	25.0	100	a	-
Normal	0	0.0	0	0.0	0	0.0	0	0.0	0	0		
Over	0	0.0	0	0.0	0	0.0	0	0.0	0	0		
Total	12	48	8	32	3	12	2	8	25	100		

* = significant data and has a relationship between variables, a = the result of the data being constant because the data has no variations

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

In Table 3, the daily energy intake variables with teenage santries nutritional status showed a significant relationship with a p-value of 0.050 and a positive and strongly demonstrated relationship with r value 0.396. This is in line with Citra research in 2021 which states that there is a relationship between daily energy intake and the nutritional status (BMI/Age) of santries, and daily energy intake tends to be less than the NAR[10]. This can happen because the results of the 2x24h food recall show that teenagers consume small amounts of energy. Apart from that, most of the santries have undernutrition status. According to Annis Catur (2023), consumption of macronutrients is one of the energy intakes that can influence nutritional status and, of course, changes in body weight. However, this does not have a direct effect but is in accordance with the body's metabolic system in each individual[20].

In Table 3, the variable daily protein intake and nutritional status of teenage santries show that there is a significant relationship with a p-value of 0.005 and there is a positive and strong relationship as evidenced by the r value of 0.546. This is in line with Citra's research in 2021 which states that there is a relationship between daily protein intake and the nutritional status (BMI/Age) of santries and daily protein intake tends to be classified as less when compared to the NAR[10]. This shows that the majority of adolescents with undernutrition status also have insufficient protein intake. According to a study from Khoerunisa (2021), protein is a nutrient that makes up cells and body tissues and has a function that cannot be replaced by other nutrients, so it can influence the growth and development of a person's body[21]. Therefore, it is necessary to increase daily protein intake, in order to optimize growth and development in adolescents.

Table 3 regarding the variable daily fat intake and the nutritional status of teenage santries show that there is a relationship with a p-value of 0.018 with a fairly strong relationship category as evidenced by an r value of 0.471. This is in line with a 2021 study by Setiyaniarum, which found a relationship between daily fat intake and nutritional status (BMI/Age) in adolescents, with fat intake below the recommended daily intake[22]. This can be seen from the 2x24h food recall data, showing that the majority of santries consume less fat. Apart from that, the nutritional status of teenagers is also classified as undernutrition. This shows that the majority of teenagers with undernutrition status also have less fat intake.

Table 3 discusses the amount of daily carbohydrate intake and nutritional status, showing that the p-value is 0.188, which means there is no significant relationship between carbohydrate intake and nutritional status, with an r value of 0.272. This is in line with the results of the Setiyaniarum (2021) study which showed that there was no relationship between daily carbohydrate intake and nutritional status (BMI/Age) in adolescents, with the average daily carbohydrate intake below the recommended amount[22]. This was also stated in Irdiana's 2017 study which concluded that there was no relationship between daily carbohydrate intake and the nutritional status of adolescents[23].

Table 3 relating daily fiber intake to nutritional status shows the p-value a (a = database is a constant). This is because all teenage santries have a low level of daily fiber intake because it can be seen from the food recall results that there is a lack of fiber consumption from vegetables and fruit. According to Virlita's research in 2015 which showed that most teenagers do not like vegetables and fruit. This is related to insufficient fiber intake due to no or low consumption of vegetables and fruit, as well as a greater tendency to consume food from outside which tends to be high in calories, fat, sugar and salt[24].

Monitoring Islamic Boarding School Menu Cycles

This menu cycle monitoring process is carried out for 7 days, starting from Monday to Sunday.The menu cycle monitoring aims to assess the food provided by the Islamic boarding school management for student consumption. From the results of monitoring this menu cycle, it will become a reference for conducting a survey of the level of preference for food ingredients.

Table 4. Monitoring the Islamic Boarding School Menu for 1 Week

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
White rice Orek tempeh Meatball Soup	White rice Fried tofu Fried noodles Tamarind Vegetable soup Chili sauce	White rice Fried tofu Fried tempe Balado eggplant	White rice Omelet Fried tempe Chicken soup Chili sauce	White rice Fried catfish Balado eggs Sauteed green beans	White rice Soy sauce chicken Balado potatoes	White rice Fried catfish Fried salted fish Balado eggs Chicken vermicelli soup

Table 4 shows the results of monitoring the Islamic boarding school food procurement system for one week from Monday to Sunday. Then it will continue with the process of determining the food ingredients that will be used as references for the food ingredients that will be used in the process of making menu modifications. This aims to ensure that every meal served can be accepted or finished by Islamic boarding school youth. Of course, in the menu preparation stage, you must follow the principles of balanced nutrition to support adequate daily intake and good nutritional status for boarding school youth.

Favorite Food Ingredients

The questionnaire used to survey the level of preference for food ingredients was created from the results of monitoring the menu cycle for 7 days. Apart from that, combined with easy and cheap food ingredients, it is affordable in terms of funds for Islamic boarding schools. The results of the survey on the level of preference for food ingredients will be a reference for creating a 7-day menu cycle in Islamic boarding schools.

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

Table 5. Favorite Food Ingredients

Food Ingredients	Modus	Min - Max
Staple Food		
Rice	5	4 - 5
Potato	4	3 - 5
Yellow Noodles	5	3 - 5
Rice Noodles	4	3 - 5
Animal Side Dishes		
Chicken	5	4 - 5
Egg	5	4 - 5
Catfish	4	3 - 5
Processed Meat	4	3 - 5
Vegetable Side Dishes		
Tofu	4	4 - 5
Tempeh	4	4 - 5
Mold	4	4 - 5
Vegetable		
Carrot	4	4 - 5
Spinach	4	4 - 5
Beans	4	3 - 5
Eggplant	4	3 - 5
Cabbage	4	3 - 5
Mustard Greens	4	3 - 5
Chinese Cabbage	4	3 - 5
Long Beans	4	3 - 5
Corn	5	4 - 5
Fruit		
Banana	5	3 - 5
Orange	5	3 - 5
Flavor		
Sweet	5	3 - 5
Salty/Savory	4	3 - 5
Tamarind	3	3 - 5
Spicy	5	3 - 5

5 = really like, 4 = like, 3 = neutral, 2 = don't like and 1 = very dislike

Table 5 shows all the food ingredients that santries like. The most popular staple food group is rice and yellow noodles. In the group of animal side dishes most liked by santries, namely chicken and eggs. In the vegetable side dishes group, all the food ingredients favored by santries include tofu, tempeh and mushrooms. For the vegetable and fruit group, overall the food items are liked by the santries. Additionally, it was observed that the taste preferences favored by santries predominantly include sweet and spicy flavors. These findings are evident in the alignment between the preferred food ingredients and the menus recalled during the 2x24-hour food recall.

Islamic Boarding School Menu Cycle

The process of creating this menu cycle is based on the results of a survey on the level of preference for food ingredients. This menu cycle was created with the aim that the menu served by Islamic boarding school varies every day and of course still applies the principles of balanced nutrition. This menu cycle consists of seven days with three groups of meal times consisting of breakfast, lunch and dinner. At every meal, of course, apply balanced nutrition containing complete components, namely staple foods, side dishes (animal side dishes and vegetable side dishes), vegetables and fruit.

Table 6. Islamic Boarding School Menu Cycle

Day	Breakfast	Lunch	Dinner
1	Fried rice	White rice	White rice
	Omelet	Sweet and sour catfish	Oyster sauce meatballs
	Dried tempeh	Fritters tofu	Pepes jamur
	Cucumber, tomato, lettuce	Misoa Soup	Capcay
	Fruit	Fruit	Fruit
2	White rice	White rice	Uduk rice
	Chicken roulade	Egg balado	Fried catfish

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

Day	Breakfast	Lunch	Dinner
	Sweet and sour tempeh	Kung Pao tofu	Orek tempeh
	Red spinach	Saute green mustard eggplant	Chickpea soup
	Fruit	Fruit	Fruit
3	Butter rice	White rice	White rice
	Black pepper squid	Spicy basil catfish	Grilled chicken
	Mushrooms	Serundeng tempeh	Sakura tofu
	Long beans, tomatoes	Cah kale	Tamarind vegetable soup
	Fruit	Fruit	Fruit
4	Hong Kong fried rice	White rice	White rice
	Fried sausage	Chicken balls in tomato sauce	Fu yung hai
	Tofu	Yellow tempeh	Steamed tofu
	Cucumber	Brokoli	Sauteed carrots, bok choy
	Fruit	Fruit	Fruit
5	White rice	White rice	Nasi hijau
	Butter chicken	Catfish in sour sauce	Garlic chicken
	Tempeh bacem	Tofu balls	Mushroom satay
	Soup	Lodeh eggplant vegetables soup	Egg corn soup
	Fruit	Fruit	Fruit
6	Fried noodles	Aromatic rice	Cwie noodles
	Grilled meatball	Egg ekado	Battered fried squid
	Tempe mendoan	Sapo tofu rainbow	Tempeh patties
	Cucumber, tomato, lettuce	Broccoli and baby corn soup	Sauteed mustard greens
	Fruit	Fruit	Fruit
7	Rice porridge	Roasted rice	White rice
	Shredded chicken	Green squid	Balado catfish
	Yellow Soup Tofu	Tempe balado	Tofu pepes
	Sauteed green beans	Cap cay meatballs	Spinach
	Fruit	Fruit	Fruit

Table 6 shows a menu cycle for seven days which contains three groups of meal times consisting of breakfast, lunch and dinner. The process of making this menu cycle is of course based on the principles of balanced nutrition, the level of youth preferences, the availability of ingredients and the processing process. Then a hedonic test was carried out on 15 semi-trained panelists on 3 menu choices. The process of determining the 3 menus that will be carried out hedonic tests is based on food menus whose manufacturing process is unique and has never been made by the Islamic boarding school before.

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

Semi-Trained Panelist Hedonic Test

Figure 1. Breakfast Menu

Figure 1 is a breakfast menu consisting of white rice, chicken roulade, sweet and sour tempeh and red spinach. One portion as in the picture above has an estimated price per portion of IDR 10,350.

Figure 2. Lunch Menu

Figure 2 is the lunch menu which consists of aromatic rice, egg ekado, rainbow tofu hotpot and baby corn and broccoli soup. One portion like the picture above has an estimated price per portion of IDR 11,300.

Figure 3. Dinner Menu

Figure 3 is a dinner menu consisting of green rice, garlic chicken, mushroom satay and egg corn soup. One portion as in the picture above has an estimated price per portion of IDR 11,400.

Tabel 7. Semi-Trained Panelist Hedonic Test

Hedonic Mode Value of the Breakfast Menu				
Parameter	**White Rice**	**Roulade Chicken**	**Sweet and Sour Tempe**	**Red Spinach**
	n (Min - Max)	**n (Min - Max)**	**n (Min - Max)**	**n (Min - Max)**
Color	4 (3 - 5)	4 (3 - 5)	5 (4 - 5)	4 (2 - 5)
Flavor	4 (3 - 5)	4 (3 - 5)	5 (4 - 5)	4 (2 - 5)
Aroma	4 (3 - 5)	4 (2 - 5)	5 (2 - 5)	4 (3 - 5)
Texture	4 (2 - 5)	3 (2 - 5)	5 (4 - 5)	4 (2 - 5)
Hedonic Mode Value of the Lunch Menu				
Parameter	**Aroma Rice**	**Egg Ekado**	**Rainbow Tofu Hotpot**	**Broccoli and Baby Corn Soup**
	n (Min - Max)	**n (Min - Max)**	**n (Min - Max)**	**n (Min - Max)**
Color	4 (3 - 5)	5 (3 - 5)	5 (2 - 5)	4 (2 - 5)
Flavor	4 (3 - 5)	4 (3 - 5)	5 (3 - 5)	4 (3 - 5)
Aroma	4 (3 - 5)	4 (3 - 5)	5 (3 - 5)	4 (2 - 5)
Texture	4 (2 - 5)	4 (2 - 5)	5 (4 - 5)	4 (4 - 5)
Hedonic Mode Value of the Dinner Menu				
Parameter	**Green Rice**	**Chicken Garlic**	**Mushroom Satay**	**Corn Egg Soup**
	n (Min - Max)	**n (Min - Max)**	**n (Min - Max)**	**n (Min - Max)**
Color	4 (4 - 5)	5 (3 - 5)	4 (3 - 5)	4 (4 - 5)
Flavor	3 (2 - 4)	5 (3 - 5)	2 (2 - 5)	4 (2 - 5)
Aroma	3 (2 - 4)	5 (3 - 5)	4 (2 - 5)	4 (2 - 5)
Texture	4 (2 - 4)	5 (3 - 5)	4 (2 - 5)	4 (3 - 5)

5 = really like, 4 = like, 3 = neutral, 2 = don't like and 1 = very dislike

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

Table 7 of the breakfast menu section shows that the majority of panelists rated the breakfast menu consisting of white rice, chicken roulade, sweet and sour tempeh, and red spinach as being given a like value (score 4) for each parameter (color, taste, aroma, and texture). However, the assessment of the texture of the chicken roulade showed that most of the panelists rated it as neutral (3) because the texture of the chicken roulade served was a little dry. Of all the menus served on this breakfast menu, most of the panelists liked the sweet and sour tempeh menu in terms of color, taste, aroma, and texture.

Table 7, part of the lunch menu, shows that most of the panelists rated the lunch menu consisting of aromatic rice, egg ekado, rainbow tofu hotpot and broccoli and baby corn soup with a like value (score 4) for each parameter (color, taste, aroma, and texture). Of all the menus served on this lunch menu, most of the panelists liked the rainbow tofu hotpot menu in terms of color, taste, aroma, and texture.

Table 7, part of the afternoon meal menu, shows that most of the panelists rated the dinner menu consisting of green rice, garlic chicken, mushroom satay, and egg corn soup, given a like value (score 4) for each parameter (color, taste, aroma, and texture). However, for assessing the taste of the mushroom satay menu, it was given the dislike category (score 2) because the taste of mushroom satay tends to be bitter. Of all the menus served on this dinner menu, most of the panelists liked the garlic chicken menu in terms of color, taste, aroma, and texture.

Untrained Panelist Hedonic Test

Figure 4. Rainbow Tofu Hotpot

Based on the results of organoleptic tests by 15 semi-trained panelists, they liked the rainbow tofu hotpot menu. Therefore, this menu will be subjected to an organoleptic test by assessing the hedonic quality by 25 untrained panelists, namely santries. Then the author will make improvements to this dish based on the assessment results of 15 semi-trained panelists starting from hedonic (color, aroma, taste and texture) as well as suggestions and comments given on the menu. The results of the suggestions and comments given by semi-trained panelists on the rainbow tofu hotpot menu include that it has a slightly less savory taste, has a slightly pale color and does not match its name, namely rainbow tofu hotpot, and tastes a little spicy but is still within the normal range and can be eaten.

Tabel 8. Untrained Panelist Hedonic Test

Parameter	n	Min - Max
Color	4	4 - 4
Flavor	4	4 - 4
Aroma	4	4 - 5
Texture	4	4 - 4

5 = really like, 4 = like, 3 = neutral, 2 = don't like and 1 = very dislike

Table 8 shows that most of the panelists rated it as good (score 4) on the parameters of color, taste, aroma and texture. The panelists said that the rainbow tofu hotpot doesn't taste spicy enough. This is related to the results of the food preferences assessment which stated that Islamic boarding school teenagers like spicy food.

Islamic Boarding School Food Procurement System

The food procurement system in Islamic boarding schools is carried out every day. Islamic boarding schools do not have a menu cycle, but the food served varies every day according to the food ingredients available. For food that is served 3 times a day, but there is no definite time for processing it. This is in line with Scholichah's research in 2020 regarding the number of meals students eat 3 times a day in accordance with recommended health standards[25]. Each meal certainly contains complete components, namely staple food, side dishes (animal side dishes and vegetable side dishes) and vegetables. In the process of purchasing wet food ingredients, Islamic boarding schools carry out a shopping system directly to the location, market or greengrocer which is carried out by a team of administrators who the day before carry out the process of recording the need for food ingredients to be processed, then purchasing food ingredients is carried out, and purchasing wet food ingredients is usually done every morning. To procure dry food ingredients which are often obtained from donors or local residents. However, if the dry food ingredients run out, the head of the foundation will immediately buy

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

them at the nearest agent. This is in line with Wahyu's research in 2019, which stated that the system for purchasing food ingredients was carried out directly by officers or administrators without prior ordering[26]. Purchases of dry food ingredients are carried out erratically or based on existing stock without calculating food needs based only on estimates.

The estimated costs incurred to purchase dry food needs are around IDR 50,000 - 100,000/day. Then the costs incurred to purchase wet food ingredients range from IDR 80,000 - 150,000/day. The source of these costs is mostly obtained from donors. The food processing system carried out by Islamic boarding schools, such as preparing food ingredients first, includes washing and cutting wet food ingredients. The number of portions made by officers is 40 portions for the total number of santries ranging from toddler santries to teenage santries. Then food processing is carried out by 1 officer. This food processing is usually done only once, namely in the morning. If there is no food remaining during lunch and dinner, the staff will prepare another meal using the available ingredients. Most cook from basic ingredients of chicken, eggs and noodles. During food distribution, each student takes their own food provided that portions are free or there are no standard portions. However, you are expected to finish the food you have taken. If you want to increase the portion, it is allowed and each food served does not have a price range for each portion. This is in line with Syifa Humairah's research in 2022 which stated that the research location had not implemented standard portions for each meal, did not have a definite time for each meal and did not have a standard menu for each meal[27]. The limitation of this research is the small and limited data collection time. Because Islamic boarding school x only allows data collection on weekends, namely on Saturdays and Sundays.

CONCLUSIONS

Most of the santries are in the early teenage category (10 - 14 years), are male and have undernutrition status (≥ -3 SD to < -2 SD). Most Islamic boarding school teenagers have insufficient daily energy, fat, carbohydrate and fiber intake. There is a relationship between daily energy, protein and fat intake and adolescent nutritional status (BMI/Age). There is no relationship between carbohydrate intake and adolescent nutritional status (BMI/Age). The results of the development of menu modifications are based on the principles of balanced nutrition. The most popular menu in terms of color, taste, aroma and texture is the rainbow tofu hotpot. Suggestions for Islamic boarding schools to start implementing the balanced nutritional menu cycle provided and start paying attention to the santries's daily intake in order to improve the santries's normal nutritional status.

ACKNOWLEDGMENTS

Thanks are given to the management and santries of Islamic boarding school X and to panelists from Nutrition Study Program, Faculty of Health Science, UPN Veteran Jakarta.

Conflict of Interest and Funding Disclosure

No conflict interest. All funding comes from personal funds.

REFERENCES

1. Dwi Jayanti, Y. & Elsa Novananda, N. The Relationship Between Knowledge of Balanced Nutrition and Nutritional Status in Female Adolescents of Grade XI Accounting 2 (at SMK PGRI 2 Kediri City). *J. Midwifery* **6**, 100-108 (2019).
2. Taqhi, S. A. The Description of Food Procurement System At the Hubulo Islamic. *Indonesia Public Health Media* **2**, 241-247 (2014).
3. Rahman, N. Factors Associated with Eating Behavior in High School Adolescents of State Senior High School 1 Palu *J. Prev.* **7**, 1-64 (2016).
4. Rahayu, P. S., Suparman, S., Dewi, M., Agung, F. & Hastuti, W. Asupan Energy Intake, Protein Intake, Physical Activity, and Nutritional Status in Female Adolescents at the Boarding School. *J. Health. Siliwangi* **2**, 995-1003 (2022).
5. Kemenkes RI. *Indonesia Health Profile. Indonesia Health Ministry*. *Pusdatin.Kemenkes.Go.Id* (2014).
6. World Health Organization. *World Health Statistics*. *Who* vol. 1 (2011).
7. Kemenkes RI. *Indonesia Health Profile 2018 Indonesia Health Ministry*. *Health Statistics* (2019).
8. Kemenkes RI. *Health Data Research* (2018).
9. Kemenkes RI. Pocket Book for Monitoring Nutritional Status. *Pocket Book* 1-150 (2017).
10. Mahkota, T. C. & Soeyono, R. D. The Relationship Between the Level of Macro-Nutrient Consumption and Physical Activity with the Nutritional Status of Adolescents at Al - Achsaniyyah Boarding School, Kudus. (2021).
11. Atmalzier, S.Basic Principles of Nutritional Science. (2009).
12. Abdullah, Dewi, A. P., Muharramah, A. & Pratiwi, A. R. Overview of Nutritional Status and Nutrient Intake in Adolescent Students at Shuffah Hizbullah Islamic Boarding School and Al-Fatah Madrasah in Lampung. *J. Aisyah Nutrition* **5**, 6-12 (2022).
13. Abbas tashakkori. *Handbook Of Mixed Methods In Social and Behavioral Research*. (2010).
14. Sugiyono. *Quantitative, Qualitative, and R&D Research Methods*. (PT Alfabet, 2016).
15. Kemenkes RI. *Anthropometric Standards for Children.* vol. 2507 (2020).
16. WNPG. *Food Security and Nutrition in the Era of Regional Autonomy and Globalization*. (LIPI, 2004).
17. Fitriyono, A. Food Technology: Theory and Practice. *Knowledge Center* 1-16 (2014).
18. Bachtiar, T., Satriani, S. & Hardiyanti, N. Analysis of Nutrient Content and Nutrient Intake of Students, as well as the Nutritional Status of Students at MA Sultan Hasanuddin, Pattunggalengang-Limbung, Gowa Regency, South Sulawesi. *Sainsmat J. Natural Sciences* **11**, 21 (2022).
19. Faradilah, A., Syakir, D. & Akbar, A. Overview of

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*

Nutritional Status and Dietary Intake of Teenagers in Tahfidz Islamic Boarding School. *Alami J. (Alauddin Islam. Medical) J.* **2**, 26 (2020).
20. Adi, A. C. Nutritional Status, Dietary Intake, and Sleep Duration of School Children: A Comparative Study : **7**, 1-7 (2023).
21. Khoerunisa, Isti Istianah, D.The Relationship Between Macronutrient Intake, Physical Activity, and Nutritional Status in Adolescents. *J. Food, Health, and Nutrition* **2**, 51-61 (2021).
22. Setiyaningrum, Z. Nutrient Intake and Nutritional Status of Female Adolescents at Firdaus Islamic Boarding School. *J. Nutrition and Health.* **3**, 1-8 (2021).
23. Irdiana, W. & Nindya, T. S. The Relationship Between Breakfast Habits, Nutrient Intake, and Nutritional Status of Female Students at SMAN 3 Surabaya. *Amerta Nutr.* **1**, 227 (2017).
24. Virlita, Destriatania, S. & Febry, F. Perception of Fiber Consumption Habits Among Junior High School and High School Adolescents in Palembang City in 2013. *J. Public Health Science.* **6**, 74-82 (2015).
25. Sholichah, F. & Syukur, F.The Organization System of Meals in Tahfidz Islamic Boarding School. *J. Research and Development in Indonesian Community Health.* **1**, 90-100 (2020).
26. Ningtyias, F. W. *et al.* Overview of the Food Organization System in Islamic Boarding Schools, Jember Regency. *J. Medical Technology in Public Health* **2**, 25-34 (2018).
27. Humaira, S., Dewintha, R. & , Shelly Festilia Agusanti, M. Overview of the Food Organization System at Al-Fatah Islamic Boarding School, Singkawang. **5**, 229-239 (2022).

IMAGE SOURCE FOR PROMOTION

https://unsplash.com/photos/salad-on-white-ceramic-bowl-on-top-of-table-near-laptop-ly_gX1NARIc

How to cite: *Camila, F., Sofianita, N. I., Fatmawati, I., & Ilmi, I. M. B. (2023) Development of a Balanced Nutrition Menu and Nutritional Status of Teenage Santries in South Jakarta: Pengembangan Menu Gizi Seimbang dan Status Gizi Santri Remaja di Jakarta Selatan. Amerta Nutrition, 7(2SP), 107–117.*