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Menu Variety, Macronutrient Intake, and Nutritional Status among Dormitory Students at Poltekkes Kemenkes Surabaya

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ABSTRACT

A cross-sectional study was conducted to analyze menu variations, the level of macronutrient intake (energy, protein, fat, and carbohydrates), and the nutritional status of students living in the dormitory of the Ministry of Health Polytechnic of Surabaya. Dormitories provide facilities and infrastructure, one of which is food, which plays an important role in shaping food intake and the nutritional status of its residents. The sample consisted of 76 students selected through proportional stratified random sampling. Data were obtained from menu variation questionnaires, observations of the seven-day menu cycle, 2×24-hour food recall interviews, and anthropometric measurements (weight and height) for the calculation of Body Mass Index (BMI). The results showed that the variety of menus was quite varied (55.3%). However, the majority of dormitory residents experienced energy deficits (82.9%), fat deficits (42.1%), and carbohydrate deficits (98.7%), while normal protein intake reached 52.6%. To meet nutritional needs, dormitory residents generally add food from outside the dormitory, with outside consumption contributing around 30% of the total Nutritional Adequacy Rate (AKG). Most respondents had a monthly allowance of IDR 500,000–IDR 1,000,000. Nutritional status based on BMI indicated that 56.6% of students were in the normal category. The correlation test showed no significant relationship between menu variation and nutrient intake, or between nutrient intake and nutritional status ($p>0.05$). Data were analyzed using descriptive statistics and Spearman Rank correlation.

INTRODUCTION

Dormitory-based meal services play a pivotal role in shaping the dietary habits, nutrient intake, and overall health of students living away from home. For many, the dormitory is not only a place to stay but also a primary source of daily meals. As such, the quality, portion size, and diversity of the menus offered directly influence students' ability to meet their nutritional requirements[1]. In institutional settings such as school dormitories, universities, and vocational training centers, food provision is often centralized and managed under strict budgets, standardized menu cycles, and logistical constraints, which can either support or hinder the attainment of balanced nutrition[2,3].

A varied menu is essential for ensuring adequate intake of macro- and micronutrients. Menu variety encompasses diversity in food groups, colors, textures, flavors, and cooking methods[4]. Beyond simply avoiding repetition, variety ensures that meals collectively meet the body's needs for essential nutrients, including energy, protein, fats, carbohydrates, vitamins, and minerals[5]. Research shows that monotonous menus where the same types of protein, staple foods, and vegetables are repeatedly

served tend to decrease appetite and satisfaction, leading to reduced food intake and lower nutrient adequacy[6]. In such circumstances, students may compensate by purchasing additional food from outside the dormitory; however, these external food choices often prioritize taste and convenience over nutritional value, increasing the risk of unhealthy eating patterns[7].

Globally, the double burden of malnutrition the coexistence of undernutrition and overnutrition within the same population is recognized as a pressing public health challenge[7,8]. This duality is particularly evident in low-and middle-income countries undergoing nutritional transition. While some individuals fail to meet basic energy and nutrient requirements, others consume diets high in refined carbohydrates, added sugars, and saturated fats, leading to overweight and obesity[6]. Among adolescents and young adults, both extremes are associated with serious long-term health consequences, including impaired cognitive function, increased susceptibility to infections, and elevated risks of non-communicable diseases (NCDs) such as diabetes, cardiovascular disease, and osteoporosis later in life[1].

Adolescents and young adults defined broadly as individuals between the ages of 15 and 24 have higher nutritional demands due to rapid physical growth, hormonal changes, and increased academic and physical workloads[4,9]. The brain continues to develop into the mid-twenties, making adequate nutrition critical not only for physical health but also for cognitive performance, emotional regulation, and decision-making capacity[9]. Inadequate energy or protein intake during this period can lead to reduced concentration, fatigue, and compromised academic performance. Conversely, excessive consumption of energy-dense, nutrient-poor foods can promote excess weight gain and metabolic dysregulation[10].

The institutional food environment including menu design, portion standards, mealtime scheduling, and dining facilities plays a decisive role in shaping students' eating behaviors[2,11]. In many dormitories, particularly those managed through outsourcing contracts, the menu cycle is fixed, often spanning 10–15 days, with minimal seasonal adjustments or rotation in staple ingredients. Studies from Indonesia and other countries have shown that such menu cycles often rely heavily on a small set of affordable protein sources (e.g., chicken and tofu), a single staple (e.g., rice), and limited vegetable diversity, with fruit served infrequently due to cost considerations[11,12]. The most common cooking methods such as deep frying may increase palatability but can also raise total fat intake while reducing nutrient density if not balanced with steaming, boiling, or baking[7].

These limitations are compounded by portion size discrepancies between actual servings and the recommended dietary allowances. The Ministry of Health's balanced nutrition guidelines for Indonesian adults aged 19 - 29 recommend daily servings of approximately 500 grams of rice or equivalent staples, 150 - 200 grams of protein foods (animal and plant combined), 300 grams of vegetables, and 250 grams of fruit[13]. Yet, in practice, dormitory-served portions are often below these

targets particularly for vegetables and fruit leading to nutrient gaps that must be filled through outside consumption. When outside foods are predominantly snacks, instant noodles, or sugary drinks, these gaps are filled with calories rather than essential nutrients[6].

The global literature also emphasizes the social and behavioral dimensions of dormitory eating patterns. Peer influence, time constraints due to academic schedules, and individual food preferences all interact with the institutional menu environment to shape dietary choices[6,7]. For instance, when menu options are unappealing, students are more likely to skip meals altogether or replace them with easily accessible but less nutritious options. Meal skipping, in turn, is associated with decreased nutrient intake, poor glycemic control, and diminished cognitive performance[10].

Within this context, students in health-related fields such as those at the Ministry of Health Polytechnic in Surabaya are a unique and strategically important population. As future healthcare professionals, their personal nutrition and health behaviors are not only vital for their own well-being but also serve as a foundation for their credibility in promoting healthy lifestyles to patients and communities[14]. Studies have noted that healthcare students with inadequate diets may experience fatigue, reduced clinical performance, and increased susceptibility to illness, which can compromise both their academic success and their professional readiness[1].

In Indonesia, the 2023 National Health Survey reported that among adults aged over 18 years, 7.9% were classified as undernourished (wasting), 52.9% as having normal nutritional status, 14.8% as overweight, and 24.4% as obese[13]. These figures underscore the urgency of targeted interventions in environments where young adults live and eat communally such as dormitories. Given the high prevalence of both ends of the nutritional spectrum, improving dormitory food services could have a meaningful impact on public health outcomes.

Despite the recognized importance of balanced nutrition, there remains a gap in empirical research examining the interplay between menu variety, actual nutrient intake, and measured nutritional status in dormitory settings particularly in Indonesian higher education institutions[2]. Much of the existing literature focuses either on menu planning and satisfaction surveys[3] or on isolated nutrient intake assessments, without integrating these elements to understand their combined effects on measurable health outcomes. Moreover, few studies have accounted for the contribution of outside food purchases to students' total daily intake, despite evidence that such consumption can represent a significant portion of energy and macronutrient intake[11].

The Ministry of Health Polytechnic Dormitory in Surabaya provides a relevant case study for this inquiry. Housing students from various health-related programs, the dormitory operates under a centralized meal service with two meals per day breakfast and dinner prepared by an external catering provider. While this arrangement offers operational efficiency, it also presents potential nutritional challenges, including the risk that students' lunch and snack choices outside the dormitory may not align with balanced diet principles. Furthermore, the fixed menu cycle, reliance on certain staple

foods, and limited fruit servings warrant closer evaluation against national and international dietary standards.

Given these considerations, this study aims to analyze menu variations, macronutrient intake, and nutritional status among dormitory residents at the Ministry of Health Polytechnic in Surabaya. By integrating observational data on menu composition with dietary recall and anthropometric measurements, the research seeks to assess whether the current menu cycle meets the recommended nutrient adequacy levels, determine the extent to which students supplement their diets with outside foods, and explore potential associations between menu variety, actual intake, and nutritional status. The findings are expected to inform policy and practice in institutional meal provision, contributing to strategies that enhance dietary quality, prevent the double burden of malnutrition, and support the health and academic performance of future healthcare professionals.

MATERIALS AND METHODS

This study employed a quantitative descriptive-analytical design with a cross-sectional approach. The research is located in the central campus dormitory of the Ministry of Health Polytechnic of the Ministry of Health of Surabaya which is located on Jl. Pucang Jajar Tengah No. 56, Kertajaya, Gubeng District, Surabaya City. Data collection was carried out from January–February 2025. The variables observed were variations in menu, intake, and nutritional status in residents of the Dormitoc Health Polytechnic of the Ministry of Health Surabaya. The independent variables in this study were menu variations and intake. Meanwhile, the bound variable in this study is nutritional status.

The menu variations that were studied were aspects of variations in ingredients, tastes, colors, and variations in food processing methods served by the dormitory and assessed by respondents using a menu variation questionnaire. Then it was assessed using 3 ordinal scales with measured results of Less Varied (Score <60%), Quite Varied (Score 60%-80%), and Varied (Score >80%) (Utami, 2023 Macronutrient intake was measured using the 2×24 hour Food Recall Form, then categorized using the Ministry of Health's cut-off points (Deficit: <90% AKG, Normal: 90–120% AKG, Excess: >120% AKG). The nutritional status of dormitory residents is produced from the measurement of body weight and height and then calculated using the BMI formula, then compared with 4 nominal scales of the National BMI classification of >18 years old according to (Ministry of Health, 2023), namely the BMI Wasting category (<18.5 kg/m2), the Normal category (≥18.5 - <25.0 kg/m2), the Overweight category (≥25.0 - <27.0 kg/m2), Obesity category (≥27.0 kg/m2).

The population in this study is 310 residents of the central campus dormitory of the Ministry of Health Polytechnic of the Ministry of Health. The sample used in this study was calculated using the Slovin formula, which was 76 people. The sampling technique in this study uses the Proportional

Stratified Random Sampling technique which is a random sampling technique by considering the proportion of the number of individuals in the population. The research flow starts from determining problem identification, determining the title of the research, literature study, data collection planning, taking care of research permits, conducting research, data collection, data processing, data analysis, and conclusions and suggestions. Prior to data collection, instrument validation was conducted through expert judgment by nutrition lecturers and a pilot test on 10 non-sample students to assess clarity, relevance, and reliability (Cronbach's alpha >0.7).

Data collection used primary data sources (Respondent identification, anthropometry data, menu variation data, and respondent nutritional intake data. Meanwhile, the collection of secondary data sources is such as the dormitory profile of the Ministry of Health Polytechnic of Surabaya, as well as an overview of food implementation including food standards, menu patterns, menu cycles, and portion standards. The data collection method uses questionnaires, interviews, anthropometric methods, observation of the menu cycle presented by the dormitory. The instruments used in this study were the form of a declaration of willingness to be a respondent, the form of a menu variation questionnaire, the 2x24 Hour Food Recall Form, and anthropometric tools such as digital scales and stadiometers.

Data processing techniques start from checking data or data completeness and then entering into the master table to find out the categories. Then code creation, which is the provision of codes for the answers from the questionnaire. Next, enter the data into a statistical software program on the computer. The last technique is to double-check the data that has been entered with the aim of preventing possible code errors or data incompleteness. After the data is obtained, edited, and frequencyd, then the data is analyzed descriptively using statistical software on a computer in 2 ways, namely Univariate analysis and Bivariate analysis. Univariate analysis was carried out to obtain an overview of the frequency distribution of free variables (Variations in menu and nutrient intake) and bound variables (nutritional status), data on the general overview of food delivery in the dormitory of the Ministry of Health Polytechnic of the Ministry of Health Surabaya and the characteristics of respondents presented in tabulation form and descriptively. Meanwhile, bivariate analysis was used to see the relationship between two variables, namely the independent variable (Variation in menu and nutrient intake) and the bound variable (nutritional status) which was carried out by the Rank Spearman test and assisted by computer software in the form of a statistical application.

RESULTS

Table 1. Respondent Chacacteristics

Variabel	n	%
Department		
Sutomo Nursing	20	26,3
Sutopo Nursing	22	28,9
Sutomo Midwifery	19	25,0
Technical Electromedic	12	15,8
Dental Health	3	3,9
Gender		
Man	3	3,9
Woman	73	96,1
Age		
18 years old	22	28,9
19 years old	40	52,6
20 years	9	11,8
21 years old	2	2,6
22 years old	2	2,6
25 years	1	1,3
Length of Residence in Dormitory		
< 6 months	2	2,6
6 months – 1 year	69	90,8
1 – 2 years	2	2,6
> 2 years	3	3,9
Allowance		
< IDR 500,000	28	36,8
IDR 500,000 – IDR 1,000,000	33	43,4
IDR 1,000,000 – IDR 2,000,000	14	18,4
> IDR 2,000,000	1	1,3
Disease History		
No	65	85,5
Yes	11	14,5
Total	**76**	**100,0**

Source : Primary Data 2025

From the table above, it can be seen that of the total number of respondents who are female, 73 students (96.1%). The age characteristics of the most respondents were 19 years old with 40 students (52.6%). The characteristics of the length of residence of the most respondents were 6 months – 1 year for 69 students (90.8%). The characteristics of the most respondents' pocket money were Rp 500,000 - Rp 1,000,000 by 33 students (43.4%). And the characteristics of the disease history of the most respondents were that 65 students (85.5%) did not have a history of disease.

Menu Variations

The observed menu variation was the respondent's assessment of the variety of menus served and also observed by the researcher for 7 days, and the following results were obtained.

Table 2. Respondents Ratings on Menu Variations

Variabel	n	%
Menu Variations		
Lack of Variety	32	42,1
Enough Variety	42	55,3
Vary	2	2,6
Flavor Variations		
Lack of Variety	22	28,9
Enough Variety	49	64,5
Vary	5	6,6
Color Variations		
Lack of Variety	17	22,4
Enough Variety	50	65,8
Vary	9	11,8
Processing Techniques		
Lack of Variety	10	13,2
Enough Variety	53	69,7
Vary	13	17,1
Variety of Ingredients		
Lack of Variety	4	5,3
Enough Variety	51	67,1
Vary	21	27,6
Total	**76**	**100,0**

Source : Primary Data 2025

The assessment of menu variations can be seen from the aspects of flavor variation, color variation, variety of processing methods, and variety of food ingredients used. From the table above, it can be seen that the assessment of menu variations in the dormitory of the Ministry of Health of Surabaya is quite varied by 42 students (55.3%), the assessment of food taste variations is with the category of quite varied for the taste of the food of 49 students (64.5%), that the assessment of the most color variations is with the category of quite varied for the color of the food of 50 students (65.8%), The assessment of the variation of food processing methods was with a fairly varied category for food processing methods of 53 students (69.7%), and the assessment of the variation of food ingredients was with a fairly varied category for food ingredients of 51 students (67.1%).

From the respondents' assessment of the menu variations above, the researcher also observed the menu cycle, the frequency of food ingredients, the frequency of processing techniques, and the realization of portion standards with balanced nutrition ratios. It was found that the frequency of foodstuffs that were often used for 7 days were chicken (10x) and tofu (10x), while the frequency of ingredients that were rarely used were meat (1x), and fruits (2x). The processing technique that is often used for 7 days is frying 25x, and steaming 17x. Meanwhile, the processing technique used is to burn as much as 1x, and roll as much as 2x. The average realization of portions served to dormitory residents is compared to the standard balanced nutritional portion in a day, because the dormitory does not know the standard portions provided by the caterer. The staple food group, namely rice, has a difference between the realization of portions and the standard of balanced nutritional portions is 133 grams, while the animal side dishes that have a difference are meat (10 grams). Other groups of foodstuffs that have a difference between the realization of portions and balanced nutritional portions

are vegetable side dishes such as tempeh and tofu with a difference (81 g), vegetables with a difference of 166 g, and fruits with a difference of 165 g.

Macronutrient Intake

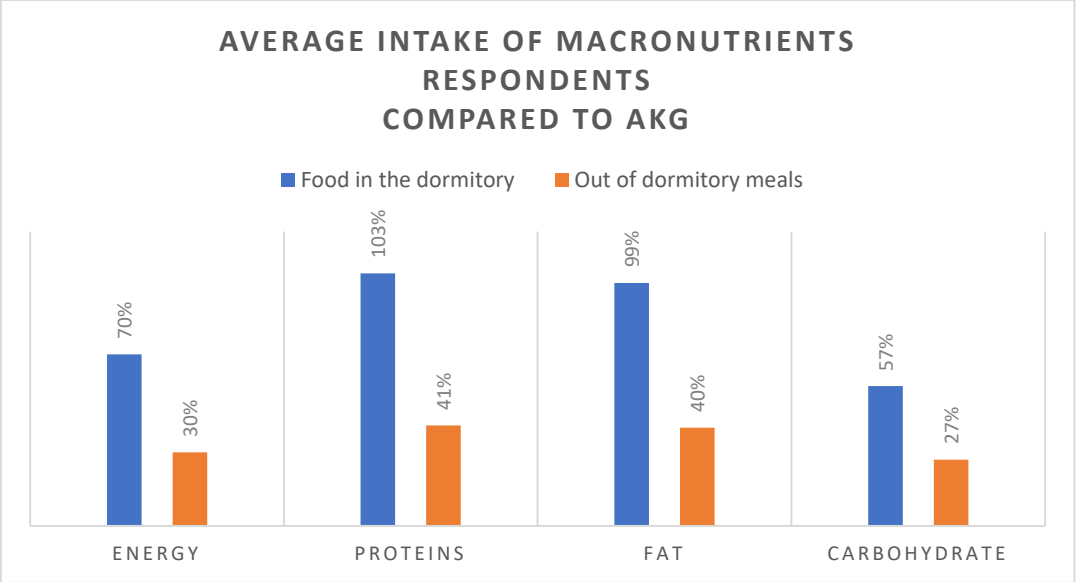
Table 3. Macronutrient Intake of Respondents

Macronutrient Intake	Energy		Protein		Fat		Carbohydrates	
	n	%	n	%	n	%	n	%
Deficit	63	82,9	20	26,3	32	42,1	75	98,7
Normal	13	17,1	40	52,6	29	38,2	1	1,3
More	0	0,0	16	21,1	15	19,7	0,0	0,0
Total	76	100.0	76	100,0	76	100,0	76	100,0

Source : primary data 2025

From the table above, it can be seen that the energy intake of respondents in the dormitory of the Ministry of Health Polytechnic of Surabaya has a deficit category (82.9%). The protein intake of respondents with the normal category was a number (52.6%). Respondents' fat intake with a deficit category was a number (42.1%). And the carbohydrate intake of respondents with a deficit category (98.1%). With this result, dormitory residents must meet their intake needs by buying food outside. From these factors, the researcher made an average comparison between the intake obtained from the dormitory and the intake obtained from the outside, seen from the following graph.

Chart 1. Average Intake of Macronutrients Respondents Compared to AKG



From the table above, it can be seen that the average intake of macronutrients comes from the dormitory and outside the dormitory has a comparison, which is 70% of energy intake comes from food obtained from the dormitory while 30% of energy intake comes from food outside the dormitory or students buy food outside. This is because the dormitory only provides 2 meals, namely breakfast and dinner, so students choose to buy food outside the dormitory to meet their daily nutritional intake needs.

Nutritional Status

Table 4. Nutritional Status of Respondents

Nutritional Status	n	%
Wasting	12	15,8
Normal	43	56,6
Overweight	8	10,5
Obesity	13	17,1
Total	**76**	**100,0**

Source : primary data 2025

From the table above, it can be seen that the distribution of the nutritional status of the dormitory respondents of the Surabaya Ministry of Health Polytechnic dormitory is 43 students (56.6%). Meanwhile, for the nutritional status in the wasting category, there were 12 students (15.8%) and the nutritional status in the obesity category there were 13 students (17.1%).

Table 5. Intake of Macronutrients with Nutritional Status

Nutrient Intake	Nutritional Status										*P-value*
	Wasting		Normal		Overweight		Obesity		Total		
	n	%	n	%	n	%	n	%	n	%	
Menu Variations											
Lack of Variety	4	12,5	21	65,6	2	6,2	5	15,6	32	100,0	0,665
Enough Variety	8	19,0	21	50,0	6	14,3	7	16,7	42	100,0	
Vary	0	0,0	1	50,0	0	0,0	1	50,0	2	100,0	
Energy											
Deficit	9	14,3	36	57,1	6	9,5	12	19,0	63	100,0	0,411
Normal	3	23,1	7	53,8	2	15,4	1	7,7	13	100,0	
More	0	0,0	0	0,0	0	0,0	0	0,0	0	100,0	
Protein											
Deficit	1	5,0	14	70,0	0	0,0	5	25,0	20	100,0	0,676
Normal	8	20,0	21	52,5	7	17,5	4	10,0	40	100,0	
More	3	18,8	8	50,0	1	6,2	4	25,0	16	100,0	
Fat											
Deficit	2	6,2	21	65,6	3	9,4	6	18,8	32	100,0	0,175
Normal	7	24,1	12	41,4	4	13,8	6	20,7	29	100,0	
More	3	20,0	10	66,7	1	6,7	1	6,7	15	100,0	
Carbohydrates											
Deficit	12	16,0	42	56,0	8	10,7	13	17,3	75	100,0	0,821
Normal	0	0,0	1	100,0	0	0,0	0	0,0	1	100,0	
More	0	0,0	0	0,0	0	0,0	0	0,0	0	100,0	
Total	**12**	**15,8**	**43**	**56,6**	**8**	**10,5**	**13**	**17,1**	**76**	**100,0**	

Source : primary data 2025

From the table above, it can be seen that there is no meaningful relationship between menu variations and the nutritional status of dormitory residents. This is in accordance with the spearman rank p value correlation test of 0.665 (>0.05) which means that the variation of the menu with the nutritional status of the respondent does not have a correlation relationship. In addition, it can be seen that there is no significant relationship between energy intake and the nutritional status of dormitory residents, according to the p-value of the spearman rank correlation test of 0.411 (>0.05). Protein intake with the nutritional status of dormitory residents had a spearman rank p value correlation test of 0.676 (> 0.05) which means that protein intake and the nutritional status of the respondents had no

correlation relationship. Fat intake with the nutritional status of dormitory residents had a spearman rank p value correlation test of 0.175 (> 0.05) which means that fat intake and the nutritional status of the respondents did not have a correlation relationship. Carbohydrate intake with the nutritional status of dormitory residents has a spearman rank p value correlation test of 0.821 (>0.05) which means that carbohydrate intake and the nutritional status of the respondents have no correlation relationship.

DISCUSSION

Respondent Characteristics

The study population predominantly consisted of young adult females aged 18–20 years, a developmental phase marked by high nutritional requirements to support metabolic functions, physical activity, and neurocognitive development[4,15]. The gender imbalance, with 96.1% female participants, is notable, as women tend to have different dietary preferences and metabolic rates compared to men. Several studies have shown that women may be more selective in food choices, often valuing variety, taste, and health attributes, but also more susceptible to restrictive eating behaviors when concerned about body image[2,16].

Most respondents reported a monthly allowance of IDR 500,000–1,000,000. This economic parameter plays a critical role in food purchasing power, especially for supplementary foods outside the dormitory. Limited allowances may restrict access to higher-quality, nutrient-dense foods, while excessive discretionary funds can increase the likelihood of purchasing energy-dense, nutrient-poor snacks and beverages. The majority had lived in the dormitory for more than six months (90.8%), which could lead to menu fatigue a reduced interest in regularly served foods due to repetition thereby lowering meal consumption within the dormitory and increasing reliance on outside food sources.

Menu Variations

While the observed menu variation was classified as “quite varied,” deeper analysis revealed a heavy reliance on a small range of core ingredients such as chicken, and tofu, with limited diversity in vegetable types and low fruit frequency. Dominance of frying as a cooking method may enhance palatability but can elevate total fat content and potentially degrade heat-sensitive vitamins. Global dietary guidelines emphasize that diversity in food groups particularly increased fruit and vegetable intake is crucial for preventing micronutrient deficiencies and reducing non-communicable disease risks[4,7].

Limited menu variety can reduce appetite and lead to nutritional imbalances. The monotonous menu reduces students' interest in dormitory food, and has an impact on reducing the adequacy of nutrients[5]. Repetitive menus tend to cause boredom, so students prefer to buy food outside with menus that are more attractive in taste and appearance[17,18]. In addition, the length of stay in the dormitory allows students to experience boredom with monotonous menus and the availability of

pocket money is one of the factors for students to choose food from the dormitory and food outside the dormitory.

However, menu variety alone does not guarantee adequate nutrient intake. Portion size, cooking methods, and actual consumption significantly influence the ultimate nutritional value. In this study, despite moderate menu diversity, the average portion of vegetables and fruit served fell far below the Indonesian Balanced Nutrition Guidelines[19]. The resulting shortfall in fiber, vitamins, and minerals could contribute to both undernutrition (via nutrient deficiencies) and overnutrition (via high-calorie, low-micronutrient external foods).

Macronutrient Intake

This deficit condition is feared to have an impact on body function in the long term, especially in students who have high physical activity. Insufficient energy will interfere with study concentration, reduce academic performance, and affect the body's metabolic balance. This imbalance suggests that while protein-rich foods were sufficiently provided possibly due to the consistent inclusion of affordable animal and plant protein sources energy contribution from staples was insufficient. Meanwhile, a high carbohydrate deficit is likely to occur due to an inadequate proportion of rice or other major carbohydrate sources in food portions[11]. An imbalance in macronutrient intake can have a direct impact on metabolic health and body immunity. Insufficient energy has the potential to lead to extreme weight loss, impaired study concentration, chronic fatigue, and an increased risk of infectious diseases[20,21].

Nutritional Status of Respondents

Low energy intake from dormitory meals could partly explain the prevalence of wasting in 15.8% of respondents. Conversely, the 17.1% obesity rate in this sample suggests that some students compensated for perceived deficits by consuming calorie-rich external foods. This divergence underscores the complexity of nutritional status determinants in communal living environments.

According to WHO (2006), a double nutrition problem is a condition when in one population there are individuals with undernutrition and overnutrition. This phenomenon is a reflection of the inequality of access and healthy food choices. Students with wasting nutritional status are suspected of having irregular eating habits or very low energy intake in the long term. Meanwhile, students with obese nutritional status have improper eating habits so they cannot control their weight[22].

The coexistence of undernutrition (wasting) and overnutrition (overweight/obesity) in this population reflects the double burden of malnutrition, a recognized global public health issue[7,8]. In Indonesia, the double burden is driven by rapid nutritional transition, where traditional diets high in whole grains and vegetables are increasingly replaced by refined carbohydrates, ultra-processed snacks, and sugary beverages[23].

In the dormitory context, the double burden may result from two parallel pathways is Energy and nutrient deficits among students who consume only institutional meals with inadequate portion

sizes and limited food variety, excessive caloric intake among students who frequently purchase fast food, fried snacks, and sweetened drinks, which are energy-dense but nutrient poor.

These pathways are reinforced by factors such as menu monotony, socio-economic differences, peer influence, and limited nutritional literacy. Without targeted interventions, the double burden can persist even in relatively homogeneous populations, leading to both short-term academic performance issues and long-term health risks such as metabolic syndrome and cardiovascular diseases.

Menu Variations with Nutritional Status

These results show that although the variety of menus is quite varied, it has not directly affected the nutritional status of dormitory residents. This can be explained that the variety of existing menus does not guarantee the adequacy of the right nutritional intake, both in terms of quantity and quality. Although the variety of menus theoretically supports the diversity of nutrients, if the portion of food is insufficient or the food is not fully consumed by the students, then the goal of nutritional fulfillment is not achieved[6]. In addition, the consumption of food from outside also affects the overall nutritional status. Many students tend to choose or reject certain types of food according to preferences, eating habits, or time constraints, so that the effectiveness of menu variations is less than optimal in improving nutritional status.

Intake of Macronutrients with Nutritional Status

Analysis of the relationship between macronutrient intake and nutritional status showed no statistically significant relationship ($p > 0.05$). This suggests that energy deficiency is not always in line with nutritional status. This is likely due to other factors that affect nutritional status, including physical activity, individual metabolism, academic stress, sleep habits, and daily consumption[14].

Another factor that is due to low energy intake so that it provides analysis results there is no correlation between macronutrient intake and nutritional status due to the condition of dormitory students of the Surabaya Ministry of Health Polytechnic, who only get 2 meals, namely at breakfast and dinner. This shows that the food provided by the dormitory is still not enough for the daily macronutrient needs of students. So that students prefer to buy food outside the dormitory at affordable prices according to the economic conditions of the students. In addition, the condition of the strategic location of students with a reach is very easy to find food sellers. However, if students only rely on food provided by the dormitory as the main source, then the intake of macronutrients for students shows a deficit or still cannot meet the daily intake based on AKG. If this happens repeatedly, it can affect the nutritional status of students, resulting in a decrease in BMI (Body Mass Index) because the body continuously uses energy reserves located in muscle and fat[24]. This lack of energy, if it lasts for a long time, will cause nutritional problems such as chronic energy deficiency[25].

However, the dormitory food protein intake is sufficient for daily protein needs based on AKG even though the dormitory of the Ministry of Health Poltekkes of Surabaya only provides 2x food. This

is because the dormitory provides various sources of protein in one menu with animal protein and vegetable protein sources and several menus add additional protein side dishes such as nuggets and eggs according to the type of menu.

This study has some limitations are that external food intake is not standardized, while respondents reported consuming food from outside the dormitory, portion size, frequency, and nutritional composition were not measured systematically. This limits the accuracy of the estimate of total nutrient intake. There is no measurement of physical activity, Physical activity significantly affects energy balance. Without objective measurements (e.g., validated accelerometers or questionnaires), it is difficult to fully interpret BMI results in relation to food intake. Subjective assessment of menu variation, Evaluation of menu variation depends in part on respondents' perceptions, which may be influenced by personal preference or memory bias. Cross-sectional design, this study captures only one point in time, preventing causal inferences. Longitudinal data will better explain the relationship between menu variations, nutrient intake, and nutritional status over time.

CONCLUSION

The characteristics of respondents showed that the majority were 19 years old (52.6%), predominantly female (96.1%), had stayed in the dormitory for 6 months to 1 year (90.8%), and received a monthly allowance of Rp. 500,000–Rp. 1,000,000 (43.4%). The highest category for menu variation was “quite varied” (55.3%). For macronutrient intake, most respondents had energy deficits (82.9%), normal protein intake (52.6%), fat in the deficit category (42.1%), and carbohydrate deficits (98.7%). The dormitory food menu met only about 70% of students’ daily energy needs, with the remainder sourced from outside foods. Nutritional status was predominantly normal (56.6%). There was no significant relationship between menu variation and nutritional status, nor between macronutrient intake and nutritional status ($p > 0.05$).

This study suggests the need for enhanced dormitory menu planning and nutrition education interventions. Efforts should include increasing the variety of menus in terms of ingredients and processing techniques, evaluating the menu cycle for nutritional adequacy, and providing targeted nutrition education to dormitory residents. These measures can improve awareness of balanced food consumption and support both the health and academic performance of students.

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