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# Description Macronutrient Intake and Student Satisfaction Levels Towards Food in the MBG Program

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## ABSTRACT

The Free Nutritious Meal Program (Makan Bergizi Gratis / MBG) is a government initiative aimed at improving students' nutritional status and human resource quality through the provision of nutritious meals. The success of this program is determined not only by the adequacy of nutrients provided, but also by the level of student satisfaction as the program beneficiaries. This study aimed to describe macronutrient intake (energy, protein, fat, and carbohydrates) and student satisfaction levels toward food provided in the MBG program at SMAN 2 Makassar City. This study employed a descriptive design with a quantitative approach supported by simple qualitative data. The sample consisted of 85 tenth-grade students selected through random sampling. Data on macronutrient intake were collected using MBG menu weighing forms and analyzed with the Indonesian Food Composition Table (TKPI) and the NutriSurvey application. Student satisfaction was measured using a Likert-scale questionnaire covering aspects of taste, portion size, menu variety, and food hygiene, then analyzed through univariate and exploratory bivariate methods. The results showed that macronutrient intake from the MBG menu was mostly categorized as low, particularly for carbohydrates and protein, while fat intake tended to fall in the moderate category. Most students reported a moderately satisfied level of satisfaction, although some expressed dissatisfaction, especially regarding taste and menu variety. In conclusion, macronutrient intake provided by the MBG program at SMAN 2 Makassar City has not yet fully met students' nutritional needs, and student satisfaction still requires improvement. Menu evaluation and enhancement are needed, both in terms of nutrient composition and sensory quality, to ensure the program runs more optimally and sustainably.

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## INTRODUCTION

The Free Nutritious Meal Program (MBG) is a national strategic policy aimed at addressing nutritional issues while simultaneously improving the quality of human resources (HR) in Indonesia. This program is designed to provide balanced nutritious food intake for students from primary to upper secondary levels to improve nutritional

status, motivate the learning process, and create equal access to education regardless of socio-economic backgrounds (Kevin Andreas Halomoan Tambunan et al., 2025). he primary focus of this program is the fulfillment of macronutrient needs—carbohydrates, proteins, and fats—which are crucial for energy supply, tissue repair, and supporting students' daily activities. An imbalance in macronutrient intake risks triggering a decline in learning concentration, chronic fatigue, and the double burden of malnutrition phenomenon due to poor dietary habits (Rahmayanti et al., 2024).

National data indicates that macronutrient fulfillment among adolescents in Indonesia mostly remains below the Recommended Dietary Allowances (RDA/AKG) targets. More than 60% of adolescent girls have not achieved the recommended nutritional adequacy, particularly in the intake of complex carbohydrates and high-quality animal protein (Musfira & Hadju, 2024). This phenomenon is reinforced by the fact that there is a significant correlation between energy-protein intake deficits and the high prevalence of undernutrition status among school-aged children. Given that macronutrient adequacy directly impacts cognitive performance, concentration levels, and physical fitness of students, evaluating the nutritional composition of the MBG program menu becomes essential to ensure the program operates effectively according to the biological needs of adolescents.

In addition to fulfilling nutritional aspects, the sustainable success of institutional programs like MBG is also heavily determined by consumer satisfaction levels, specifically the students themselves. This satisfaction aspect is influenced by food quality (including appearance, taste, texture, portion size, aroma, and temperature) as well as the quality of service provided by the food administrators. However, initial observations at SMAN 2 Makassar indicated the existence of complaints from students regarding meal quality. Several commodity menus, such as specific vegetables and animal-based side dishes, were considered less appealing due to limited flavor profiles, a hard carbohydrate (rice) texture, and portion imbalances relative to gender needs. This subjective condition impacts students' habits, causing them to skip program meals due to reduced appetite.

Although the Indonesian Nutritional Status Survey (SSGI) confirms high rates of chronic energy deficiency (CED/KEK) among adolescents, several prior studies prove that school lunch interventions generally improve anthropometric status, reduce anemia rates, and increase student attendance. Nevertheless, program implementation in the field frequently encounters structural obstacles such as limited menu variation, low organoleptic quality control, and minimal involvement of nutritionists and nutrition education within the school environment (SSGI, 2024).

Most prior scientific literature still focuses on macro policy evaluations or general health impacts. Studies specifically analyzing the integration between the quantification of actual macronutrient intake from school menus and students' organoleptic satisfaction levels at the upper secondary school level remain very limited. Yet, target consumers' acceptance of food determines the effectiveness of sustainable nutrient absorption (Rahmah et al., 2024). Therefore, this study aims to examine the profile of

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macronutrient intake while evaluating student satisfaction levels toward the Free Nutritious Meal Program (MBG) at SMAN 2 Makassar City as an empirical evaluation instrument for future program optimization.

Macronutrient intake in adolescents should ideally meet daily energy requirements while maintaining a composition of carbohydrates, protein, and fat suitable for growth needs, learning activities, and long-term health. The Indonesian Recommended Dietary Allowances (RDA/AKG) reference provides standards by age and sex to assess the energy and macro adequacy of each student, so that school lunch portions can be targeted to contribute approximately 30–40% of daily needs (energy and macros) as a single main mealtime (Kemenkes RI, 2019).

International recommendations also emphasize a balanced distribution of macronutrients, where 45–65% of energy is derived from carbohydrates, 10–35% from protein, and 20–35% from fat (Kim et al., 2020). his balance is crucial for adolescents because, during this phase, energy requirements increase to support physical activity, brain development, and maintain health conditions. If properly applied within the school lunch program, the principle of macronutrient balance will facilitate program success by providing optimal energy and nutritional quality for students.

Based on the description regarding the role of macronutrients, it can be concluded that the adequacy of energy, protein, fat, and carbohydrates significantly influences immune resistance, learning concentration, and physical activity in adolescents. Therefore, evaluating macronutrient intake in the Free Nutritious Meal Program (MBG) menu needs to be conducted to determine the extent to which school lunches can fulfill adolescent nutritional needs in accordance with the Recommended Dietary Allowances (RDA/AKG) recommendations (Dina Febriani R Parewasi et al., 2021).

According to a recent study by (Amalia et al., 2023), consumer satisfaction in institutional food services reflects the fulfillment of needs measured through perceptions of taste and the physical quality of the dishes. Within the school scope, this satisfaction plays an important role as it correlates directly with students' daily macronutrient consumption adequacy levels. Furthermore, (Arifah, 2024), explains that student satisfaction with school food in secondary education is influenced by various organoleptic or sensory dimensions, including portion suitability and the variation of menus served.

This phenomenon aligns with a global study by(Sayili et al., 2024), which states that if these dimensions are poorly rated by students, satisfaction levels will decline, which can ultimately trigger low nutrient acceptability by the adolescent body. The student satisfaction level represents the response or evaluation of students toward the food served in the MBG Program, encompassing aspects of taste, portion size, menu variation, aroma, and food presentation. Student satisfaction becomes a critical factor because it affects meal acceptance and consumption rates (Arifah, 2024).

Students who feel satisfied with the served food tend to consume the entire meal, allowing the received nutrient intake to approach the planned nutritional value. Conversely, low satisfaction levels can cause food to be left unfinished, which impacts low macronutrient intake (Hafidzah Najwa, 2024).

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In general, recent literature indicates that student satisfaction is not only influenced by the nutritional quality of food, but also by sensory aspects (taste, aroma, texture, appearance), menu variation, environmental comfort, and service factors (Hikma et al., 2024). herefore, in the context of the Free Nutritious Meal (MBG) program at schools, creating varied menus, acceptable flavors for students, and good service are highly important to enhance satisfaction. This satisfaction is expected to foster better food acceptance, thereby supporting nutritional fulfillment, health, and academic achievement among students.

## METHODS

This study utilizes a descriptive research design with a quantitative approach. This approach was selected because the study aims to describe the actual conditions regarding macronutrient intake (protein, fat, carbohydrates) in the Free Nutritious Meal Program (MBG) menu, alongside students' satisfaction levels toward the food served at SMAN 2 Makassar City. The research design employed is a descriptive cross-sectional study. A cross-sectional design was used because data collection was conducted at a single point in time to obtain an overview of macronutrient intake and student satisfaction levels regarding the provided meals. The cross-sectional design is capable of describing the conditions of the research variables within a specific time period without introducing any interventions. A population is a group of individuals, objects, or items that serve as the source for sampling, representing a collective that meets certain criteria related to the research problem (Dawis et al., 2023). The population in this study consisted of 108 tenth-grade students at SMA Negeri 2 Makassar.

A sample is a subset of the research population or a representative example of the entire research population. It represents a portion or a proxy of the population under study (Mukhid, 2021). The sampling technique employed in this study was random sampling. The total population in this study encompassed all tenth-grade students at SMA Negeri 2 Makassar. However, due to time and resource constraints, this study focused specifically on three classes, each consisting of 36 students. Consequently, the total population size for this study was calculated as follows:

$$N = 3 \times 36 = 108 \text{ students.}$$

The sample size for this study was determined using the Slovin formula with an error tolerance level of 5% (0.05).

Data collection was carried out using an MBG weighing form, enabling the researcher to directly record the served MBG menu, including its types and portion sizes, to obtain more accurate data regarding the macronutrient content of the Free Nutritious Meal Program (MBG) menu. Students' satisfaction was measured using a questionnaire, ensuring that students evaluated identical aspects, such as taste, portion size, menu variation, presentation, and food cleanliness. Furthermore, this method was deemed efficient for obtaining data from a large number of respondents within a short period.

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Data processing involved editing and coding to prepare the data prior to analysis, utilizing software (such as Excel, SPSS, or other statistical software) to analyze the data.

The independent variable (macronutrient intake) was measured using the MBG portion weighing form method, which recorded the entire served Free Nutritious Meal Program (MBG) menu. The nutritional values for protein (grams), fat (grams), and carbohydrates (grams) were subsequently determined using the Indonesian Food Composition Table (TKPI) or nutritional. The dependent variable (students' satisfaction level toward the MBG program) was measured using a questionnaire instrument based on a five-point Likert scale, covering aspects of taste, portion size, menu variation, and cleanliness. Each response was scored from 1 (very dissatisfied) to 5 (very satisfied). The obtained scores were then calculated and converted into percentages, which were subsequently categorized based on specific criteria (Sayili et al., 2024). namely: 81–100% (very satisfied), 61–80% (satisfied), 41–60% (moderately satisfied), 21–40% (dissatisfied), and ≤20% (very dissatisfied).

Data analysis was utilized to describe each research variable. For the macronutrient intake variable (protein, fat, carbohydrates), the average values of energy, protein, fat, and carbohydrates present in the MBG Program menu were calculated. Meanwhile, for the student satisfaction level, the frequency and percentage of student responses for each indicator namely taste, portion size, variation, and food cleanliness were computed. Although this study is descriptive in nature, an exploratory bivariate analysis was conducted to observe the correlation trends between the independent variable (macronutrient intake) and the dependent variable (student satisfaction level). Because the intake data is numerical (ratio) and the satisfaction data is categorical (ordinal), the Spearman correlation test was applied. When comparing mean intake across satisfaction categories, the Mann-Whitney test was used for two groups, or the Kruskal-Wallis test for more than two groups. This analysis was not intended for hypothesis testing, but rather served as supplementary descriptive insights regarding the potential relationship between nutritional intake and student satisfaction levels. The bivariate analysis was conducted strictly as an exploratory approach and was not intended to test hypotheses or establish causal relationships.

## RESULTS AND DISCUSSION

### Result

**Table 1.**
Nutritional adequacy level of 15-year-old students on Monday

| Nutriens | Gender | MBG Intake on Monday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 26,5 | 70 | 21 gr | Adequate |
| | Famale | | 65 | 19,5 gr | Adequate |
| Fat | Male | 26,8 | 80 | 24 gr | Adequate |
| | Famale | | 70 | 21 gr | Adequate |
| Carbohydratest | Male | 96,8 | 350 | 105 gr | Deficien |
| | Famale | | 300 | 90 gr | Adequate |

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**Table 2.**
Nutritional adequacy level of 15-year-old students on Tuesday

| Nutriens | Gender | MBG Intake on Tuesday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 15,2 | 70 | 21 gr | Deficien |
| | Famale | | 65 | 19,5 gr | Deficien |
| Fat | Male | 14,9 | 80 | 24 gr | Deficien |
| | Famale | | 70 | 21 gr | Deficien |
| Carbohydratest | Male | 38,9 | 350 | 105 gr | Deficien |
| | Famale | | 300 | 90 gr | Deficien |

**Table 3.**
Nutritional adequacy level of 15-year-old students on Wednesday

| Nutriens | Gender | MBG Intake on Wednesday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 22,5 | 70 | 21 gr | Deficien |
| | Famale | | 65 | 19,5 gr | Deficien |
| Fat | Male | 17,2 | 80 | 24 gr | Deficien |
| | Famale | | 70 | 21 gr | Deficien |
| Carbohydratest | Male | 43,4 | 350 | 105 gr | Deficien |
| | Famale | | 300 | 90 gr | Deficien |

**Table 4.**
Nutritional adequacy level of 15-year-old students on Thursday

| Nutriens | Gender | MBG Intake on Thursday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 17,7 | 70 | 21 gr | Deficien |
| | Famale | | 65 | 19,5 gr | Deficien |
| Fat | Male | 20,7 | 80 | 24 gr | Deficien |
| | Famale | | 70 | 21 gr | Deficien |
| Carbohydratest | Male | 41,8 | 350 | 105 gr | Deficien |
| | Famale | | 300 | 90 gr | Deficien |

**Table 5.**
Nutritional adequacy level of 15-year-old students on Friday

| Nutriens | Gender | MBG Intake on Friday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 21,6 | 70 | 21 gr | Deficien |
| | Famale | | 65 | 19,5 gr | Adequate |
| Fat | Male | 17,1 | 80 | 24 gr | Deficien |
| | Famale | | 70 | 21 gr | Deficien |
| Carbohydratest | Male | 52,1 | 350 | 105 gr | Deficien |
| | Famale | | 300 | 90 gr | Deficien |

**Table 6.**
Nutritional adequacy level of 15–18-year-old students on Monday

| Nutriens | Gender | MBG Intake on Monday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 26,5 | 75 | 22,5 gr | Adequate |
| | Famale | | 65 | 19,5 gr | Adequate |
| Fat | Male | 26,8 | 85 | 25,5 gr | Adequate |
| | Famale | | 70 | 21 gr | Adequate |
| Carbohydratest | Male | 96,8 | 400 | 120 gr | Deficien |
| | Famale | | 300 | 90gr | Adequate |

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**Table 7.**
Nutritional adequacy level of 15–18-year-old students on Tuesday

| Nutriens | Gender | MBG Intake on Tuesday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 15,2 | 75 | 22,5 gr | Deficien |
| | Famale | | 65 | 19,5 gr | Deficien |
| Fat | Male | 14,9 | 85 | 25,5 gr | Deficien |
| | Famale | | 70 | 21 gr | Deficien |
| Carbohydratest | Male | 38,9 | 400 | 120 gr | Deficien |
| | Famale | | 300 | 90gr | Deficien |

**Table 8.**
Nutritional adequacy level of 15–18-year-old students on Wednesday

| Nutriens | Gender | MBG Intake on Wednesday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 21,5 | 75 | 22,5 gr | Deficien |
| | Famale | | 65 | 19,5 gr | Adequate |
| Fat | Male | 17,2 | 85 | 25,5 gr | Deficien |
| | Famale | | 70 | 21 gr | Deficien |
| Carbohydratest | Male | 43,4 | 400 | 120 gr | Deficien |
| | Famale | | 300 | 90gr | Deficien |

**Table 9.**
Nutritional adequacy level of 15–18-year-old students on Thursday

| Nutriens | Gender | MBG Intake on Thursday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 17,7 | 75 | 22,5 gr | Deficien |
| | Famale | | 65 | 19,5 gr | Deficien |
| Fat | Male | 20,7 | 85 | 25,5 gr | Deficien |
| | Famale | | 70 | 21 gr | Deficien |
| Carbohydratest | Male | 41,8 | 400 | 120 gr | Deficien |
| | Famale | | 300 | 90gr | Deficien |

**Table 10.**
Nutritional adequacy level of 15–18-year-old students on Friday

| Nutriens | Gender | MBG Intake on Friday | AKG Standard (13-15 yo) | Lunch Target (30% AKG) | Description |
|---|---|---|---|---|---|
| Protein | Male | 21,6 | 75 | 22,5 gr | Deficien |
| | Famale | | 65 | 19,5 gr | Adequate |
| Fat | Male | 17,1 | 85 | 25,5 gr | Deficien |
| | Famale | | 70 | 21 gr | Deficien |
| Carbohydratest | Male | 52,1 | 400 | 120 gr | Deficien |
| | Famale | | 300 | 90gr | Deficien |

## Discussion

Based on the research findings in the discussion section, the Free Nutritious Meal Program (MBG) at SMAN 2 Makassar was generally not yet fully capable of meeting the ideal target for midday energy and macronutrient adequacy, which should ideally contribute 30% of the students' daily Recommended Dietary Allowances (RDA/AKG). Through daily menu monitoring, it was revealed that the carbohydrate and protein contents served fell into the low category on most observation days. This indicates an urgent need for periodic adjustments to the menu cycle to increase these bodybuilding

nutrient components to support the biological activities of students, especially when facing high-intensity academic activities such as examination periods. On the other hand, the lipid (fat) intake component from the provided daily menu demonstrated a better condition, falling within the moderate adequacy category.

The evaluation of the program's acceptance aspect indicated that the majority of respondents were in the moderately satisfied category, reaching 60.9%. Although the absolute dissatisfaction rate was relatively small and the program was considered acceptable by most students, the dominance of this moderately satisfied category implies that the quality of service and meals has not yet reached an optimal level. The students' subjective assessments were highly influenced by sensory or organoleptic food indicators in the field. Several physical constraints frequently complained about included flavors that did not match adolescent preferences, monotonous food combinations each week, poor physical quality such as a hard rice texture, and a lack of freshness in the served fruits. Furthermore, the portion size was also deemed insufficient, particularly for male students who biologically have higher basal energy requirements compared to female students.

Overall, these findings reinforce the functional correlation between the degree of consumer satisfaction and the success of daily macronutrient fulfillment. When students feel satisfied with the taste, aroma, and presentation of the food, the tendency to consume the entire meal increases, allowing the 30% RDA target to be achieved. Conversely, less appealing organoleptic quality triggers a low appetite among students, resulting in plate waste. Therefore, the sustainability of the positive impacts of this institutional nutritional intervention program does not solely rely on the precise calculation of nutritional values on paper, but must also be aligned with enhancements in culinary quality standards and menu variations to suit the biological preferences of the adolescent age group.

## CONCLUSION

The description of macronutrient intake (carbohydrates, protein, and fat) in the MBG Program at SMA Negeri 2 Makassar indicates that most of the menus served have not yet fully met the midday target requirement of 30% of the students' daily Recommended Dietary Allowances (RDA/AKG). Carbohydrate and protein intakes on most observation days remained in the low category, whereas fat intake tended to be in the moderate category. This condition demonstrates that the composition of the MBG menu still needs improvement to be more balanced and aligned with the nutritional requirements of adolescents, particularly in fulfilling energy and body-building nutrients to support students' learning activities and growth.

The level of student satisfaction with the food in the MBG Program at SMA Negeri 2 Makassar was largely in the moderately satisfied category. The majority of students could accept the food served; however, there are still several aspects that need enhancement, particularly regarding taste, menu variation, and portion sizes. Some

students assessed that the flavor profile did not match their preferences, the menu variation was still monotonous, and certain portions were insufficient to meet their needs, specifically for male students. This indicates that the success of the MBG Program depends not only on nutritional adequacy but also on the sensory quality and food acceptability among students.

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