

INDIVIDUAL AND ENVIRONMENTAL FACTORS ASSOCIATED WITH ACCEPTANCE OF FREE NUTRITIOUS MEAL MENU COMPONENTS AMONG JUNIOR HIGH SCHOOL STUDENTS

Faktor individu dan lingkungan yang berhubungan dengan daya terima komponen menu makan bergizi gratis pada siswa SMP

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ABSTRACT

The Free Nutritious Meal Program (Makan Bergizi Gratis, MBG) can provide optimal benefits only when foods served are accepted and consumed by students. This study examined associations of eating habits, family income, nutrition knowledge, and teacher role with acceptance of each MBG menu component among junior high school students. This was a cross-sectional study of 73 students at Tanjung Priok Junior High School, North Jakarta, observed across 11 menu-cycle days in July 2025. Acceptance of staple foods, animal-source dishes, plant-based dishes, vegetables, and fruits was assessed using a 5-point hedonic scale. Associations with component-specific acceptance scores were analyzed using Spearman correlation. The largest proportions of high acceptance were observed for animal-source dishes (68.5%) and fruits (67.1%), whereas vegetables had the lowest proportion (13.7%). Eating habits were associated with acceptance of animal-source dishes ($r=0.250$; $p=0.033$), plant-based dishes ($r=0.262$; $p=0.025$), vegetables ($r=0.274$; $p=0.019$), and fruits ($r=0.294$; $p=0.012$), but not staple foods ($p=0.156$). Family income was associated with staple foods ($r=0.446$; $p<0.001$), animal-source dishes ($r=0.344$; $p=0.003$), and fruits ($r=0.306$; $p=0.008$). Nutrition knowledge and teacher role were not associated with any component ($p>0.05$). MBG acceptability and its associated factors differed across menu components. Program evaluation should assess each component separately to support targeted recipe improvement and food-familiarization strategies.

Keywords: Eating Habits, Family Income, Food Acceptability, Free Nutritious Meal Program, Junior High School Students

ABSTRAK

Program Makan Bergizi Gratis (MBG) dapat memberi manfaat optimal apabila makanan yang disajikan diterima dan dikonsumsi siswa. Penelitian ini bertujuan menganalisis hubungan kebiasaan makan, pendapatan keluarga, pengetahuan gizi, dan peran guru dengan daya terima setiap komponen menu MBG pada siswa SMP. Penelitian ini merupakan studi potong lintang terhadap 73 siswa SMP Tanjung Priok, Jakarta Utara, dengan pengamatan selama 11 hari siklus menu pada Juli 2025. Daya terima makanan pokok, lauk hewani, lauk nabati, sayur, dan buah

dinilai menggunakan skala hedonik 5 poin. Hubungan faktor individu dan lingkungan dengan skor daya terima setiap komponen dianalisis menggunakan korelasi Spearman. Proporsi daya terima tinggi terbesar terdapat pada lauk hewani (68,5%), diikuti buah (67,1%), sedangkan sayur memiliki proporsi terendah (13,7%). Kebiasaan makan berhubungan dengan daya terima lauk hewani ($r=0,250$; $p=0,033$), lauk nabati ($r=0,262$; $p=0,025$), sayur ($r=0,274$; $p=0,019$), dan buah ($r=0,294$; $p=0,012$), tetapi tidak dengan makanan pokok ($p=0,156$). Pendapatan keluarga berhubungan dengan makanan pokok ($r=0,446$; $p<0,001$), lauk hewani ($r=0,344$; $p=0,003$), dan buah ($r=0,306$; $p=0,008$). Pengetahuan gizi dan peran guru tidak berhubungan dengan seluruh komponen menu ($p>0,05$). Daya terima MBG dan faktor yang berhubungan dengannya berbeda menurut komponen menu. Evaluasi program perlu memisahkan setiap komponen agar perbaikan resep dan strategi pembiasaan makan lebih tepat sasaran.

Kata Kunci: Daya Terima Makanan, Kebiasaan Makan, Makan Bergizi Gratis, Pendapatan Keluarga, Siswa SMP

INTRODUCTION

School meal programs are one of the strategies to improve students' access to nutritious food while creating a more structured eating environment. In Indonesia, the Free Nutritious Meals (Makan Bergizi Gratis/MBG) Program has become a national intervention targeting students and positioning educational institutions as important points for food provision and monitoring. However, the nutritional adequacy of the menu does not necessarily ensure the program's benefits when some of the food is not consumed. Therefore, acceptability needs to be assessed as part of the program implementation evaluation, particularly among adolescents who are beginning to have greater autonomy in food choices (Badan Gizi Nasional, 2025; Pramesthi et al., 2025).

School food acceptability is not always consistent across components. Research on school lunch provision in Indonesia indicates that student characteristics and portion appropriateness need to be considered alongside food acceptance (Fitriani & Sulistiyani, 2024). Studies across

various school meal programs have also shown that food waste varies by food group and serving characteristics (Martins et al., 2021; Petchoo et al., 2022; Adjapong et al., 2024). Texture, familiarity, as well as children's developing perceptions of taste and health benefits also influence food preferences (Cappellotto & Olsen, 2021; Serrano-Gonzalez et al., 2021; Lee et al., 2024). Therefore, component-level analysis provides more operational information for improving the MBG menu cycle.

Among adolescents, food-related decisions are shaped by the interaction of individual and environmental factors. Nutrition knowledge and food literacy can help adolescents understand healthier choices, but their application remains influenced by habits, preferences, peers, food availability, and the school environment (Egg et al., 2020; Ares et al., 2024; Iyassu et al., 2024; Mahmood et al., 2025). Teachers can provide support during mealtimes, although their impact depends on the form and intensity of the intervention (Thompson et al., 2022). Family economic conditions may also shape the variety and frequency of food exposure

at home, which may subsequently be associated with food acceptability at school.

This study separated the outcomes into staple food, animal-based side dishes, plant-based side dishes, vegetables, and fruits. This study aimed to analyze the associations of eating habits, family income, nutrition knowledge, and teacher roles with the acceptability of each MBG menu component among junior high school students.

METHODS

This study was an analytical observational study with a cross-sectional design conducted at Tanjung Priok Junior High School, North Jakarta, in July 2025. Observations were conducted over 11 days of MBG menu distribution.

The school population consisted of 340 students, with the accessible population comprising students in grades VIII and IX. Subjects were selected using consecutive sampling from students who attended school during the data collection period and received the MBG menu. Inclusion criteria included willingness to participate in the study and complete assessment data, while students who were ill, withdrew from the study, or completed the questionnaire incompletely were excluded from the analysis. After data cleaning, 73 junior high school students had complete data and were included in the analysis.

Food acceptability was assessed immediately after eating on each observation day over the 11-day period using a 5-point hedonic scale (1 =

strongly dislike to 5 = strongly like). The assessment covered taste, appearance, texture, color, aroma, portion size, and overall acceptance of staple food, animal-based side dishes, plant-based side dishes, vegetables, and fruits. The mean score for each component across the observation days for each subject was used in the analysis. For descriptive presentation, acceptability categories were established by dividing the theoretical range of the 1–5 scale into three equal intervals: low (1.00–2.33), moderate (2.34–3.67), and high (3.68–5.00). This categorization was used only for descriptive purposes, whereas the association analyses used the mean scores.

Individual factors included eating habits, family income, and nutrition knowledge, while environmental factors were represented by the teacher's role. All factors were assessed once using a questionnaire completed by the subjects. Eating habits were measured using a Food Frequency Questionnaire (FFQ), which recorded the frequency of food consumption as daily, weekly, monthly, or never, covering staple foods, side dishes, vegetables, fruits, and snacks. The total score was categorized based on the study mean score as poor (<11.26) and adequate (≥ 11.26).

Family income was calculated based on the cumulative monthly household income and categorized as below the Provincial Minimum Wage (UMP) or equal to/above the 2025 DKI Jakarta UMP of IDR 5,396,761. The MBG menu received by all students was the same and was not adjusted according to family income; income was analyzed only as an independent variable. Nutrition

knowledge was measured using five multiple-choice questions on balanced nutrition. Correct answers were assigned a score of 20 and incorrect answers a score of 0, resulting in a total score ranging from 0–100; categories were poor (<56%), adequate (56–75%), and good (76–100%). The teacher's role was measured using five statements on a 5-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree, covering teacher support, motivation, and involvement in MBG implementation. Scores were converted into percentages and categorized as poor (<56%), adequate (56–75%), and good (76–100%). In a pilot test involving 30 students, the five knowledge items had calculated *r* values ranging from 0.396–0.628, while the five teacher-role items ranged from 0.420–0.750 (*r* table = 0.361); the instrument had a Cronbach's alpha value of 0.669.

Univariate analysis was presented as frequencies and percentages. Acceptability categories were used to describe the distribution of acceptance, whereas association analyses used the acceptability scores for each component. The association of each independent variable with the acceptability scores of staple food, animal-based side dishes, plant-based side dishes, vegetables, and fruits was analyzed using Spearman correlation because the data were ordinal and mostly not normally distributed. Correlation coefficients (*r*) and *p*-values were reported to indicate the direction and strength of the associations, with a significance threshold of $p < 0.05$. Because multiple associations were tested across five components, the findings were

interpreted as exploratory patterns and were not used to establish causal relationships. Analyses were performed using IBM SPSS Statistics.

Ethical approval for the study was issued by the Health Research Ethics Committee of Universitas Binawan (No. 476/KEPK-UBN/VII/2025). Information about the study and informed consent for subject participation were provided in accordance with the procedures approved by the ethics committee.

RESULTS

A total of 73 students had complete data and were included in the analysis. Table 1 presents the characteristics of the subjects and the study variables. The majority of subjects were 14 years old (61.6%) and female (57.5%). Most subjects had eating habits in the adequate category (61.6%), more than half of the families had income above the UMP (57.5%), most students had good nutrition knowledge (78.1%), and the teacher's role was rated as good by 67.1% of students (Table 1).

Table 2 presents food acceptability according to MBG menu components. Acceptability differed across menu components. The highest proportion of high acceptability was observed for animal-based side dishes (68.5%), followed by fruits (67.1%), whereas vegetables had the lowest proportion (13.7%). Staple food was more frequently classified as having high acceptability (54.8%), while plant-based side dishes and vegetables were more commonly classified as moderate. None of the five components analyzed fell into the low acceptability category.

Table 1.
Subject Characteristics and Study Variables

Characteristics	n	%
Age		
13 years	5	6.8
14 years	45	61.6
15 years	23	31.5
Gender		
Male	31	42.5
Female	42	57.5
Eating habits		
Poor	28	38.4
Adequate	45	61.6
Family income		
Below the UMP	31	42.5
At or above the UMP	42	57.5
Nutrition knowledge		
Poor	2	2.7
Adequate	14	19.2
Good	57	78.1
Teacher's role		
Poor	1	1.4
Adequate	23	31.5
Good	49	67.1
Total	73	100.0

Note:

UMP = Provincial Minimum Wage. Percentages were calculated based on all subjects.

Table 2.
Food Acceptability by MBG Menu Component

Menu component	Moderate n (%)	High n (%)
Staple food	33 (45.2)	40 (54.8)
Animal based side dish	23 (31.5)	50 (68.5)
Plant based side dish	53 (72.6)	20 (27.4)
Vegetable	63 (86.3)	10 (13.7)
Fruits	24 (32.9)	49 (67.1)

Note:

Low acceptability was not observed in any of the five components; n = 73 for each component.

Moderate acceptability was defined as a mean score of 2.34–3.67, while high acceptability was defined as 3.68–5.00.

Spearman analysis showed different patterns of association across menu components (Table 3). Eating habits were associated with animal-based side dishes ($p = 0.033$), plant-based side dishes ($p = 0.025$), vegetables ($p = 0.019$), and fruit ($p = 0.012$), but not with staple food ($p = 0.156$). Family income

was associated with staple food ($p < 0.001$), animal-based side dishes ($p = 0.003$), and fruit ($p = 0.008$), but not with plant-based side dishes or vegetables. Nutrition knowledge and the teacher's role were not associated with food acceptability across any of the components analyzed ($p > 0.05$).

Table 3.
Associations of Individual and Environmental Factors with Acceptability of Menu Components

Factor	Staple food	Animal based side dish	Plant based side dish	Vegetable	Fruit
Eating habits	0.168 (0.156)	0.250 (0.033)*	0.262 (0.025)*	0.274 (0.019)*	0.294 (0.012)*
Family income	0.446 (<0.001)*	0.344 (0.003)*	0.156 (0.188)	-0.020 (0.867)	0.306 (0.008)*
Nutrition knowledge	0.083 (0.483)	-0.052 (0.663)	0.142 (0.230)	0.092 (0.441)	0.084 (0.482)
Teacher's role	0.205 (0.082)	0.032 (0.790)	0.139 (0.241)	-0.158 (0.181)	0.165 (0.162)

Note:

Values are presented as r (p); Spearman correlation test; p < 0.05.

Values of p < 0.001 are reported instead of p = 0.000.

The significant correlation coefficients ranged from weak to moderate. The strongest association was found between family income and staple food acceptability ($r = 0.446$; $p < 0.001$), while the associations between eating habits and components other than staple food ranged from $r = 0.250$ – 0.294 . This pattern indicates that the factors associated with acceptability were not consistent across all MBG menu components.

DISCUSSION

Component-level analysis showed that MBG menu acceptability among junior high school students varied across components. The highest proportion of high acceptability was found for animal-based side dishes, followed by fruit, while vegetables were most frequently classified as having moderate acceptability. This means that overall menu acceptability may appear favorable even when some components are less preferred. Research on school meals has also shown that food consumption and leftovers vary by food group. Therefore, evaluations that separate menu components may generate more specific menu

recommendations (Martins et al., 2021; Petchoo et al., 2022; Adjapong et al., 2024).

The lower proportion of high acceptability for vegetables compared with animal-based side dishes and fruit may be understood in terms of sensory characteristics and food familiarity. Texture, taste, previous experiences, and food neophobia or picky eating tendencies may influence acceptance of certain foods (Cappellotto & Olsen, 2021; Lee et al., 2024). This finding does not imply that vegetables should be reduced, but rather indicates the need to improve preparation methods, texture, seasoning combinations, color, and serving variations. Such an approach is more relevant than assessing program success solely based on the presence of vegetables in the menu.

Eating habits were associated with the acceptability of animal-based side dishes, plant-based side dishes, vegetables, and fruit, but not with staple food. Staple food in the form of rice is highly familiar to most students, so variations in eating habits may have less influence on its acceptability. In contrast, side dishes, vegetables, and fruit vary more in type and preparation

methods and are more likely to be influenced by repeated exposure at home. Studies among adolescents indicate that eating patterns are shaped by interactions between eating experiences, home and school environments, and personal choices. The more established the eating habits, the more likely these habits are to be carried over into the school eating context (Iyassu et al., 2024; Mahmood et al., 2025).

Family income was associated with the acceptability of staple food, animal-based side dishes, and fruit, but not with plant-based side dishes or vegetables. Economic conditions may be related to the availability, variety, and frequency of food exposure at home, whereas the provision of the same menu at school may reduce some of these differences (Adjapong et al., 2024). This finding is consistent with Srimiati et al. (2026), who found no association between income and overall food acceptability (Srimiati et al., 2026).

Nutrition knowledge was not associated with the acceptability of any of the five components, although 78.1% of students had good nutrition knowledge. Among adolescents, knowledge may be associated with dietary quality, but actual food choices remain influenced by taste preferences, availability, habits, price, and the social environment (Egg et al., 2020; Dewi et al., 2024; Iyassu et al., 2024). Nutrition education remains necessary, but it should be accompanied by improvements in the eating experience and the sensory quality of the menu.

The teacher's role was also not directly associated with the

acceptability of any individual component. This finding does not negate the role of teachers in MBG implementation, as teacher support may operate through more distal mechanisms, such as creating an orderly eating environment, serving as role models, and encouraging students to try less familiar foods. Teacher-based interventions have shown that structured encouragement can increase school lunch consumption, suggesting that the quality and intensity of involvement may be more important than a general assessment of the teacher's role (Thompson et al., 2022). Among junior high school students, increasing autonomy in food choices may also make personal preferences and peer influence more dominant.

This study has several limitations. The analysis included only 73 students from a single school using non-probability sampling, so the findings cannot be broadly generalized. The cross-sectional design does not allow causal conclusions to be drawn. Food acceptability was assessed using hedonic ratings without measuring actual consumption or food waste. Nutrition knowledge was measured using only five items, and therefore may not fully represent the entire domain of nutrition knowledge. The 11-day observation period was summarized at the subject level and was not modeled as repeated daily data. In addition, several correlations were tested across five components, so the findings should be viewed as exploratory signals that require confirmation in larger samples. Nevertheless, separating each component provides practical

information for identifying which parts of the menu should be prioritized in MBG evaluation.

School-based MBG evaluation should record acceptability at the component level rather than relying only on the overall menu score. Vegetables and other components with lower acceptability can be targeted for testing variations in recipes, texture, cutting shapes, seasoning, presentation, and repeated exposure. Brief feedback from students and food waste measurements can be used to assess whether these improvements actually increase consumption.

CONCLUSION

MBG acceptability among junior high school students varied across menu components. Eating habits were associated with the acceptability of animal-based side dishes, plant-based side dishes, vegetables, and fruit, while family income was associated with staple food, animal-based side dishes, and fruit. Nutrition knowledge and the teacher's role showed no associations at the component level. Component-level evaluation, along with improvements in recipes and strategies to promote eating habits, should be prioritized for vegetables and plant-based side dishes, which had lower proportions of high acceptability. Future studies should involve more schools and combine hedonic testing with food waste measurements.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest to disclose.

DECLARATION USE AI

The authors declare that generative AI tools were used only for language editing and grammar correction. The authors remain fully responsible for the content and integrity of the manuscript.

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