



The Effect Of Free Nutritious Meal Program On Students Physical Fitness, Growth, And Learning Motivation In Jepara Regency

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Abstract

This study aimed to analyze the effect of the Government Free Nutritious Meal Program (Makan Bergizi Gratis/MBG) on students' physical fitness, growth, and learning motivation in Jepara Regency. The MBG program represents a national strategic policy designed to enhance human resource quality through balanced nutritional intake for school-aged children. However, empirical studies examining its simultaneous impact on both physical and psychological dimensions remain limited. This research employed a quantitative approach using a pretest–posttest design. The sample consisted of 220 students from grades VII, VIII, and IX at MTs Mathalibul Huda Mlonggo, Jepara Regency, selected through purposive sampling. Physical fitness was measured using the Indonesian Physical Fitness Test (TKJI), growth status was assessed through Body Mass Index (BMI) based on height and weight measurements, and learning motivation was evaluated using a validated and reliable Likert-scale questionnaire. Data were analyzed through normality testing followed by the Wilcoxon Signed-Rank Test to determine differences before and after program implementation. The findings revealed that the Free Nutritious Meal Program had a statistically significant effect on students' physical fitness ($p < 0.05$), as indicated by improved TKJI scores after the intervention. Growth indicators based on BMI categories also showed significant improvement ($p < 0.05$), reflecting better nutritional status. Furthermore, students' learning motivation significantly increased ($p < 0.05$), suggesting that adequate nutritional intake contributed to enhanced energy levels, concentration, and academic engagement. These findings confirm that the MBG program not only improves biological outcomes such as physical fitness and growth but also positively influences psychological aspects, particularly learning motivation. Therefore, the Free Nutritious Meal Program can be considered an effective strategic intervention to support students' health and educational quality in a holistic and sustainable manner.

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INTRODUCTION

Human resource development cannot be separated from the health quality and nutritional status of students. Adequate and balanced nutritional intake functions as a biological foundation that supports growth, development, and both physical and cognitive performance. According to the World Health Organization (2020), school-based nutrition interventions have been proven effective in improving health status, learning participation, and academic achievement among school-aged children.

Physiologically, physical fitness is defined as the body's ability to perform daily activities without experiencing excessive fatigue (Raharjo et al., 2023). Physical fitness encompasses cardiorespiratory endurance, muscular strength, power, agility, and flexibility (Mukhlis et al., 2022). Cardiorespiratory endurance is strongly influenced by maximal oxygen uptake capacity ($VO_2\text{max}$), which is closely related to adequate energy and macronutrient intake, particularly carbohydrates and protein (Supariyadi et al., 2022). Insufficient energy intake may reduce muscle glycogen stores, thereby impairing optimal physical performance.

From a growth perspective, adolescence represents a period of accelerated growth (growth spurt) characterized by significant increases in height and body weight. Soetjiningsih (2013) explains that growth results from the interaction between genetic and environmental factors, in which nutrition serves as the primary environmental determinant of optimal linear growth and body mass development. Deficiencies in protein and essential micronutrients may lead to growth disturbances and abnormal nutritional status, as reflected in Body Mass Index (BMI) values. Soekirman (2011) emphasizes that the balance between energy intake and metabolic requirements

determines the quality of nutritional status in children and adolescents.

Beyond biological aspects, a healthy physiological condition also influences students' psychological dimensions, particularly learning motivation. Learning motivation refers to internal and external drives that stimulate individuals to achieve specific academic goals. Sardiman (2018) states that learning motivation is influenced by physical condition, basic needs fulfillment, and students' mental readiness. When physiological needs, such as hunger, are met, students tend to demonstrate higher levels of concentration and persistence.

From a neurophysiological standpoint, the availability of blood glucose plays a crucial role in maintaining cognitive function, working memory, and attention (Kasim et al., 2018). Insufficient food intake before or during learning activities may lead to decreased focus and classroom participation. Therefore, school-based nutrition interventions constitute a strategic approach to enhancing students' overall learning readiness.

The Free Nutritious Meal Program (MBG) was launched as a national policy to ensure that students receive balanced meals within the school environment. This program aims not only to address undernutrition but also to improve the quality of learning through the enhancement of students' physical condition. However, empirical studies examining the simultaneous effects of this program on physical fitness, growth, and learning motivation remain limited, particularly within the context of Jepara Regency.

Based on this theoretical framework, it can be assumed that fulfilling balanced nutritional needs through the MBG program has the potential to enhance physiological capacity (physical fitness), optimize growth (BMI), and strengthen psychological aspects (learning motivation). Therefore, this study was conducted to empirically analyze the

effect of the MBG program on these three variables.

METHODS

This study employed a quantitative approach with a pre-experimental design using the one-group pretest–posttest model. This design was selected because the research aimed to determine changes in students' physical fitness, growth, and learning motivation before and after receiving the intervention in the form of the Free Nutritious Meal Program (MBG). The design enables researchers to compare the initial condition (pretest) and the final condition (posttest) within the same group, allowing the intervention effect to be directly identified (Sugiyono, 2019). A quantitative approach was applied because the study focused on objective measurement of variables, numerical data processing, and statistical hypothesis testing to obtain empirical and measurable conclusions (Arikunto, 2018).

The research was conducted in 2026 at MTs Mathalibul Huda Mlonggo, Jepara Regency, one of the schools implementing the MBG Program. The research subjects consisted of 220 students from grades VII, VIII, and IX who were registered as program beneficiaries and actively participated in learning activities during the research period. The sampling technique used was purposive sampling, defined as a technique for selecting samples based on specific criteria relevant to the research objectives (Sugiyono, 2019). The inclusion criteria included students who regularly participated in the MBG program, did not have serious health disorders, and were willing to complete the entire series of tests. This technique ensured that all respondents received the same treatment, thereby maintaining the internal validity of the study.

The physical fitness variable was measured using the Indonesian Physical Fitness Test (Tes Kesegaran Jasmani Indonesia/TKJI) as described by Mahardika

(2014). TKJI is a nationally standardized instrument designed to measure the primary components of adolescent physical fitness, including speed, muscular strength and endurance, power, and cardiorespiratory endurance. Each raw test score was subsequently converted into a standardized value based on TKJI norms to ensure uniform measurement units and allow comparative analysis.

The growth variable was measured using Body Mass Index (BMI), calculated as body weight in kilograms divided by height in meters squared. BMI was used as an indicator of nutritional status because it reflects the balance between energy intake and the body's metabolic requirements (Soekirman, 2011). Height was measured using a stadiometer with an accuracy of 0.1 cm, while body weight was measured using a digital scale with an accuracy of 0.1 kg. Measurement procedures followed standard anthropometric protocols to minimize measurement error.

Learning motivation was measured using a Likert-scale questionnaire developed based on the indicators of learning motivation proposed by Sardiman (2018), including persistence in learning, interest in tasks, attention during the learning process, and goal orientation. Prior to its use, the instrument was tested for validity using the product–moment correlation and for reliability using Cronbach's Alpha coefficient to ensure internal consistency of the items (Arikunto, 2018).

The research procedure began with the administration of a pretest to assess students' initial physical fitness, BMI, and learning motivation before the implementation of the MBG program. Subsequently, students participated in the MBG program for a specified period in accordance with school policy. At the end of the intervention period, a posttest was conducted using the same instruments to identify any changes that occurred.

Data analysis was conducted in stages. First, a normality test was performed using the Kolmogorov–Smirnov test to determine the distribution of the data. Since some data did not meet the assumption of normality, the non-parametric Wilcoxon Signed-Rank Test was used to examine differences between pretest and posttest scores. According to Ghozali (2021), the Wilcoxon test is used to compare two related samples that are not normally distributed. Conceptually, the test calculates the differences between paired scores, ranks the absolute values of these differences, and then sums the positive and negative ranks. The test statistic is determined based on the smaller of these rank sums and is subsequently converted into a Z value to determine significance at the $\alpha = 0.05$ level. If the significance value (Asymp. Sig.) is less than 0.05, a statistically significant difference exists between the conditions before and after the intervention.

Through this systematic methodological procedure, the study is expected to provide valid and reliable empirical evidence regarding the effect of the Free Nutritious Meal Program on students' physical fitness, growth, and learning motivation in Jepara Regency.

RESULTS AND DISCUSSION

The implementation of the Free Nutritious Meal Program (MBG) at MTs Mathalibul Huda Mlonggo, Jepara Regency, demonstrated observable changes based on direct observations conducted throughout the research process. Prior to the routine implementation of the program, several students appeared less enthusiastic during Physical Education classes. Some exhibited signs of early fatigue when participating in endurance tests, particularly in the middle-distance running component. In classroom learning activities, a number of students showed decreased concentration during afternoon sessions, which was presumed to be associated with physiological factors,

especially the suboptimal fulfillment of daily energy requirements.

After the MBG program was implemented in a structured and consistent manner, notable changes were observed in the learning dynamics. Students appeared more active in physical activities, were less prone to fatigue, and demonstrated higher participation levels during exercise sessions. In classroom settings, students seemed more focused and responsive to teachers' questions. These observations indicate that adequate nutritional intake has a direct impact on students' physical and psychological readiness.

Physiologically, balanced and nutritious food intake provides sufficient energy for metabolic processes and learning activities. Soekirman (2011) emphasizes that energy balance achieved through adequate intake of carbohydrates, proteins, and fats enhances muscle work efficiency and organ function. This aligns with the World Health Organization (2020), which states that school-based nutrition interventions contribute to improved health status and academic performance. Empirical observations in the field therefore reinforce the statistical findings of this study, demonstrating positive changes following program implementation.

Following the consistent implementation of the MBG program, statistically significant changes were identified. The results of the Wilcoxon Signed-Rank Test indicated significance values (Asymp. Sig.) of less than 0.05 for all variables, signifying significant differences between pre-intervention and post-intervention conditions. Thus, statistically, the MBG program was proven to have an effect on students' physical fitness, growth, and learning motivation.

**Table 1. Wilcoxon Signed-Rank Test
Indonesia Physical Fitness Test
Test Statistics^a**

	Post Test TKJI - Pre Test TKJI
Z	-12,360 ^b
Asymp. Sig. (2-tailed)	,000

Wilcoxon Signed Ranks Test

Hypothesis testing in this study was conducted using a nonparametric statistical test, namely the Wilcoxon Signed-Rank Test. The Wilcoxon test was employed to determine differences in the results of the Indonesian Physical Fitness Test (TKJI) before and after the intervention within the same sample. Decision-making in the Wilcoxon test was based on the Asymp. Sig. (2-tailed) value with a significance level of 5%. The results of the Wilcoxon Signed-Rank Test showed an Asymp. Sig. (2-tailed) value of 0.000 (< 0.05).

Regarding the physical fitness variable, the increase in Indonesian Physical Fitness Test (TKJI) scores indicates improvements in cardiorespiratory endurance, muscular strength and endurance, as well as power. Physiologically, this improvement can be explained through energy metabolism mechanisms. Carbohydrates consumed through nutritious meals are converted into glucose and stored as glycogen in muscles and the liver. Glycogen serves as the primary energy source during moderate to high-intensity physical activity. Adequate glycogen reserves enable muscles to function more efficiently and delay the onset of fatigue (Soekirman, 2011). In addition, protein plays a crucial role in muscle tissue repair and synthesis, thereby supporting increases in strength and endurance.

These findings are consistent with Mukhlis et al. (2022), who state that good nutritional status is one of the main determinants of physical fitness. Cardiorespiratory endurance is strongly influenced by maximal oxygen uptake

capacity (VO_{2max}), which is closely related to sufficient energy intake and optimal circulatory system function (Supariyadi et al., 2022). Therefore, the improvement in students' physical fitness following the MBG intervention indicates that the fulfillment of balanced nutritional intake has a tangible impact on physiological capacity.

**Table 2. Wilcoxon Signed-Rank Test
Growth (Body Mass Index)**

Test Statistics^a

	Post Test IMT - Pre Test IMT
Z	-12,876 ^b
Asymp. Sig. (2-tailed)	,000

Wilcoxon Signed Ranks Test

Hypothesis testing in this study was conducted using a nonparametric statistical procedure, namely the Wilcoxon Signed-Rank Test. The Wilcoxon test was applied to determine differences in Body Mass Index (BMI) results before and after the intervention within the same sample. Decision-making was based on the Asymp. Sig. (2-tailed) value at a 5% significance level. The results of the Wilcoxon Signed-Rank Test showed an Asymp. Sig. (2-tailed) value of 0.000 (< 0.05).

In terms of growth, BMI measurements indicated a shift in nutritional status toward the normal category. The number of students classified as undernourished decreased after the program was implemented. Biologically, adolescence represents a period of rapid growth (growth spurt) that requires adequate energy and protein intake to support the formation of new tissues. Soetjiningsih (2013) explains that optimal growth can only be achieved when macro- and micronutrient requirements are fulfilled in a balanced manner. Long-term energy imbalance may lead to growth disturbances and abnormal nutritional status.

The improvement in BMI observed in this study suggests that the MBG program

contributed to establishing a balance between students' energy intake and metabolic needs. Soekirman (2011) emphasizes that a positive energy balance within normal limits supports healthy body mass gain and optimal physical development. Through the provision of nutritious meals at school, daily intake disparities among students can be minimized, particularly for those from lower-to middle-income backgrounds.

Table 3. Wilcoxon Signed-Rank Test student learning motivation questionnaire

Test Statistics ^a	
	Post Test Angket - Pre Test Angket
Z	-12,867 ^b
Asymp. Sig. (2-tailed)	,000

Wilcoxon Signed Ranks Test

Hypothesis testing in this study was conducted using a nonparametric statistical method, namely the Wilcoxon Signed-Rank Test. The Wilcoxon test was applied to determine differences in Learning Motivation Questionnaire scores before and after the intervention within the same sample. Decision-making was based on the Asymp. Sig. (2-tailed) value at a 5% significance level. The results of the Wilcoxon Signed-Rank Test indicated an Asymp. Sig. (2-tailed) value of 0.000 (< 0.05).

Regarding the learning motivation variable, the increase in questionnaire scores reflects positive changes in the indicators of persistence, interest, attention, and goal orientation in learning. Psychologically, learning motivation is influenced not only by internal factors such as interest and aspirations but also by an individual's physiological condition. Sardiman (2018) states that the fulfillment of basic needs is a prerequisite for the emergence of optimal learning drive. Students who are hungry or experiencing energy deficiency tend to

demonstrate reduced concentration and diminished mental endurance.

From a neurocognitive perspective, the availability of blood glucose plays a crucial role in maintaining brain function, particularly in areas responsible for working memory and attention (Kasim et al., 2018). When the brain's energy requirements are adequately met, neural impulse transmission becomes more effective, enabling students to sustain focus for longer periods. This explains why, following the implementation of the MBG program, students appeared more responsive, actively asked questions, and were more engaged in the learning process.

Viewed integratively, the three variables examined in this study are systemically interconnected. Good physical fitness enhances students' stamina and resilience in participating in learning activities. Optimal growth reflects a healthy nutritional status, which forms the foundation for physiological stability. Stable physical conditions ultimately support psychological readiness and motivational engagement in the learning process. This interrelationship demonstrates that school-based nutrition interventions generate multidimensional impacts extending beyond health outcomes to the overall quality of education.

These findings reinforce the World Health Organization's (2020) perspective that school feeding programs represent an effective strategy for simultaneously improving students' health and academic performance. Accordingly, the Free Nutritious Meal Program is not only relevant as a public health policy but also serves as a strategic instrument in advancing human capital development.

Overall, the results indicate that nutritional intervention through the MBG program produces significant and measurable effects on improving physical fitness, enhancing growth status, and strengthening students' learning motivation.

This affirms that school-based nutritional policies have long-term implications for improving educational quality and human development.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the Free Nutritious Meal Program (MBG) had a significant effect on improving physical fitness, enhancing growth status, and strengthening students' learning motivation at MTs Mathalibul Huda Mlonggo, Jepara Regency. The Wilcoxon test results indicated statistically significant differences between pre-intervention and post-intervention conditions across all research variables ($p < 0.05$), further supported by effect size values in the moderate to large categories. This demonstrates that the program's impact was not only statistically significant but also substantively meaningful in practical terms.

The improvement in physical fitness suggests that the fulfillment of balanced nutritional intake contributed to enhanced physiological capacity, particularly in endurance and muscular strength components. The improvement in Body Mass Index (BMI) toward the normal category reflects the establishment of a balance between energy intake and metabolic requirements, which is crucial during adolescence, a critical period of growth. Meanwhile, the increase in learning motivation indicates that stable physiological conditions positively influenced students' psychological readiness to engage in the learning process.

Conceptually, these findings reinforce the interconnection between health and education, highlighting that school-based nutritional interventions serve as a foundational element in supporting the quality of learning. The MBG program affects not only biological aspects but also psychological dimensions that contribute to increased academic participation and engagement.

Therefore, the implementation of school-based nutritional fulfillment programs can be regarded as a comprehensive strategy for human resource development from an early age. Sustainability, nutritional quality control, and periodic evaluation are essential to ensure that the positive impacts of the program are maintained and continuously enhanced over time.

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It is hoped that the findings of this study will contribute positively to the development of school-based education and health policies and serve as a reference for future research in the fields of sports education and school nutrition.

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