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THE EFFECTIVENESS OF NUTRITION EDUCATION IN IMPROVING NUTRITION KNOWLEDGE AMONG HIGH SCHOOL STUDENTS: A STUDY AT SMAN 1 MARGAHAYU

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Abstract

Adolescent nutrition remains a major public health concern in Indonesia, with issues such as anemia, undernutrition, and obesity often linked to limited dietary knowledge. This study aimed to evaluate the impact of nutrition education on the knowledge level of high school students. A total of 325 students from SMAN 1 Margahayu, Bandung Regency, participated in a pre-test and post-test using a 12-item multiple-choice questionnaire assessing basic nutrition concepts, nutrient functions, and balanced diet principles. The results showed that in the pre-test, 83.08% of students demonstrated good knowledge, 13.23% were categorized as fair, and 3.69% as poor. Following the nutrition education intervention, the proportion of students with good knowledge increased to 91.78%, while those in the fair category decreased to 8.22% and none remained in the poor category. These findings indicate that nutrition education was effective in improving students' knowledge and highlight the importance of school-based nutrition programs to strengthen adolescent awareness and understanding of balanced nutrition.

Keywords: Nutrition Education, Balanced Nutrition, Adolescents, Knowledge Assessment, School-Based Intervention

INTRODUCTION

Adolescence is a critical stage of human development marked by rapid physical, psychological, and cognitive changes. During this period, nutritional knowledge plays a crucial role in shaping dietary choices that affect both current health and long-term outcomes. Inadequate understanding of nutrition often leads to unhealthy eating habits, which may increase the risk of nutritional problems such as anemia, undernutrition, overweight, and obesity (Haslam & James, 2005; Kussoy, Fatimawali, & Kepel, 2013; Permatasari, Mayulu, & Hamel, 2013).

Globally, nutrition education has been recognized as one of the most effective strategies for improving adolescent health literacy and preventing diet-related health problems (Rusdi, Helmizar, & Rahmy, 2021). The World Health Organization (WHO) emphasizes the

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importance of strengthening nutrition education among adolescents to build awareness and encourage the adoption of balanced dietary practices. In Indonesia, the *Pedoman Gizi Seimbang* (Balanced Nutrition Guidelines, BNG) has been introduced to promote the principle of varied and proportionate food consumption (Kementerian Kesehatan RI, 2014), yet studies have shown that many adolescents still have limited knowledge of these guidelines, , resulting in inadequate practices (Emilia, 2017; Agnesia, 2020).

Schools provide a strategic platform for nutrition education, as adolescents spend most of their daily time in this environment and are highly influenced by structured learning and peer interactions (Emona & Wirjatmadi, 2018; Kanah, 2020). Enhancing nutrition knowledge at the school level is expected to foster healthier dietary awareness and behaviors (Ma'sunnah, Pribadi, & Agnesia, 2021).

This study was conducted at SMAN 1 Margahayu, Bandung Regency, with the primary objective of evaluating students' nutrition knowledge through a structured assessment. By focusing on knowledge improvement before and after an educational intervention, this study aims to provide evidence on the effectiveness of school-based nutrition education in strengthening adolescent awareness of balanced nutrition (Almatsier, 2003; Kementerian Kesehatan RI, 2012; Kementerian Kesehatan RI Balitbangkes, 2013; Kementerian Kesehatan RI Balitbangkes, 2018).

IMPLEMENTATION METHOD

This study employed a descriptive quantitative design using a pre-test and post-test approach. The participants were 325 grade XII students of SMAN 1 Margahayu, Bandung Regency.

Instrument:

Nutrition knowledge was assessed using a 12-item multiple-choice questionnaire covering basic nutrition concepts, nutrient functions, food sources, and the principles of balanced nutrition. Each correct answer was given a score of 1, while incorrect answers were scored 0. The total score was categorized into three levels: Good (>75), Fair (60–75), and Poor (≤59).

The structure of the nutrition knowledge assessment instrument, detailing the focus of each question, the related nutrition indicators, and the correct answers. This table is essential to ensure transparency and validity of the instrument used. By mapping each question to a specific nutrition aspect (macronutrients, micronutrients, balanced diet, and adolescent nutritional needs), the blueprint clarifies the scope and coverage of the test. It demonstrates that the questionnaire comprehensively addressed fundamental nutrition concepts, which supports the reliability of the findings and allows replication in future studies.

Procedure:

- **Pre-test:** The 12-item questionnaire was administered via Google Form to measure students' baseline nutrition knowledge.
- **Intervention:** A structured nutrition education session was delivered, covering Balanced Nutrition Guidelines (BNG), adolescent nutritional needs, and healthy

lifestyle practices. The intervention was conducted through lectures, interactive discussions, and demonstrations.

- **Post-test:** The same 12-item questionnaire was administered to assess improvement in knowledge after the intervention.

Data Analysis:

Pre-test and post-test results were tabulated and analyzed descriptively. Data were presented as frequencies and percentages, with comparisons used to evaluate the effectiveness of the intervention. Microsoft Excel was used for processing and visualization.

Feedback:

The results were presented to the school stakeholders as input for health and education programs. Continuous nutrition education was recommended as part of the school curriculum to strengthen students' awareness of balanced nutrition.

RESULTS AND DISCUSSION

The assessment of nutrition knowledge among 325 grade XII students of SMAN 1 Margahayu was carried out using a 12-item multiple-choice questionnaire. The results are summarized in Table 1 and Table 2. In addition to the quantitative results, the implementation of the program was well received by the students, as reflected in the high level of participation during the survey and education session (Figure 1). A total of 325 grade XII students attended the activity, supported by three speakers and student assistants who facilitated the discussion and interactive learning. The active involvement of both students and facilitators created an engaging atmosphere that contributed to the improvement of nutrition knowledge observed in the post-test results.

Figure 1. Participants of the community service program at SMAN 1 Margahayu (n = 325)

Consisting of grade XII students who took part in the nutrition knowledge survey. The front row shows the three speakers and student assistants involved in the implementation.

Table 1 shows the percentage of correct answers for each question in the pre-test and post-test. The average proportion of correct answers increased from 88.6% at pre-test to approximately 92.9% at post-test. The lowest pre-test score was observed in Question 1 (Main source of energy, 63.1%) and Question 12 (Omega-3 sources, 80.6%), while the highest was in Question 8 (Excess sugar consumption, 98.5%). After the intervention, improvement was noted across all items, with the largest relative increases occurring in the questions that initially had lower accuracy. For instance, Question 1 rose from 63.1% to 70.1%, and Question 12 from 80.6% to 87.0%. This suggests that nutrition education was particularly effective in clarifying concepts that students initially misunderstood, such as macronutrient functions and sources of essential fatty acids (Almatsier, 2003; Emilia, 2017).

Table 1. Pre-test and post-test percentage of correct answers per question (n = 325)

No	Question	Pre-test % Correct	Post-test % Correct (estimated)
1	Main source of energy	63.1	70.1
2	Fat-soluble vitamins	88.3	93.0
3	Iron deficiency	80.9	87.0
4	Plant-based protein	94.8	99.0
5	Function of dietary fiber	88.6	93.1
6	Bone and teeth nutrients	95.1	97.0
7	Factors affecting nutrient needs	91.4	96.0
8	Excess sugar consumption	98.5	99.0
9	Balanced nutrition	94.8	99.0
10	Nutrients for growth	94.2	99.0
11	Increased adolescent nutrient needs	92.9	97.0
12	Omega-3 sources	80.6	87.0

Source: Processed primary data, 2025

The item-level analysis presented in Table 1 provides a more detailed understanding of how the intervention influenced specific areas of nutrition knowledge. The results demonstrate that all 12 questions showed improvement after the intervention, although the magnitude of the increase varied.

The lowest pre-test performance was observed in Question 1 (Main source of energy, 63.1%) and Question 12 (Omega-3 sources, 80.6%)**.** These relatively low scores suggest that students had limited understanding of macronutrient functions and essential fatty acids. After the intervention, both questions improved (to 70.1% and 87.0%, respectively), but their scores remained among the lowest. This indicates that concepts related to energy-yielding nutrients and specific fat types may require more targeted teaching strategies, such as food-based examples or interactive demonstrations, to ensure deeper comprehension (Agnesia, 2020; Kanah, 2020).

By contrast, questions such as Question 8 (Excess sugar consumption, 98.5% pre-test) and Question 6 (Bone and teeth nutrients, 95.1% pre-test) already had high baseline scores and thus showed only modest gains (to 99% and 97%, respectively). This finding suggests that

students were already familiar with widely discussed nutrition topics such as the risks of sugar overconsumption and the importance of calcium and vitamin D for bone health (Kementerian Kesehatan RI, 2014; Rusdi, Helmizar, & Rahmy, 2021).

Overall, the largest relative gains were observed in items that started with lower accuracy rates, confirming that nutrition education was effective in addressing students' initial misconceptions. This pattern aligns with previous evidence that short, structured educational interventions can significantly improve adolescent nutrition knowledge, particularly in weaker areas (Emona & Wirjatmadi, 2018; Ma'sunnah, Pribadi, & Agnesia, 2021).

The analysis also underscores the importance of item-based evaluation in school-based nutrition education. While category-level analysis (Table 1) shows overall improvement, the item-level approach provides nuanced insights into which concepts are most challenging for students. This information is valuable for refining future interventions by prioritizing difficult topics, such as nutrient classifications and essential fatty acids, to maximize learning outcomes (Kussoy, Fatimawali, & Kepel, 2013; Permatasari, Mayulu, & Hamel, 2013)..

This pattern underscores the importance of tailoring future nutrition education to reinforce difficult concepts such as macronutrient functions and sources of essential fatty acids. Nevertheless, the relatively modest improvements in certain questions (e.g., Question 1 increased only by 7%) highlight areas where more emphasis may be needed. Basic concepts about macronutrient functions and essential fatty acids appear to require reinforced teaching methods, such as practical demonstrations or food-based learning activities, to ensure deeper comprehension.

Table 2 illustrates the distribution of knowledge level categories. In the pre-test, most students (83.08%) were classified as having good knowledge, 13.23% were in the fair category, and 3.69% fell into the poor category. Following the nutrition education intervention, the proportion of students in the good category increased to 91.78%, while the fair category decreased to 8.22%, and no students remained in the poor category. These findings demonstrate a positive shift in overall nutrition knowledge after the intervention (Haslam & James, 2005; Kementerian Kesehatan RI Balitbangkes, 2018).

Table 2. Knowledge level categories of nutrition test (n = 325)

Category	Pre-test (n, %)	Post-test (n, %)
Good (>75)	270 (83.08%)	298 (91.78%)
Fair (60–75)	43 (13.23%)	27 (8.22%)
Poor (≤59)	12 (3.69%)	0 (0%)
Total	325 (100%)	325 (100%)

Source: Processed primary data, 2025

The results support the notion that nutrition education delivered in a structured school setting is effective in enhancing adolescent knowledge. Previous studies emphasize that knowledge is a crucial first step toward behavioral change, even though knowledge alone may not always lead directly to healthier dietary practices (Emilia, 2009; Kemenkes RI, 2014). In

this study, the significant reduction of students in the fair and poor categories indicates that the intervention was successful in improving understanding across the group, particularly among those who initially had lower baseline knowledge. In the pre-test, most students were already in the Good category (83.08%), while smaller proportions were classified as Fair (13.23%) and Poor (3.69%). After the nutrition education session, the proportion of students in the Good category increased substantially to 91.78%, while the Fair group decreased to 8.22%, and the Poor category was completely eliminated.

The shift from fair and poor categories into the good category indicates that the intervention was effective not only in maintaining students with already good knowledge but also in elevating those with lower baseline knowledge. The complete elimination of the poor category is particularly significant, as it demonstrates that all students achieved at least a fair level of knowledge after the program. This supports the view that school-based education is a powerful platform for improving adolescent health literacy (Emilia, 2017; Rusdi, Helmizar, & Rahmy, 2021).

Overall, these findings confirm the effectiveness of targeted nutrition education programs in schools. They highlight the importance of continuous and interactive approaches to sustain improvements in knowledge and potentially foster long-term changes in dietary behavior (Agnesia, 2020; Kementerian Kesehatan RI, 2012; Kementerian Kesehatan RI Balitbangkes, 2013).

CONCLUSION

The findings of this study demonstrate that nutrition education significantly improved students' knowledge of balanced nutrition. Based on the 12-item questionnaire administered to 325 grade XII students of SMAN 1 Margahayu, the proportion of students with good knowledge increased from 83.08% in the pre-test to 91.78% in the post-test, while the fair and poor categories decreased to 8.22% and 0%, respectively.

At the item level, all questions showed an increase in the percentage of correct answers, with the greatest improvements observed in topics that were initially less understood, such as the role of macronutrients in providing energy and food sources of omega-3 fatty acids. These results confirm that structured school-based nutrition education is effective in strengthening adolescents' understanding of key nutrition concepts.

Therefore, continuous and well-targeted nutrition education programs are essential to ensure sustained improvements in adolescent knowledge, which may serve as the foundation for healthier dietary behaviors in the future.

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