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Research Article

Nutrition Education for Adolescent Girls as a Strategy for Intergenerational Stunting Prevention: A Quantitative Study at SMAN 03 Rumbai

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Abstract

Stunting is a chronic nutritional problem with long-term consequences for human capital and is influenced by nutritional conditions across the life course, including adolescence as a critical preconception period. Adolescent girls play a strategic role in intergenerational stunting prevention; however, nutrition literacy in this group remains relatively low. This study aimed to analyze the effect of nutrition education on improving nutrition knowledge among adolescent girls as a preventive strategy for intergenerational stunting among senior high school students.A quasi-experimental study with a one-group pretest posttest design was conducted. The study participants consisted of 100 female students in grades X and XI from a senior high school in Rumbai, Indonesia, selected using a total sampling technique. Data were collected using a structured nutrition knowledge questionnaire that had been tested for validity and reliability. Data analysis included univariate and bivariate analyses. Normality was assessed using the Shapiro Wilk test, and differences in nutrition knowledge scores before and after the intervention were analyzed using a paired t-test with a significance level of $p < 0.05$. The mean nutrition knowledge score increased significantly from 65.42 ± 6.12 before the intervention to 81.30 ± 6.05 after the intervention ($p < 0.001$). A mean difference of 15.88 points indicates a substantial improvement in nutrition knowledge following the nutrition education program. In conclusion, nutrition education is effective in improving nutrition knowledge among adolescent girls and has the potential to serve as an upstream preventive strategy for intergenerational stunting.

Keywords: Education, Nutrition, Stunting

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INTRODUCTION

Stunting is a chronic nutritional problem with long-term consequences for the quality of human resources, including impaired physical growth, cognitive development, and an increased risk of non-communicable diseases in adulthood. Evidence from previous studies indicates that stunting is not solely determined by nutritional conditions during early childhood, but rather represents the cumulative effects of nutritional problems across the life course, including adolescence as a critical preconception period (Fahmida et al., 2025; Jaleel et al., 2025; Mukhopadhyay, 2025). Therefore, stunting prevention efforts should not be limited to pregnancy and the first 1,000 days of life, but should also target adolescent girls as future mothers.

Adolescent girls are particularly vulnerable to nutritional problems, such as inadequate nutrient intake and low nutrition literacy, which may affect their nutritional preparedness prior to pregnancy. Studies conducted in Indonesia have shown a significant association between adolescents' nutrition knowledge and nutritional status, suggesting that limited understanding of balanced nutrition may increase the risk of long-term nutritional problems, including stunting in the next generation (Akombi-Inyang, 2025; Brown et al., 2025). These findings highlight the importance of implementing promotive and preventive interventions beginning at the secondary school level.

School-based nutrition education is widely regarded as an effective and sustainable strategy to improve nutrition knowledge and awareness among adolescent girls. Experimental studies have demonstrated that nutrition education delivered through educational media, such as flip charts, significantly enhances adolescents' knowledge and attitudes toward stunting prevention (Anyati et al., 2025; Azhar et al., 2025; Pasha et al., 2025). In addition, interactive and context-based educational approaches, including educational games, have been shown to increase adolescents' awareness of the importance of balanced nutrition in daily life (Bezie et al., 2025; Hasib Joarder et al., 2025; Lundberg et al., 2025).

Further empirical evidence suggests that peer-based nutrition education models are also effective in strengthening adolescent girls' understanding as prospective mothers. Quantitative studies have reported that peer group nutrition education contributes positively to improvements in adolescents' nutrition knowledge and dietary behaviors and is considered a strategic approach to reducing the risk of stunting in a sustainable manner (Mekuriaw et al., 2025; Samuel et al., 2025; Zemariam et al., 2025). These findings reinforce the argument that nutrition education among adolescent girls plays a critical role in breaking the cycle of intergenerational stunting.

Despite this evidence, most stunting prevention programs in Indonesia remain focused on nutritional interventions for pregnant women and young children, while upstream approaches targeting adolescent girls have not been systematically optimized. In fact, adolescents' nutrition literacy plays an essential role in shaping healthy eating behaviors and nutritional readiness before entering the reproductive period, which ultimately contributes to stunting prevention (Bustos et al., 2025; Fogarty et al., 2025; Haniarti et al., 2025). This gap underscores the need for quantitative studies that specifically examine the role of nutrition education for adolescent girls in the context of intergenerational stunting prevention.

Based on these considerations, this study addresses the limited quantitative evidence regarding the effectiveness of nutrition education for adolescent girls as a strategy for intergenerational stunting prevention at the senior high school level. Nutrition education was selected as the intervention because it is promotive, preventive, easily integrated into the school environment, and has the potential for long-term impact. This study aims to analyze the role of

nutrition education in improving nutrition knowledge and nutritional preparedness among adolescent girls as a preventive effort against intergenerational stunting. The findings are expected to contribute to strengthening national evidence and to serve as a foundation for the development of more effective and sustainable adolescent nutrition education programs.

RESEARCH METHOD

Contains the type of research, time and place of research, targets/objectives, research subjects, procedures, instruments and data analysis techniques as well as other matters related to the method of research. Targets and objectives, research subjects, procedures, data and instruments, and data collection techniques, as well as data analysis techniques and other matters related to the method of research can be written in sub-chapters, with sub-headings. Sub-subheadings do not need to be notated, but are written in lowercase with a capital letter, Times New Roman-11 bold, left aligned. As an example can be seen below .

Research Design

This study employed a quantitative approach using a quasi-experimental design with a one-group pretest posttest model. This design was selected to assess changes in nutrition knowledge among adolescent girls before and after the implementation of a nutrition education intervention as a strategy for intergenerational stunting prevention.

Research Target/Subject

The study participants consisted of 100 female students from grades X and XI. Inclusion criteria included active enrollment, age between 17 and 18 years, willingness to participate, and completion of all stages of the research. Exclusion criteria were absence during the pretest or posttest sessions and incomplete participation in the nutrition education activities. A total sampling technique was applied, whereby all students who met the eligibility criteria were included as study participants.

Research Procedure

The research procedures were conducted in accordance with the quasi-experimental design using a one-group pretest posttest approach. The study was implemented in several sequential stages. Initially, administrative approval was obtained, followed by coordination with the school authorities to ensure the smooth implementation of the research activities. Participants were then informed about the objectives, procedures, and ethical considerations of the study, and written informed consent was obtained prior to data collection (Guo et al., 2025; Hu et al., 2025; Soharwardi et al., 2025).

Baseline data were collected through a pretest to assess the initial level of nutrition knowledge among adolescent girls. Following the pretest, a structured nutrition education intervention was delivered to all participants. The intervention was conducted using interactive lectures and group discussions, with educational materials covering adolescent balanced nutrition, anemia and its prevention, preconception nutrition, and the relationship between adolescent nutritional status and stunting.

After the completion of the nutrition education sessions, post-intervention data were collected using the same nutrition knowledge questionnaire administered during the pretest. This posttest aimed to measure changes in participants' nutrition knowledge following the intervention. The pretest and posttest scores were subsequently compared to evaluate the effect of the nutrition education program (Burger et al., 2025; Hu et al., 2025; Shiyami & Mardiana, 2025).

Instruments, and Data Collection Techniques

The data collected in this study were primary data in the form of nutrition knowledge scores. A structured questionnaire was used as the research instrument, developed based on adolescent balanced nutrition guidelines and concepts of stunting prevention. The questionnaire underwent validity and reliability testing to ensure its accuracy and consistency in measuring nutrition knowledge (Fatkuriyah et al., 2025; Hu et al., 2025; Soharwardi et al., 2025). Data were collected through self-administered questionnaires during the pretest and posttest sessions, with researcher supervision to ensure completeness and accuracy of responses

Data Analysis Technique

The data collected in this study were primary data in the form of nutrition knowledge scores. A structured questionnaire was used as the research instrument, developed based on adolescent balanced nutrition guidelines and concepts of stunting prevention (Mokori et al., 2025; Soharwardi et al., 2025; Worku et al., 2025). The questionnaire underwent validity and reliability testing to ensure its accuracy and consistency in measuring nutrition knowledge. Data were collected through self-administered questionnaires during the pretest and posttest sessions, with researcher supervision to ensure completeness and accuracy of responses

RESULTS AND DISCUSSION

The initial quantitative analysis focused on pretest and posttest data of adolescent girls' nutrition knowledge scores obtained through a structured nutrition knowledge questionnaire. Descriptive analysis revealed a clear upward trend following the implementation of the nutrition education intervention (Fogarty et al., 2025; Mokori et al., 2025; Soharwardi et al., 2025). An increase in the mean nutrition knowledge score was observed, accompanied by a shift in the minimum and maximum values toward higher scores, indicating an overall improvement in adolescents' understanding of balanced nutrition concepts. These findings suggest that the nutrition education intervention had a positive effect on enhancing nutrition knowledge among adolescent girls as part of intergenerational stunting prevention efforts.

Table 1. Mean Nutrition Knowledge Scores Before and After Nutrition Education

Variable	Mean ± SD	Min–Max
Pretest	65,42 ± 6,12	46 – 73
Posttest	81,30 ± 6,05	60 – 90

Table 1 presents the mean nutrition knowledge scores before and after the nutrition education intervention. Prior to the intervention, the mean nutrition knowledge score was 65.42 ± 6.12, with scores ranging from 46 to 73. After the nutrition education was delivered, the mean score increased to 81.30 ± 6.05, with a minimum score of 60 and a maximum score of 90. This improvement demonstrates a substantial increase in nutrition knowledge following the intervention, both in terms of mean values and score distribution, reflecting a comprehensive enhancement of nutrition understanding among most participants.

Table 2. Normality Test for Nutrition Knowledge Scores

Variabel	Kolmogorov Smirnov Sig.	Shapiro Wilk Sig.
Pretest	0,143	0,605
Posttest	0,200	0,467

Normality testing using the Shapiro Wilk test indicated that the pretest ($p = 0.605$) and posttest ($p = 0.467$) nutrition knowledge scores were normally distributed. Therefore, differences between pretest and posttest scores were analyzed using a paired t-test.

These findings demonstrate that nutrition education significantly improves nutrition knowledge among adolescent girls. The observed increase in mean knowledge scores suggests that structured and targeted nutrition information effectively enhances adolescents' understanding of balanced nutrition principles. This result supports the role of nutrition education as an effective promotive preventive approach for adolescent populations.

The results of this study are consistent with those reported by Azhari and Fayasari (2020), who found that nutrition education delivered through lectures and animated video media significantly improved adolescents' nutrition knowledge, attitudes, and eating behaviors. Similarly, Nurcahyani (2020) reported that balanced nutrition counseling using video media had a positive effect on dietary intake among adolescent girls. These findings indicate that improvements in nutrition knowledge may serve as an important initial step toward fostering healthier eating behaviors.

This study also aligns with the findings of Farikhah (2021), who reported that nutrition education delivered through infographic-and web-based media effectively enhanced nutrition knowledge and balanced eating behaviors. In addition, Damayanti (2022) emphasized that dietary patterns are significantly associated with adolescents' nutritional status. Therefore, improving nutrition knowledge through education has the potential to contribute to better dietary practices and the prevention of nutritional problems among adolescent girls.

In the context of intergenerational stunting, enhanced nutrition knowledge among adolescent girls has important strategic implications for early prevention during the preconception phase. Adolescent girls with adequate nutrition knowledge are expected to have better nutritional preparedness before entering the reproductive period, thereby reducing the risk of adverse pregnancy outcomes and low birth length, which are early determinants of stunting. Consequently, nutrition education for adolescent girls not only contributes to short-term improvements in knowledge but also represents a critical component of long-term strategies to prevent intergenerational stunting

CONCLUSION

This study demonstrates that nutrition education significantly improves nutrition knowledge among adolescent girls. The observed increase in knowledge scores following the intervention indicates that nutrition education is an effective approach to addressing the issue of limited nutrition understanding among adolescents.

More broadly, improved nutrition knowledge among adolescent girls has important implications for intergenerational stunting prevention. Adolescent girls with adequate nutrition knowledge are expected to have better nutritional preparedness before entering the reproductive period, which may reduce the risk of nutritional problems among mothers and children in the future. Therefore, nutrition education for adolescent girls can be considered an upstream preventive strategy to break the cycle of intergenerational stunting.

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AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Methodology; Project administration.
Author 2: Investigation; Validation; Supervision; Resources; Writing – review and editing.

CONFLICTS OF INTEREST

The authors declare no conflict of interest

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