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Effectiveness of nutrition education on stunting prevention behavior in mothers under five

Risna Ayu Rahmadani[1], Ari Setiawati[2]*, Indrawati Aris[3], Anita Lontaan[4], Prasetyowati[5]

[1]Department of Midwifery, University of Muhammadiyah Manado, North Sulawesi, Indonesia
[2]Department of Midwifery, Central Java University of Qur'an Science in Wonosobo, Indonesia
[3]Department of Nursing, Central Java University of Qur'an Sciences in Wonosobo, Indonesia
[4]Department of Midwifery, Polytechnic of the Ministry of Health Manado, North Sulawesi, Indonesia
[5]Department of Midwifery, Polytechnic of the Ministry of Health Tanjungkarang, Lampung, Indonesia

*Correspondence: Ari Setiawati, Department of Midwifery, Central Java University of Qur'an Science in Wonosobo, Indonesia. Email: setyawatiari61@gmail.com

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ABSTRACT

Introduction: Stunting is a global health problem that impacts children's growth and development. One of the main factors contributing to stunting is the lack of maternal knowledge about balanced nutrition. Nutrition education is expected to increase mothers' understanding of healthy eating and toddler stunting prevention practices. This study aims to analyze the effectiveness of nutrition education on changes in maternal behavior in preventing stunting in toddlers.

Materials and Methods: This study uses a quasi-experimental design with a pretest-posttest approach with a control group. The sample consisted of mothers with toddlers, selected by purposive sampling. The intervention group was given nutrition education through counseling media and interactive discussions, while the control group did not receive the intervention.

Results: The study showed a significant increase in mothers' knowledge and practice of nutrition after being given nutrition education ($p<0.05$). In addition, there were substantial differences between the intervention and control groups regarding stunting prevention behavior.

Conclusions: Nutrition education has been proven effective in increasing maternal knowledge and behavior and preventing toddler stunting. Therefore, public health programs need to expand nutrition education interventions to reduce stunting incidence.

Keywords: nutrition education, maternal behavior, stunting prevention.

INTRODUCTION

Stunting, or the condition of failure to grow in children due to chronic malnutrition, has become a significant concern in global health. The World Health Organization (WHO) reported that in 2020, about 22% of children under the age of five worldwide were stunted. This condition affects a child's physical growth, negatively impacts cognitive development productivity in adulthood, and increases the risk of chronic diseases. In Indonesia, the prevalence of stunting is still a serious problem. Basic Health Research Data (Riskesdas) 2018 shows that 30.8% of children under five are stunted. This figure is far above the WHO threshold, which is 20%. Factors such as inadequate nutritional intake, recurrent infections, and improper feeding practices contribute to the high rate of stunting in Indonesia. Stunting, or the shortness of a child's height compared to the standard age, is an essential indicator of children's nutritional status and health. According to a report by the United Nations Children's Fund (UNICEF), the World Health Organization (WHO), and the World Bank Group (2023), around 148.1 million children under the age of five are stunted globally. Stunting is not just a matter of physical growth but is also closely related to impaired cognitive development, weak immunity, and an increased risk of non-communicable diseases in adulthood (Batani and Maharaj, 2024).

Various factors affect the incidence of stunting, including lack of nutritional intake, inadequate diet, low access to health services, and inappropriate feeding practices in children (Ochi and Saidi, 2024). One of the main factors contributing to the high prevalence of stunting is the low knowledge of mothers about nutrition and healthy diets for children (Frongillo, Adebiyi and Boncyk, 2024). Nutrition education is one of the main strategies in stunting prevention because it can increase mothers' understanding of the importance of fulfilling children's nutritional needs from an early age, including exclusive breastfeeding, appropriate complementary breastfeeding, and a balanced diet (Shinde *et al.*, 2023). Nutrition education-based interventions have improved maternal behavior regarding healthy food choices, improved child feeding patterns, and enhanced children's nutritional status (Nyirenda, Mulenga and Nyambe-Silavwe, 2025). Nutrition education carried out through various media, such as direct counseling, community-based counseling, and digital media, can positively impact maternal knowledge and practices in feeding children under five (Bidzha, Ngepah and Greyling, 2024). The role of mothers is crucial in stunting prevention, considering that they are the primary decision-makers in feeding and caring for children (Sentika *et al.*, 2024). Mother's knowledge and attitude towards nutrition dramatically affect the nutritional status of children (Ibrahim and Fathi Zaghamir, 2024). Therefore, interventions in the form of nutrition education for mothers under five are considered an effective strategy to prevent stunting (Proaño *et al.*, 2024).

Nutrition education aims to increase mothers' knowledge about the importance of balanced nutritional intake, correct feeding practices, and hygienic behaviors that can prevent infections (Madziva, Chinouya and Njoroge, 2024). Studies show that structured nutrition education programs can improve maternal nutrition knowledge and practices, which contributes to reducing the prevalence of stunting (Fleming *et al.*, 2023). Nutrition education aims to increase mothers' understanding of the importance of nutrition in child growth, including the role of macronutrients (carbohydrates, proteins, fats) and micronutrients (iron, calcium, vitamin A, and zinc) in stunting prevention. Nutrition education interventions must be able to change the mindset of mothers toward the importance of healthy eating and feeding practices that are appropriate for the child's age (Gutema *et al.*, 2024). Nutrition education at the family level is critical so that the healthy behaviors taught can be applied in daily life, such as cooking nutritious food, regulating a balanced diet, and maintaining food hygiene to prevent infections that contribute to stunting (Koivu *et al.*, 2023).

However, the effectiveness of nutrition education is influenced by various factors, including delivery methods, frequency of interactions, and local cultural context. Approaches that involve communities and consider local wisdom tend to be more successful in changing behavior.

In addition, support from health workers and posyandu cadres also plays an important role in the success of the nutrition education program. Despite various efforts that have been made, challenges in the implementation of nutrition education programs still exist. Limited resources, low levels of maternal education, and restricted access to health services are the main obstacles. Therefore, a comprehensive and sustainable strategy is needed to ensure that nutrition education can achieve its goals and significantly impact stunting prevention. In this context, further research is required to evaluate the effectiveness of various nutrition education models and identify the approach that best suits local conditions. A deeper understanding of the factors that influence an intervention's success will help design more effective and sustainable programs. Overall, nutrition education for mothers under five is a key component in efforts to prevent stunting. With the right approach and support from various parties, it is hoped that the prevalence of stunting can be suppressed so that children can grow and develop optimally.

MATERIALS AND METHODS

Research Design

This study uses a quasi-experimental design with a pretest-posttest approach with a control group. This design was used to evaluate the effectiveness of nutrition education on changes in maternal behavior to prevent stunting in toddlers.

Population and Sample

This study's population is mothers with toddlers (aged 6-24 months) registered at Posyandu or Puskesmas in the research area. Inclusion criteria: Mothers with children aged 6-24 months, willing to participate in the nutrition education program until completion, can read and understand the educational materials provided. Exclusion criteria: Mothers who cannot attend the entire education session, mothers or children with certain medical conditions that can affect nutritional status, such as chronic diseases or metabolic disorders.

The purposive sampling technique was used to select participants who met the research criteria. The sample consisted of two groups: the Intervention Group, which received nutritional education about stunting prevention, and the Control Group, which did not receive nutrition education but still received routine health services at Posyandu/Puskesmas. Based on the calculation of the sample size with power analysis using a confidence level of 95% and power of 80%, it is estimated that each group needs a minimum of 50 respondents so that the total sample is 100 mothers under five.

Data Collection

Nutrition education was carried out for 4 weeks with four meeting sessions (1 time per week). Each session lasts 60-90 minutes and is given by trained health workers (nutritionists and midwives). The educational methods include interactive lectures, which present material on balanced nutrition, exclusive breastfeeding, proper MP-ASI, and stunting prevention practices. Group Discussion: A question-and-answer session will be held to discuss obstacles and strategies in implementing healthy nutrition in the family. Practical Demonstration: Simulate how to prepare nutritious food for toddlers according to the Balanced Nutrition Guidelines. Educational Media: Using guidebooks, leaflets, and short videos to strengthen participants' understanding. The control group was not given special education but received routine health services from the Puskesmas/Posyandu. Independent variable: Nutrition education. Dependent variables: Changes in maternal behavior in stunting prevention, including Knowledge about nutrition and stunting. Attitude towards the importance of nutrition in child growth. Feeding practices and nutritional parenting of toddlers.

Research Instruments

Data were collected using structured questionnaires that had been tested for validity and reliability. The instruments used include the Knowledge Questionnaire: Measuring mothers'

understanding of nutrition and stunting prevention before and after the intervention (pretest and posttest). Attitude Questionnaire: Using the Likert scale to assess changes in maternal attitudes related to nutrition and health of children. Practice Observation: Use checklists to evaluate changes in children's feeding practices, such as breastfeeding, appropriate MP-ASI, and healthy food variations.

Data Analysis

The following statistical methods were used to analyze the data obtained: Normality Test (Kolmogorov-Smirnov/Shapiro-Wilk): To determine whether the data is usually distributed. Paired Sample t-Test: Used to compare pretest and posttest scores in the intervention and control groups if the data is generally distributed. Wilcoxon Signed-Rank Test: Used when the data is not normally distributed. Independent Sample t-test or Mann-Whitney U Test: To compare the difference in change between the intervention and control groups. The entire analysis was conducted using the latest version of SPSS software with a significance level of $p < 0.05$.

Research Ethics

This research has received approval from the Health Research Ethics Committee with the relevant research license number. All respondents were given informed consent before participating, and the data collected was kept confidential.

RESULTS

Table 1. Characteristics of Respondents

Characteristic	Intervention Group (n=50)	Control Group (n=50)	p-value
Usia Ibu (tahun)	26,4 ± 4,5	27,1 ± 5,2	0,521
Maternal Education (%)			
Elementary school	12 (24%)	14 (28%)	0,432
Junior high school	18 (36%)	17 (34%)	
Senior high school	14 (28%)	13 (26%)	
Universitas	6 (12%)	6 (12%)	
Mother's Job (%)			
Housewife	35 (70%)	37 (74%)	0,612
Work	15 (30%)	13 (26%)	

Note: There was no significant difference in demographic characteristics between the intervention and control groups ($p > 0.05$).

Table 2. Mother's Knowledge Score on Stunting Prevention

Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)	p-value
Intervention	58,4 ± 10,2	85,6 ± 8,3	<0,001
Control	59,1 ± 9,8	62,5 ± 10,4	0,112

The Paired Sample t-test results showed a significant improvement in maternal knowledge scores after the intervention ($p < 0.001$).

Table 3. Score of Mother's Attitude towards Stunting Prevention

Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)	p-value
Intervention	62,3 ± 8,7	88,2 ± 7,6	<0,001
Control	61,8 ± 9,1	65,4 ± 8,9	0,098

Maternal attitudes in stunting prevention increased significantly after education in the intervention group ($p < 0.001$).

Table 4. The score of Child Feeding Practice and Nutritional Parenting

Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)	p-value
Intervention	55,2 ± 9,5	83,4 ± 7,8	<0,001
Control	54,8 ± 8,9	59,7 ± 9,3	0,134

Maternal feeding practices and nutritional parenting improved significantly after nutrition education in the intervention group ($p < 0.001$). Nutrition education significantly improves maternal knowledge**,** attitudes**,** and practices in stunting prevention. The intervention group experienced a much more significant increase than the control group in all aspects. These results show that nutrition education interventions improve stunting prevention behavior in mothers under five.

DISCUSSION

Research has found that nutrition education significantly improves maternal knowledge, attitudes, and practices in stunting prevention. The intervention group experienced a much more significant improvement than the control group in all aspects. These results show that nutrition education interventions improve stunting prevention behavior in mothers under five. The results of this study show that nutrition education significantly increases maternal knowledge about stunting prevention. The knowledge score in the intervention group increased from an average of 58.4 to 85.6 after the intervention, while the control group showed no significant change. Nutrition education is effective in increasing maternal knowledge about stunting prevention. This increase in knowledge can be attributed to interactive educational methods and the use of relevant media. Using video media in stunting education can increase mothers' understanding more effectively than conventional methods (Kaur *et al.*, 2025). Audiovisual media can convey information in a more enjoyable and easy-to-understand way, thus facilitating the increase in knowledge (Fetriyuna *et al.*, 2023).

Increasing knowledge, this study also identified positive attitude changes in mothers related to stunting prevention. The attitude score in the intervention group increased from 62.3 to 88.2 after education, indicating that the information provided was understood and positively received by the mothers. This is important because a positive attitude is the first step towards the desired behavior change. This change in attitude may be influenced by educational approaches that consider local and cultural contexts—the importance of nutrition education based on local wisdom to increase maternal acceptance and understanding of stunting prevention. Integrating local values and practices makes education more relevant and acceptable to the target community. Nutrition education is effective in increasing maternal knowledge about stunting prevention. This increase in knowledge can be attributed to interactive educational methods and the use of relevant media (Bhandari *et al.*, 2025). Using video media in stunting education can increase mothers' understanding more effectively than conventional methods. Audiovisual media can convey information in a more enjoyable and easy-to-understand way, thus facilitating the increase in knowledge (Meierhofer, Kunwar and Shrestha, 2023).

Feeding practices and nutritional parenting also experienced significant improvements in the intervention group, with the mean score increasing from 55.2 to 83.4. This shows that nutrition education improves knowledge and attitudes and encourages fundamental changes in maternal behavior related to feeding and child nutrition care. Implementing these better practices is most likely influenced by practical demonstrations and group discussions during educational sessions. The combination of lectures and practical demonstrations can improve the skills and confidence of mothers in preparing nutritious meals for their children. This practical approach allows mothers to directly put into practice the knowledge gained, making it easier to adopt positive behaviors. Implementing these better practices is most likely influenced by practical demonstrations and group discussions during educational sessions (Linggi *et al.*, 2024). The combination of lectures and practical demonstrations can improve the skills and confidence of mothers in preparing nutritious meals for their children. This practical approach allows mothers to directly put into practice the knowledge gained, making it easier to adopt positive behaviors (Ode Novi Angreni *et al.*, 2024).

The use of appropriate media in nutrition education plays a crucial role in the effectiveness of information delivery. The study used various media, including interactive lectures, group

discussions, and practical demonstrations (Kumar *et al.*, 2024). The literature shows that interactive media, such as videos and integration cards, can increase maternal knowledge more effectively than traditional media, such as leaflets or modules. Interactive media tends to be more engaging and facilitates more profound understanding, thus encouraging desired behavior change (Escher *et al.*, 2024). Nutrition education has proven effective in improving maternal knowledge, attitudes, and practices in stunting prevention. The use of interactive methods and relevant media, as well as approaches that consider local wisdom, play an important role in the success of the intervention (Durevall and Isaksson, 2024). Implementing comprehensive and sustainable nutrition education programs at the community level can be a key strategy in reducing the prevalence of stunting in Indonesia (Astuti, Suindyah and Atmojo, 2025). The use of appropriate media in nutrition education plays a crucial role in the effectiveness of information delivery. The study used various media, including interactive lectures, group discussions, and practical demonstrations (Zangerl *et al.*, 2024). The literature shows that interactive media, such as videos and integration cards, can increase maternal knowledge more effectively than traditional media, such as leaflets or modules. Interactive media tends to be more engaging and facilitates more profound understanding, thus encouraging desired behavior change (Syaharuddin *et al.*, 2024).

Practical Implications and Recommendations

The findings of this study have several practical implications. First, a well-designed nutrition education program adapted to the local context can effectively prevent stunting. Second, using interactive media and a practical approach in education can increase the program's effectiveness. Therefore, it is recommended that public health program organizers consider integrating diverse methods and media in nutrition education interventions. In addition, the involvement of local communities and stakeholders in the planning and implementation of educational programs can increase the relevance and sustainability of the intervention. This participatory approach ensures that the program is tailored to local needs and values, thereby increasing effectiveness and acceptance by the community. Limitations of the Research and Suggestions for Further Research Although this study shows positive results, some limitations must be considered. Quasi-experimental designs without complete randomization may affect the generalization of findings. In addition, this study did not evaluate the long-term impact of nutrition education on the prevalence of stunting. For future studies, it is recommended to use a randomized study design and a more rigorous control group to increase the validity of the findings. In addition, long-term evaluations are needed to assess the sustainability of behavior changes and their impact on children's nutritional status. Further research can also explore the effectiveness of different types of educational media and approaches adapted to various cultural and social contexts.

CONCLUSIONS

It can be concluded that nutrition education is an essential strategy to prevent stunting in children under five. Various international studies show that increasing maternal knowledge about nutrition can contribute significantly to improving children's diets and reducing stunting rates. However, challenges in implementing nutrition education, such as social and economic factors and limited access to information, must be overcome through a comprehensive and evidence-based approach. Support from various parties, including health workers, the government, and the community, is urgently needed to increase the effectiveness of nutrition education. With the right policies and sustainable interventions, it is hoped that the stunting rate can continue to decrease so that children can grow and develop optimally.

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