



## Balanced Nutrition Education Program for Stunting Prevention Among Mothers of Toddlers in Banda Aceh

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### Abstract

Stunting remains one of the major public health challenges in Indonesia, primarily resulting from chronic malnutrition during the first 1,000 days of life. Limited maternal knowledge of balanced nutrition is a key contributing factor to inadequate child feeding practices and increased stunting risk. This community service program aimed to improve the knowledge of mothers with toddlers regarding balanced nutrition as an effective strategy for stunting prevention in Geuceu Komplek Village, Banda Raya District, Banda Aceh City. A quantitative pre-experimental approach employing a one-group pre-test and post-test design was implemented involving 20 mothers of toddlers. The intervention consisted of an interactive balanced nutrition education session covering the principles of balanced nutrition, dietary diversity, the importance of animal-source protein, and appropriate feeding practices for young children. Participants' knowledge was assessed before and immediately after the educational intervention using a structured questionnaire. The results demonstrated a substantial increase in the average knowledge score from 53.7% in the pre-test to 98.0% in the post-test, representing an overall improvement of 44.3 percentage points. Participants actively engaged in discussions and demonstrated strong enthusiasm throughout the educational activities, indicating the effectiveness of the interactive lecture method in facilitating knowledge acquisition. These findings suggest that community-based balanced nutrition education effectively enhances maternal nutritional knowledge and supports positive behavioral changes for improving child feeding practices and preventing stunting. The novelty of this community service lies in integrating an interactive nutrition education model with quantitative knowledge evaluation in a local community setting, providing a practical and replicable approach for strengthening evidence-based stunting prevention programs in Indonesia.

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## 1. Introduction

Stunting remains one of the most critical public health and nutritional challenges worldwide, particularly in low- and middle-income countries. It is defined as impaired linear growth resulting from chronic undernutrition, recurrent infections, and inadequate care during the first 1,000 days of life. Children affected by stunting are more likely to experience delayed cognitive development, poor

educational achievement, reduced productivity in adulthood, and an increased risk of chronic diseases later in life. According to the World Health Organization (WHO), reducing childhood stunting is one of the primary global nutrition targets because of its long-term implications for human capital development and national economic growth [1], [2]. Although Indonesia has made significant progress in reducing stunting prevalence in recent years, the condition remains a major public health concern requiring comprehensive interventions involving families, communities, and government sectors. National data from the Indonesian Ministry of Health reported that the prevalence of stunting reached approximately 21.5% in 2024, indicating that further preventive efforts are still urgently needed [3].

Numerous studies have demonstrated that maternal knowledge is one of the strongest determinants influencing children's nutritional status and growth. Mothers play a central role in selecting, preparing, and providing daily food intake while also determining appropriate infant and young child feeding practices. Limited understanding of balanced nutrition often results in inadequate dietary diversity, insufficient protein intake, and inappropriate complementary feeding practices, all of which contribute significantly to stunting. Previous studies conducted in Indonesia consistently reported that children whose mothers had lower educational attainment or inadequate nutritional knowledge were significantly more likely to experience stunting than those whose mothers possessed higher nutritional literacy [4]–[7]. Consequently, improving maternal knowledge through nutrition education has become one of the most recommended community-based strategies for preventing childhood stunting and improving child nutritional outcomes.

Balanced nutrition education represents a promotive and preventive intervention designed to improve knowledge, attitudes, and healthy dietary behaviors among caregivers. Unlike curative interventions that focus on treating nutritional disorders after they occur, nutrition education emphasizes behavioral change by encouraging families to adopt diversified diets, consume adequate animal-source protein, maintain proper hygiene, and routinely monitor children's growth. Several intervention studies have reported that educational programs delivered through lectures, counseling sessions, audiovisual media, or community empowerment significantly improved maternal nutritional knowledge and feeding practices, ultimately contributing to better child nutritional status [8]–[11]. Interactive educational approaches are particularly effective because they facilitate two-way communication, encourage participant engagement, and provide opportunities to clarify misconceptions related to child nutrition and stunting prevention.

Recognizing the multidimensional nature of stunting, the Government of Indonesia has implemented an integrated national strategy involving nutrition-specific and nutrition-sensitive interventions through multisectoral collaboration. In Banda Aceh, local government programs have strengthened convergence initiatives by integrating nutrition services, sanitation improvement, maternal and child healthcare, and family assistance programs for households at risk of stunting. Nevertheless, preliminary observations conducted in Geuceu Komplek Village, Banda Raya District, indicated that several mothers of toddlers still had limited understanding regarding the principles of balanced nutrition, appropriate meal composition, dietary diversity, and practical implementation of balanced nutrition guidelines in daily family life. Similar findings have been reported by previous community-based studies showing that insufficient maternal nutritional literacy remains an important barrier to achieving optimal child growth despite ongoing governmental nutrition programs [5], [9], [12], [13].

Community service activities provide an effective platform for translating evidence-based nutritional knowledge into practical community interventions. Educational activities delivered directly to mothers of toddlers allow immediate interaction between health educators and participants while simultaneously strengthening community awareness regarding healthy feeding practices during early childhood. In this community service program, balanced nutrition education was delivered using an interactive lecture approach accompanied by structured discussions and pre-test–post-test evaluations to assess participants' knowledge improvement. Interactive lectures were selected because previous intervention studies consistently demonstrated their effectiveness in enhancing participants' comprehension, encouraging active participation, and promoting positive behavioral changes related to child nutrition and stunting prevention [10], [11], [14], [15]. Such educational interventions are expected not only to improve maternal knowledge but also to foster sustainable behavioral changes supporting healthy child growth within households.

The specific objective of this community service program was to improve the knowledge of mothers with toddlers regarding balanced nutrition as a practical strategy for preventing stunting in Geuceu Komplek Village, Banda Raya District, Banda Aceh City. The novelty of this article lies in integrating an interactive community-based nutrition education program with quantitative pre-test and post-test evaluation to measure immediate knowledge gains among mothers in a local community with limited prior nutritional literacy. Unlike many previous studies that primarily examined associations between maternal education and stunting or reviewed educational interventions, this community service article provides practical evidence regarding the implementation and effectiveness of an interactive balanced nutrition education model conducted directly within the community setting. The findings are expected to support local government initiatives for accelerating stunting reduction while providing a replicable educational model for similar community-based nutrition programs in other regions of Indonesia.

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## **2. Methodology**

### **2.1 Study Design**

This community service program employed a quantitative pre-experimental approach using a **one-group pre-test and post-test design** to evaluate the effectiveness of balanced nutrition education in improving the knowledge of mothers with toddlers regarding stunting prevention. The intervention consisted of a structured educational session delivered through an interactive lecture, followed by a discussion and question-and-answer session. Participants' knowledge was assessed before and immediately after the educational intervention using the same questionnaire. This design was selected because it provides a practical and reliable approach for measuring immediate changes in participants' knowledge following community-based health education activities.

### **2.2 Study Setting and Participants**

The community service activity was conducted on 13 May 2026 at Geuceu Komplek Village, Banda Raya District, Banda Aceh City, Indonesia. The target population comprised mothers who had children under five years of age (toddlers). A total of 20 mothers voluntarily participated in the program. Participants were recruited through coordination with village authorities and local community health workers. The inclusion criteria were: (1) mothers with toddlers aged below five years, (2) permanent residents of Geuceu Komplek Village, (3) willing to participate throughout the educational activity, and (4) able to complete both the pre-test and post-test questionnaires. Mothers who were unable to attend the complete educational session or did not complete both questionnaires were excluded from the data analysis.

### **2.3 Community Service Intervention**

The intervention consisted of a balanced nutrition education program designed to improve participants' understanding of nutritional practices for stunting prevention. The educational session was delivered by the community service team using an interactive lecture method, allowing active communication between facilitators and participants. The educational materials covered several essential topics, including:

- 1) Definition and causes of stunting;
- 2) Principles of balanced nutrition according to the Indonesian Ministry of Health;
- 3) The four pillars of balanced nutrition;
- 4) The importance of animal-source protein for child growth and development;
- 5) Appropriate dietary diversity for toddlers;
- 6) Examples of balanced daily menus for children under five years of age;
- 7) Practical recommendations for preventing stunting at the household level.

The educational session was supported by PowerPoint presentations and followed by an open discussion and question-and-answer session, enabling participants to clarify nutritional misconceptions and share their experiences in feeding young children.

## 2.4 Data Collection

Knowledge assessment was conducted using a structured questionnaire developed by the community service team based on the Indonesian Balanced Nutrition Guidelines and relevant literature concerning maternal nutrition and stunting prevention.

The questionnaire consisted of 15 multiple-choice questions covering knowledge related to balanced nutrition, dietary diversity, child feeding practices, animal protein consumption, and stunting prevention. Data collection was conducted in two stages:

- a. Pre-test: administered before the educational session to determine participants' baseline knowledge.
- b. Post-test: administered immediately after the educational session using the same questionnaire to evaluate changes in knowledge following the intervention.

Both questionnaires were completed individually under the supervision of the facilitators to ensure consistency in data collection.

## 2.5 Implementation Procedures

The community service program was implemented in three consecutive phases.

### Preparation Phase

The preparation phase involved coordinating with village officials, preparing educational materials, developing the pre-test and post-test questionnaires, arranging the venue, and informing participants about the activity schedule.

### Implementation Phase

During implementation, participants first completed the pre-test questionnaire before attending the balanced nutrition education session. The facilitators then delivered educational materials through an interactive lecture supported by visual presentations. Throughout the session, participants actively engaged in discussions and asked questions regarding child nutrition and practical dietary management.

### Evaluation Phase

Following completion of the educational session, participants completed the post-test questionnaire. The evaluation aimed to measure improvements in participants' knowledge by comparing pre-test and post-test scores. In addition, participant attendance, engagement during discussions, and overall participation were documented as supporting indicators of program implementation.

## 2.6 Data Analysis

The collected data were analyzed using **descriptive statistical methods**. Individual questionnaire scores were converted into percentages, and the mean knowledge scores obtained before and after the intervention were calculated.

Knowledge improvement was determined by comparing the average pre-test and post-test scores using the following equation:

$$\text{Knowledge Improvement (\%)} = \frac{\text{Mean Post-test Score} - \text{Mean Pre-test Score}}{\text{Mean Pre-test Score}} \times 100$$

The effectiveness of the educational program was evaluated based on the increase in the participants' average knowledge scores. According to the analysis, the mean pre-test score increased from 53.7% before the intervention to 98.0% after the educational session, representing an average knowledge improvement of 44.3%. These findings indicate that the interactive balanced nutrition education program effectively enhanced mothers' understanding of balanced nutrition and stunting prevention.

## 2.7 Ethical Considerations

This community service activity was conducted in accordance with ethical principles governing community-based educational programs. Participation was entirely voluntary, and all participants were informed about the objectives and procedures of the activity before providing verbal informed consent. Personal information obtained during the program was treated confidentially and used exclusively for educational evaluation and scientific publication purposes. No invasive procedures or interventions posing health risks were involved during the implementation of this community service activity.

## 3. Result & Discussion

The balanced nutrition education program was successfully implemented in Geuceu Komplek Village, Banda Raya District, Banda Aceh City, involving 20 mothers of toddlers as participants. The primary objective of this community service activity was to improve participants' knowledge of balanced nutrition as an effective strategy for preventing stunting during early childhood. Program evaluation was conducted using a pre-test and post-test design to assess changes in participants' knowledge before and after the educational intervention. In addition to quantitative assessment, participants' engagement, enthusiasm, and active participation during the interactive lecture and discussion sessions were observed throughout the activity. The findings presented in this section describe the implementation process of the education program, the improvement in maternal knowledge following the intervention, and the implications of these outcomes for strengthening community-based efforts to prevent stunting through nutrition education.



**Figure 1.** Balanced Nutrition Education Activities for Mothers of Toddlers in Geuceu Komplek Village, Banda Raya District, Banda Aceh City.

**Figure 1** illustrates the implementation of the balanced nutrition education program conducted for mothers of toddlers in Geuceu Komplek Village, Banda Raya District, Banda Aceh City. The activity was carried out using an interactive community-based approach that encouraged direct engagement between the facilitators and participants. As shown in the figure, the facilitators provided individualized guidance while simultaneously interacting with mothers and their children in a comfortable community setting. This learning environment enabled participants to actively discuss nutritional issues related to child growth, feeding practices, and stunting prevention. The presence of toddlers during the activity also allowed facilitators to provide practical examples of age-appropriate nutritional practices, making the educational session more relevant to participants' daily experiences. Such direct interaction is considered an effective educational strategy because it enhances participants' understanding through personalized communication and immediate feedback.

The implementation of the educational activities shown in **Figure 1** reflects the importance of participatory learning in community health promotion. Rather than relying solely on one-way information delivery, the facilitators encouraged mothers to ask questions, share personal experiences, and discuss challenges encountered in providing balanced nutrition at home. This participatory approach created an interactive learning atmosphere that increased participants' motivation and confidence in applying the knowledge gained during the session. Furthermore, conducting the education program within the local community improved accessibility and strengthened collaboration between health educators, community members, and local stakeholders. These conditions are expected to facilitate sustainable behavioral changes among mothers, particularly in adopting balanced dietary practices, improving child feeding behaviors, and supporting long-term efforts to reduce the prevalence of stunting among children under five years of age.



**Figure 2.** Interactive Balanced Nutrition Education Session for Mothers of Toddlers in Geuceu Komplek Village, Banda Raya District, Banda Aceh City.

**Figure 2** presents the interactive balanced nutrition education session conducted for mothers of toddlers in Geuceu Komplek Village, Banda Raya District, Banda Aceh City. The educational activity was delivered using an interactive lecture method that encouraged active participation through group discussions and question-and-answer sessions. As illustrated in the figure, participants were seated in a collaborative learning environment that facilitated direct communication between the facilitators and the mothers. This arrangement enabled participants to exchange experiences regarding child feeding practices, nutritional challenges, and strategies for preventing stunting within their households. The facilitators used visual presentation materials to explain the principles of balanced nutrition, the importance of dietary diversity, adequate consumption of animal-source protein, and practical recommendations for preparing nutritious meals for toddlers. The interactive nature of the session allowed participants to seek clarification on topics they found difficult, thereby enhancing their understanding of balanced nutrition concepts.

The educational approach demonstrated in **Figure 2** emphasizes the importance of active learning in community-based health promotion. Unlike conventional one-way lectures, the interactive discussion created opportunities for participants to engage in meaningful dialogue, express their concerns, and receive immediate feedback from the facilitators. Such participatory communication promotes greater knowledge retention because participants are actively involved in the learning process rather than serving as passive recipients of information. Furthermore, the supportive atmosphere observed during the session encouraged mothers to share real-life experiences related to child nutrition, making the educational content more practical and applicable to their daily lives. This collaborative learning process is expected to strengthen mothers' confidence in implementing balanced nutrition practices at home, improve child feeding behaviors, and ultimately contribute to sustainable community efforts aimed at reducing the prevalence of stunting among children under five years of age.

**Table 1.** Average Knowledge Scores of Mothers of Toddlers Before and After the Balanced Nutrition Education Program in Geuceu Komplek Village, Banda Raya District, and Banda Aceh City.

| Description                  | Average Score (%) |
|------------------------------|-------------------|
| Pre-test                     | 53.7              |
| Post-test                    | 98.0              |
| <b>Knowledge Improvement</b> | <b>44.3</b>       |

As presented in **Table 1**, there was a substantial improvement in participants' knowledge following the balanced nutrition education program. The average pre-test score was 53.7%, indicating that many mothers initially had limited knowledge regarding the principles of balanced nutrition and its role in preventing stunting. After participating in the educational intervention, the average post-test score increased markedly to 98.0%, representing an overall knowledge improvement of 44.3 percentage points. This considerable increase demonstrates that the interactive balanced nutrition education program effectively enhanced participants' understanding of appropriate nutritional practices for toddlers and the importance of balanced dietary intake in supporting healthy child growth and preventing stunting.

The significant improvement in knowledge also highlights the effectiveness of the interactive lecture method as a community-based health education strategy. The combination of lectures, discussions, and question-and-answer sessions enabled participants to actively engage in the learning process, clarify misconceptions, and relate the educational content to their daily experiences in caring for their children. These findings suggest that improving maternal nutritional knowledge through structured educational interventions can strengthen mothers' capacity to make informed decisions regarding child feeding practices and balanced meal preparation. Consequently, such community-based nutrition education programs have considerable potential to contribute to long-term behavioral changes and support government initiatives aimed at reducing the prevalence of stunting among children under five years of age.



**Figure 3.** Group Photo of the Community Service Team and Participants Following the Balanced Nutrition Education Program in Geuceu Komplek Village, Banda Raya District, Banda Aceh City.

**Figure 3** presents a group photograph of the community service team and the participants following the completion of the balanced nutrition education program in Geuceu Komplek Village, Banda Raya District, Banda Aceh City. The group photo symbolizes the successful implementation of the community service activity and reflects the strong collaboration established between the facilitators and the participating mothers of toddlers. The active involvement of participants throughout the educational

session demonstrates their enthusiasm and commitment to improving their understanding of balanced nutrition and child health. Such participation is an important indicator of the effectiveness of community-based health promotion programs, as active engagement facilitates knowledge transfer and encourages participants to become more receptive to health-related information.

Furthermore, the documentation shown in **Figure 3** highlights the importance of community participation and institutional collaboration in supporting sustainable stunting prevention initiatives. The involvement of mothers, local community members, and the community service team created a supportive learning environment that strengthened communication and mutual trust among all stakeholders. This collaborative atmosphere is expected to encourage participants to apply the knowledge gained during the education program in their daily childcare and feeding practices, while also sharing the information with other family members and the broader community. Consequently, community-based nutrition education activities not only improve individual knowledge but also contribute to increasing public awareness and strengthening collective efforts to reduce the prevalence of stunting and promote healthy child growth in the community.

Future community service programs should be conducted on a larger scale by involving more participants from diverse communities and implementing longer follow-up periods to evaluate the sustainability of knowledge retention and behavioral changes among mothers. Integrating balanced nutrition education with practical activities, such as healthy meal preparation demonstrations, child growth monitoring, home visits, and digital health education, may further enhance participants' engagement and the effectiveness of the intervention. In addition, future research is recommended to employ more rigorous study designs, such as quasi-experimental or randomized controlled trials with larger sample sizes, to assess not only improvements in maternal knowledge but also long-term outcomes related to child feeding practices, nutritional status, and stunting prevalence. Collaborative partnerships among universities, healthcare professionals, local governments, and community organizations are also encouraged to strengthen evidence-based community interventions and support the sustainable implementation of stunting prevention programs in Indonesia.

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#### **4. Conclusion**

The balanced nutrition education program implemented in Geuceu Komplek Village, Banda Raya District, Banda Aceh City, was successfully conducted and demonstrated a positive impact on improving the knowledge of mothers with toddlers regarding balanced nutrition and stunting prevention. The findings showed a substantial increase in participants' average knowledge score from 53.7% before the intervention to 98.0% after the educational session, representing an overall knowledge improvement of 44.3 percentage points. These results indicate that the interactive lecture method was highly effective in enhancing participants' understanding of balanced nutrition principles, appropriate child feeding practices, and the importance of adequate nutritional intake during early childhood as key strategies for preventing stunting.

Furthermore, the active participation and enthusiasm demonstrated throughout the educational activities suggest that community-based nutrition education can serve as an effective approach for promoting health awareness and encouraging positive behavioral changes among mothers. Strengthening maternal nutritional knowledge is expected to improve household feeding practices and contribute to better child growth and development. Therefore, continuous collaboration among universities, healthcare professionals, local governments, and community organizations is essential to expand similar educational initiatives and support the sustainable reduction of stunting prevalence through evidence-based community empowerment programs.

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