

Community-Based Health Education for Improving Maternal Knowledge of Childhood Stunting and Gastrointestinal Disorders in Rural Bondowoso, Indonesia

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Abstract Stunting is a condition resulting from chronic undernutrition and recurrent illness during the first 1,000 days of life. Diarrheal diseases and helminthic infections are among the most common risk factors contributing to stunting in children under five years of age. In 2017, Bondowoso Regency reported a high prevalence of stunting, with the Curahdami District reaching rates as high as 70% in 2018. This study aimed to evaluate the impact of a community development intervention that combined health education—delivered in part by a pediatrician team—with anthropometric monitoring on maternal knowledge related to stunting and gastrointestinal disorders in the Curahdami District. The program consisted of educational sessions and child growth assessments. Maternal knowledge was measured using a pre- and post-test design. Anthropometric data were collected from 37 children, more than half of whom were classified as stunted. The results demonstrated a substantial improvement in maternal knowledge following the intervention. In conclusion, this community-based educational approach effectively increased maternal awareness and has the potential to be implemented as a regular program in the future.

1. INTRODUCTION

Stunting is a manifestation of chronic undernutrition that results in impaired physical growth. It is primarily caused by inadequate nutrient intake and repeated infections during the first 1,000 days of life (De Sanctis et al., 2021; Laksono et al., 2022). Stunting is defined as a height-for-age z-score (HAZ) below minus two standard deviations for moderate stunting, and below minus three standard deviations for severe stunting, based on the 2006 WHO Child Growth Standards (World Health Organization, 2015). According to Gunardi et al. (2021), a child is considered stunted when their weight-for-age (WAZ) and length-for-age (LAZ) are both below the standard expected for their chronological

age.

Early-onset stunting has been linked to long-term consequences, including impaired cognitive development, poor academic achievement, increased risk of malnutrition, and future susceptibility to degenerative diseases. These outcomes can significantly hinder economic development and may persist across generations (De Onis & Branca, 2016; Lestari et al., 2024). According to Indonesia Nutrition Status Survey (SSGI) Kementerian Kesehatan Republik Indonesia (2025), despite a gradual decline in prevalence, stunting remains a critical public health concern in Indonesia, which ranks third among Southeast Asian

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countries for the highest prevalence of stunting in children under five (De Onis & Branca, 2016; Laksono et al., 2021).

According to the 2021 Indonesian Basic Health Research (Risikesdas), the national prevalence of stunting stood at 24.4%. East Java was identified as one of the provinces with the highest rates of stunting (Titaley et al., 2019). In Bondowoso Regency, the prevalence increased from 34.8% to 38.3% in 2017 (Titaley et al., 2019). Within Bondowoso, Curahdami District reported a particularly alarming rate of stunting—reaching as high as 70% in 2018—although more recent figures suggest a potential decline by 2021 (Black et al., 2013).

There is a well-established association between stunting and gastrointestinal infections such as diarrhea and helminthiasis (Lefebo et al., 2023). Prior studies have identified diarrhea and worm infections as the most common risk factors contributing to stunting in children under five (Wicaksono et al., 2021). Additional contributing factors include poor maternal nutritional status, inadequate infant nutrition, and systemic issues related to food systems, healthcare access, and water and sanitation infrastructure.

The elimination of childhood stunting is one of six global objectives outlined in the World Health Organization's Global Nutrition Targets for 2025 (Beal et al., 2018). However, progress in reducing stunting prevalence in Indonesia has been slow over the past decade (Gunardi et al., 2021). Among the demographic factors influencing stunting, maternal education has received particular attention. Studies indicate that children under two years of age who are stunted are more likely to be born to mothers with lower levels of education. Educational attainment influences parenting patterns and health practices, which in turn affect child nutrition and development (Laksono et al., 2022).

In response to these challenges, we implemented a community development initiative in Curahdami District, Bondowoso, focused on improving maternal knowledge about stunting and gastrointestinal disorders, specifically diarrhea and worm infections. The intervention emphasized prevention strategies and early management. This study aimed to assess the effect of the community-based program on maternal knowledge regarding stunting and gastrointestinal health in the targeted district.

2. METHOD

A cross-sectional study was conducted on August 25, 2024, in Curahdami District, Bondowoso Regency. Ethical approval was obtained from the Ethics Committee of the Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia (Approval No. 86/EC/KEPK/FKUA/2024). The educational session was initiated by the Gastroenterology Division of the Department of Child Health, Faculty of Medicine, Universitas Airlangga, in collaboration with healthcare personnel from Puskesmas Curahdami, Bondowoso Regency.

The study involved 37 children and their parents who participated in educational activities at Puskesmas Curahdami. All individuals who provided informed consent

were included in the study. The community intervention comprised anthropometric measurements and a structured health education session.

Anthropometric assessments included measurements of weight, height, head circumference, and arm circumference. Weight was measured using a SECA digital scale, and height was measured with stadiometers produced by GEA and One Med. Stunting status was determined based on the 2006 WHO Child Growth Standards, with stunting defined as a height-for-age more than two standard deviations below the median. Weight-for-age and height-for-age indicators were also considered. According to Gunardi et al. (2021), a child was considered stunted when weight-for-age was lower than height-for-age, which in turn was lower than chronological age.

Sociodemographic information was collected for each child, including gender, age, immunization status, history of illness, birth process, and birth weight. Immunization status was classified as complete or incomplete, in accordance with the national immunization schedule established by the Ministry of Health.

The educational session consisted of two presentations delivered by pediatricians, each lasting approximately 15 to 20 minutes. The first presentation focused on the importance of stunting prevention and routine child growth monitoring, while the second addressed the recognition and management of common digestive disorders in children, such as diarrhea and worm infections. These sessions were attended by parents, healthcare providers, and local community leaders, and emphasized early detection, prevention, and appropriate response to nutritional and gastrointestinal issues in early childhood.

Maternal knowledge was assessed using a pre-test and post-test format. The same questionnaire was administered before and after the session and included multiple-choice questions related to stunting and gastrointestinal disorders. To preserve the integrity of the responses, participants were seated with at least one meter of space between them on all sides.

The questionnaire measured understanding of various developmental and health-related concepts. Topics included the identification of motor milestones through physical activities like head lifting, sitting, standing, and walking; the correct method for measuring height in children over two years of age; the importance of regular growth assessments and the use of child health monitoring booklets; the clinical definition of constipation, including stool consistency and defecation frequency; the signs of dehydration in children; and the recognition of diarrhea based on changes in stool frequency and consistency. It also included questions about common gastrointestinal conditions in children.

All responses were coded to maintain confidentiality. Pre-test and post-test results were compared using the Wilcoxon Signed-Rank Test. Data were analyzed using IBM SPSS Statistics for Mac OS, version 25.0. Results were reported as mean \pm standard deviation, and a p-value of less than 0.05 was considered statistically significant.

3. RESULT AND DISCUSSION

The community development was carried out well and smoothly because of the good teamwork between the Community Development team and health workers. A total of 37 children were included in this study and they would be categorized as stunting (51.3%) and not stunting (48.7%). Most of them were female (51.4%), with their aged were below 3 years and the median aged was 23 ± 9.276 months. Subject characteristics were detailed in Table 1. There was a significant increase in maternal knowledge before and after the educational session (63.51 ± 14.54 vs 77.16 ± 12.68 ; $p = < 0.001$) as shown in Figure 1. Their median body height or length was 78.9 ± 8.37 cm.

Stunting results from prolonged insufficient nutritional intake and frequent infections during the first two years of life (Morales et al., 2023). Children who experience repeated illnesses are at greater risk of malnutrition, while malnourished children are in turn more vulnerable to infections. Diarrheal diseases are particularly detrimental to child growth, as they impair the intestine's ability to absorb nutrients. Without timely intervention and proper dietary support, recurrent diarrhea can contribute to growth failure (Wicaksono et al., 2021).

The prevalence of stunting and diarrheal diseases in children is influenced by a combination of factors, including socioeconomic conditions, environmental hygiene, and educational attainment of caregivers (De Sanctis et al., 2021). Parents with lower educational levels often have limited knowledge about appropriate child-rearing

practices, especially in terms of nutrition and disease prevention (Black et al., 2013). These knowledge gaps can hinder optimal child development and exacerbate the cycle of undernutrition and illness.

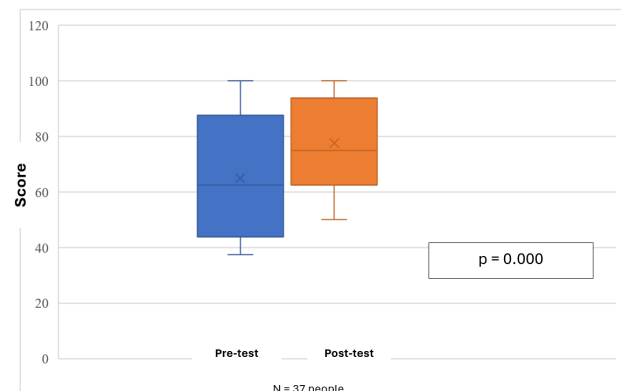


Figure 1. Subject's knowledge before and after education

Findings from this study reinforce previous evidence that feeding practices and caregiving behaviors can be positively influenced through educational interventions delivered by competent health professionals (Widiasih et al., 2025). Limited awareness among caregivers and even among health professionals has also been associated with inadequate care for children suffering from gastrointestinal disorders (Unger et al., 2014). Community-based efforts to address diarrhea and stunting are strengthened when health workers and local residents collaborate to promote hygiene,

Table 1. Subject characteristics

Child Characteristics	Stunting (N=19)	Non Stunting (N=18)	P-Value*
Age (month)	23 ± 9.276		
<1 year	2 (66.7)	1 (33.3)	
2 - 3 years	15 (51.7)	14 (48.2)	
3 - 5 years	2 (40)	3 (60)	0.026
Gender			
Male	9 (50)	9 (50)	
Female	10 (52.6)	9 (47.4)	0.541
Immunization Status			
Complete	17 (50)	17 (50)	
Uncomplete	2 (66.7)	1 (33.3)	0.307
History of Labor			
Pervaginam	17 (48.6)	18 (51.4)	
SC	2(100)	0 (0)	2.003
Birth Weight			
Normal	18 (50)	18 (50)	
Low birth weight	1 (100)	0 (0)	0.974
History of Disease			
None	17 (54.9)	14 (45.1)	
Hernia inguinalis	1 (50)	1 (50)	
Respiratory tract infection	0 (0)	3 (100)	
Febrile seizure	1 (100)	0 (0)	4.266
Maternal Educational Level			
Below senior high school	8 (47.1)	9 (52.9)	
After senior high school	11 (55)	9 (45)	1.557

*Chi-square value

handwashing practices, and access to clean water, which remain essential for prevention (Behera et al., 2021).

Consistent with these findings, a prior study by Ranuh et al. (2022) demonstrated that community health education significantly improved public understanding of gastrointestinal disorders, particularly diarrhea and functional constipation. In our educational sessions, we emphasized the definition, early detection, and prevention of stunting and gastrointestinal disorders. Topics included hygiene and sanitation, child nutrition, risk reduction through immunization, and early management techniques. These messages were delivered using PowerPoint presentations and printed leaflets, designed to engage and inform parents effectively.

To ensure that health education is impactful, it must be well-organized, clearly targeted, and delivered by qualified individuals. In this study, pediatricians served as facilitators, providing credible and accessible information. Our findings showed a significant increase in maternal knowledge after the intervention. This improvement may be attributed to the reduced communication gap between healthcare providers and the community, aligning with earlier research that suggests behavior change is more effectively driven by education than by regulation (Ranuh et al., 2022).

Community resources also play a crucial role in reinforcing family engagement with early diagnosis and intervention. Community involvement remains central to the success of public health programs. Ongoing support is essential to strengthen the caregiving environment, especially in relation to early stunting detection using anthropometric monitoring in local health posts (*posyandu*). In this study, anthropometric data were collected to identify stunted children, and the findings were forwarded to the head of Puskesmas as part of program evaluation and planning for stunting management in Curahdami District, Bondowoso.

Looking ahead, this type of educational intervention can be systematically implemented for health workers and local cadres. With adequate preparation, these individuals can act as peer educators, contributing to early detection, public awareness, and family-level decision-making regarding stunting and gastrointestinal health. Children identified with stunting will be referred for further evaluation at primary healthcare facilities, or if needed, supported in accessing services at secondary or tertiary care centers.

Although health workers and community cadres were present during the educational activity, they did not receive specific training beforehand. Future implementations should incorporate structured training sessions for cadres to ensure they are fully equipped to deliver health education independently and effectively. Preparing cadres in this way will be a critical step toward expanding community-based stunting prevention efforts at a larger scale.

4. CONCLUSION

Health education focusing on childhood stunting and gastrointestinal disorders significantly enhances maternal knowledge. To further accelerate efforts in reducing

stunting and its associated risk factors, continued involvement of local health workers and community cadres is essential. Future programs should emphasize sustainable, community-driven approaches supported by evidence-based education and collaborative implementation.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest related to this project.

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