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Training on Making Modified Formula Food Made from Green Beans and Anchovies: Stunting Prevention Strategy

Erlina Nasution[1], Rina Doriana Pasaribu[1], Oslida Marthoni[1]

[1]*Department of Nutrition, Politeknik Kesehatan Kementerian Kesehatan Medan*

**Corresponding Author: Rina Doriana Pasaribu*
E-mail: rinadoriana@gmail.com

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Abstract

The main cause of stunting is the lack of nutritional intake since the golden period of the first life of toddler growth. Education through counseling, demonstration, and practice is very good and necessary because it has a very important role in the implementation of integrated health posts, with increased nutritional knowledge that will affect the PMT provided, and socialization delivered to mothers of toddlers. This study aims to analyze the effect of training on modified food formula made from green beans and anchovies on knowledge and attitudes. This study is a quasi-experimental research. The target of the training was 30 consisting of health cadres, PKK mothers, and mothers who have babies/toddlers at risk of stunting. The training was conducted for 2 days. Data were collected using a questionnaire and analyzed using a paired t-test. The results showed a significant change in the average knowledge and attitudes of training participants (p-value <0.05). This finding provides a new understanding of efforts to prevent stunting.

Introduction

Indonesia has a stunting problem with the average prevalence of stunting in children under five 24 - 59 months from 2005 to 2017 amounting to 36.4%, although it had decreased in 2014, namely 28.9%, but increased in 2018, namely 30. 8%. Based on the 2022 Indonesian Nutrition Status Survey (SSGI), North Sumatra's prevalence rate fell by 4.7% to 21.1%, from 25.8% in 2021. Stunting can have negative impacts, in the short term, disrupting brain development and growth. physique, and metabolism in the body. Meanwhile, in the long term there is a decline in cognitive abilities and learning achievement, decreased immunity resulting in easy disease and a high risk of infectious diseases (Bloom et al., 2023; Baskerville et al., 2024; Hernandez-Ruiz et al., 2022; Wie et al., 2023; Beckmann et al., 2021).

Serdang Bedagai has been designated as one of the stunting loci. According to the results of Basic Health Research (Riskesdas) in 2018, the prevalence of stunting in Serdang Bedagai Regency was found to be 30% of children under five. Changes in behavior and interpersonal communication are very important for accelerating stunting reduction in the form of information communication, activating villages in converging on accelerating stunting reduction (Sufri et al., 2024; Khuzaimah et al., 2024; Wijaya et al., 2023).

The use of posyandu and the active role of the community increases access to maternal and child health services. Efforts to prevent stunting include early detection of stunting at posyandu through measuring body weight and height (Sari, 2021; Prabandari et al., 2021; Koka et al., 2022; Sulistyaningsih et al., 2022). Education by means of counseling, demonstration and practice is very good and necessary because it has a very important role in the implementation

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of posyandu, increasing nutritional knowledge will have an impact on the PMT provided, and the socialization delivered to mothers of toddlers.

Apart from being found in milk, sources of protein and calcium can also be found in various other foods, both animal and vegetable (Murphy & Allen, 2003; Miller et al., 2001). One source of protein and calcium is green beans and anchovies. Green bean plants as a source of vegetable protein are very useful for fulfilling family nutrition and can produce in conditions of limited irrigation such as in NTT. Green beans are rich in protein such as Isoleucine 6.95%, Leucine 12.90%, Lysine 7.94%, Methionine 0.84%, Phenylalanine 7.07%, Thereonine 4.50%, Valine 6.23%, and amino acids nonessential. Apart from protein, one of the micronutrients that is important for linear growth is calcium. As much as 70% of bone weight consists of calcium phosphate crystals, this shows the importance of calcium intake for optimal bone growth. Anchovies are a good source of calcium, because anchovies are consumed whole with the bones (Safitri et al., 2023; Sugiharto et al., 2024; Kari et al., 2022).

Utilizing local food such as anchovies and green beans to make formula food into a product that is delicious, practical and easy to obtain for consumption by babies/toddlers at risk of stunting and stunting toddlers so that it becomes an important intervention because anchovies and green beans contain important nutrients for stunting prevention. Especially calcium and protein. Various studies have proven that fish products are a very important nutritional intervention in preventing and overcoming stunting (Chipili et al., 2022; Nadimin et al., 2021). This community service is also the result of research by members of the community service team, namely the use of local food, namely lemuru fish, in preventing stunting in processed nugget products. This background is what underlies the community service team to carry out training in making modified food formulas made from green beans and anchovies to prevent stunting in toddlers. in Sei Naga Lawan Village, Serdang Bedagai Regency in 2024.

Methods

This research uses a quasi-experimental design, specifically a pre-test/post-test design without a control group, to evaluate the impact of a training intervention on knowledge and attitudes related to stunting prevention. A more explicit description of this quasi-experimental approach is necessary, as it clarifies the strengths and limitations inherent in the lack of random assignment. The study's focus on a pre-test/post-test structure allows for measuring changes in the same participants, though it does limit generalizability and introduces potential internal validity concerns, such as maturation effects or external influences on participants. Discussing how these factors might affect the results, along with acknowledging the quasi-experimental design’s constraints, would strengthen the research transparency.

The intervention included a structured training program delivered over two days, featuring lectures, demonstrations, and practical exercises. The training content covered evidence-based guidelines on infant and toddler nutrition, with a focus on local ingredients, such as green beans and anchovies, known for their protein and calcium content beneficial to child growth. Further details on the core learning objectives and practical components, including recipe modification techniques and nutrition-focused content, would enhance the clarity of the training’s intended outcomes and the relevance to stunting prevention. By emphasizing the connection between training content and public health goals, this section would better demonstrate the intervention's role in promoting sustainable nutrition practices.

Thirty participants, comprising health cadres, PKK mothers, and mothers with toddlers at risk of stunting, were selected using a purposive sampling method targeting individuals involved in child nutrition and health. Elaborating on recruitment methods and participant engagement strategies, such as any incentives for participation or collaboration with community organizations, would provide insight into the sample’s representativeness and the feasibility of the intervention in similar settings. Additionally, the questionnaire used to assess knowledge

and attitudes included 30 knowledge-based questions and 20 attitude statements, both of which underwent validity and reliability testing, achieving Cronbach's alpha scores of 0.764 for knowledge and 0.695 for attitudes.

Result and Discussion

The training methods applied were lectures, questions and answers, demonstrations, and exercises (practice) for 2 days.

Table 1. Training materials

Day	Material
First (1)	Stunting Benefits and nutritional content of green beans Benefits and nutritional content of anchovies Formula Food Complementary food for breast milk
Second (2)	Modified food formula for green beans and anchovies How to make green beans and anchovies formula food Modification of the recipe for processed green beans and anchovies

The characteristics of the training participants and respondents in this research to analyze the effectiveness of the training can be seen in table 2 below.

Table 2. Characteristics of Respondents in Evaluation of the Impact of Modified Training Formula food made from green beans and anchovies in Sei Nagalawan Village in 2024

No	Variables	n	Percentage (%)
1	**Age**		
	20 - 30 Years	18	60
	31 - 57 Years	12	40
2	**Education**		
	Elementary – Middle School	9	30
	Senior High School	20	67
	PT	1	3
3	**Work**		
	PKK	4	32
	Cadre	6	46
	Housewife	20	22
	Amount	30	100

From the results of measuring knowledge and attitudes, an increase in the average knowledge and attitudes was obtained before and after training. Changes in the level and average of knowledge and attitudes can be seen in the following table:

Table 3. Frequency Distribution of Knowledge Level and Attitudes of Respondents Training on Making Modified Formula Foods Made from Green Beans and Anchovies in Sei Nagalawan Village in 2024 (n=30)

Variable	Pre Test		Post Test	
	N	%	n	%
Knowledge				
Good	1	3,4	25	83.3
Enough	4	13.3	5	16.7
Not enough	25	83.3		

Attitude				
Good	4	13.3	24	80
Not enough	26	86.7	6	20
Amount	30	100	30	100

Table 4. Average Distribution of Respondents' Knowledge and Attitudes Before and After Training Modification of Formula food made from Green Beans and Anchovies Before and After Training (n=30)

Variable	**Mean ± SD**	**Mean Change ± SD**	***p value****
Knowledge			
Before	12.43 ± 4.26	-16.014 ± 5.75	0.001
After	26.30 ± 3.83		
Attitude			
Before	47.67 ± 14.06	-42.95 ± 14.25	0.001
After	85.30 ± 7.30		

*difference within groups (before and after) using paired t test, at significance level of 5%

The results of statistical tests using the paired t test show that there is a difference in the average knowledge and attitudes of mothers who have babies/toddlers before and after being given nutrition promotion by change agents (p value < 0.05).

The description of knowledge related to training in making modified formula food made from green beans and anchovies to prevent stunting in toddlers in Sei Naga Lawan Village, Serdang Bedagai Regency in 2024 is that mothers have a significant understanding of the concept and benefits of this food. It is hoped that this knowledge can improve mothers' ability to design and provide healthy food for their toddlers, so that it can be effective in preventing stunting in the community. Sei Nagalawan Village is a coastal area that produces a lot of anchovies and also the local food green beans which are grown by some residents.

The attitudes of mothers from giving questionnaires regarding training in making modified formula food made from green beans and anchovies to prevent stunting in toddlers in Sei Naga Lawan Village, Serdang Bedagai Regency in 2024 showed that the majority of mothers showed a positive and enthusiastic attitude towards the training. They are generally open to learning and receiving information regarding the importance of good nutrition in preventing stunting in their children (Ali, 2021; Endrinikapoulos et al., 2023). This attitude provides an indication that training has the potential to be successful in improving understanding and practice of nutrition in these communities.

Knowledge and attitudes greatly influence training in modifying formula food made from green beans and anchovies to prevent stunting in toddlers in Sei Nagalawan Village. Parental education greatly influences knowledge. Knowledge of change is increasing rapidly. Lack of parental knowledge regarding children's nutritional problems and their future. Knowledge has a significant influence on family parenting patterns (Mahmood et al., 2021; Wang et al., 2023; Vereecken & Maes, 2010).

Stunting, a condition in which a child's growth and development is disrupted due to chronic malnutrition, remains a significant public health challenge, especially in developing countries. Early childhood, especially the first 1,000 days of life, is a critical period for physical and cognitive development. Proper nutrition during this stage is very important to prevent stunting. Development of a modified food formula to include green beans and anchovies, which are nutrient-dense ingredients, aimed at preventing stunting in toddlers (Hayati & Ridwan, 2022; Mejos et al., 2021). Green beans are rich in protein, vitamins (such as B vitamins), minerals (such as iron, magnesium, and potassium), and dietary fiber. These nutrients are important for

the growth and development of children. Green beans are also easy to digest, making them suitable for young children (Abbas & Karim, 2023).

And anchovies are an excellent source of high-quality protein, omega-3 fatty acids, calcium, and vitamin D. This nutrient plays an important role in bone development, cognitive function, and overall growth. The high calcium content in anchovies is very useful for preventing stunted growth, because calcium is very important for growth and bone density. The development of a modified food formula involves combining green beans and anchovies to create a balanced, nutrient-rich food suitable for toddlers. The findings indicate a significant improvement in both knowledge and attitudes regarding stunting prevention among the participants, as shown by pre- and post-intervention scores. This statistically significant increase (p-value < 0.05) demonstrates that the training had a positive impact; however, discussing effect sizes alongside p-values would provide a clearer picture of the practical significance of the intervention. By including effect sizes, readers can better assess the real-world implications of these changes for stunting prevention efforts.

The training's emphasis on locally available and nutrient-rich foods, such as green beans and anchovies, aligns with Indonesia's public health goals, which focus on sustainable and community-based nutrition interventions. Further elaboration on how the training content corresponds with national and international stunting prevention recommendations would enhance the intervention's credibility and contextual relevance. Additionally, discussing how improved maternal knowledge and attitudes might lead to behavioral changes in dietary practices within families and communities could provide a holistic understanding of the intervention's potential long-term impact on child health.

While the study's results are promising, the quasi-experimental design limits causal inference. Addressing these limitations openly such as the absence of random assignment and the lack of a control group, can help contextualize the findings within broader public health research on stunting prevention. Future studies could address these limitations by incorporating a control group or using a randomized controlled trial to strengthen causal claims. Moreover, exploring ways to sustain the training's impact and assess knowledge retention over time would be beneficial for understanding the intervention's effectiveness beyond the immediate post-intervention period. These findings have implications for health policy. In terms of policy implications, scaling this intervention to similar rural settings in Indonesia could support broader stunting reduction initiatives, especially when integrated with community-based health programs. Suggestions for future researchers include adapting the training model to diverse populations, taking into account regional dietary variations and socio-cultural factors that influence nutrition and health behaviours.

Conclusion

Training on making modified formula foods made from green beans and anchovies to prevent stunting was effective in increasing knowledge and attitudes (p value < 0.05). These findings provide new understanding and can be used as a strategy to prevent stunting by increasing maternal knowledge and attitudes.

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