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Enhancing Pregnant Women's Capacity to Achieve Balanced Nutrition for Stunting Prevention

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ABSTRACT

Stunting remains a serious public health issue in Indonesia, particularly among children under five years of age. One of the main causes of stunting is the lack of understanding and practice of balanced nutrition, especially among pregnant women and mothers with toddlers. This community service activity aims to improve the knowledge of pregnant women regarding balanced nutrition as an effort to prevent stunting. The implementation stages include preparation, execution, and monitoring and evaluation. The community service activity was carried out on August 27, 2025, in the working area of Bungus Health Center, Padang. The participants in the community service were 10 pregnant women. The activity lasted for 120 minutes, including a pre-test on pregnant women's knowledge of nutrition and pregnancy, blood sugar and hemoglobin tests to identify pregnancy complications, providing education on nutrition during pregnancy, and a post-test. The mean knowledge score increased from 7.10 before the intervention to 8.70 after the intervention. Statistical analysis using a paired t-test showed a significant improvement in knowledge ($p = 0.005$). These results indicate the need for periodic health education for pregnant women during antenatal visits, especially regarding pregnancy care related to meeting nutritional needs during pregnancy.

Keywords: balanced nutrition, health education, maternal nutrition, pregnant women, stunting prevention

INTRODUCTION

Stunting is a condition in which a child is too short for their age (UNICEF, WHO, & World Bank, 2021). Stunting is a condition in which a child is too short for their age ((UNICEF), 2020; De Sanctis et al., 2021; Vaivada et al., 2020). In addition, in adulthood, individuals who experienced stunting have a higher risk of developing non-communicable diseases such as diabetes, obesity, and cardiovascular diseases. Economically, stunting also contributes to increased healthcare costs (Kemenkes RI, 2022).

Although the prevalence of stunting among children under five decreased from 31% in 2000 to 22% in 2020, it remains a significant concern. In 2020, approximately 149.2 million children under five worldwide were stunted, with the highest prevalence in Asia (53%) and Africa (41%) (UNICEF, WHO & World Bank, 2021). In Indonesia, around 29% of children under five were stunted in 2015. This figure decreased to 27.5% in 2016 but increased again to 29.6% in 2017. The prevalence of stunting among infants aged six

months was 22% and increased significantly to 38% at the age of two years. West Sumatra is one of the provinces in Indonesia with a relatively high prevalence of stunting, with 10.64% categorized as short and 18.22% as severely stunted. In Padang City, the prevalence of short and severely short children is 10.45% and 12.29%, respectively (Kemenkes RI, 2022).

Maternal nutrition and complementary feeding practices are two major contributing factors to stunting in children. Historically, both factors have received limited attention at global and regional levels (UNICEF, WHO & World Bank, 2021). Additionally, socioeconomic factors such as low maternal education (Santosa et al., 2022) and household income also contribute to stunting (Li et al., 2020).

Maternal knowledge of nutrition and child health plays an important role in determining a child's nutritional and health status. Knowledge related to food selection, feeding practices, exclusive breastfeeding, and appropriate formula feeding after six months contributes to better child nutrition. Previous studies have shown that maternal knowledge significantly reduces infant mortality and stunting rates (Santosa et al., 2022).

Breastfeeding and complementary feeding practices guided by cultural beliefs and traditions are commonly passed down from generation to generation (Buser et al., 2020). These cultural practices include early introduction of complementary foods, provision of traditional foods believed to protect children from illness, and restrictions on certain foods considered taboo (Buser et al., 2020; Rakotomanana et al., 2020).

Regarding early complementary feeding, a study in Padang found that grandparents often encourage mothers to introduce infant formula and solid foods early to promote growth and health. Additionally, there is a belief in the community that children should not consume meat, fish, or sweet potatoes because they are considered difficult to chew and digest. Some mothers also believe that eggs should not be given to infants due to the risk of allergies and developmental delays (Reynolds et al., 2021). These foods are important sources of protein essential for child growth and development. Restricting protein intake may increase the risk of malnutrition and other health problems (Buser et al., 2020), particularly stunting (Anin et al., 2020).

Based on the Padang City Health Profile data in 2023, 144 pregnant women were reported to have anemia at the Bungus Health Center. Pregnant women with anemia are at higher risk of delivering low birth weight infants. In 2023, there were two cases of low-birth-weight infants and one case of premature birth reported at the Bungus Health Center. The rate of exclusive breastfeeding was around 65%, which is still below the national target. Meanwhile, among 1,670 infants whose height was measured, 34 were identified as stunted (Dinas Kesehatan Kota Padang, 2024).

According to the Head of Bungus Health Center, Dr. Yuli Rilda, the consumption of iron (Fe) tablets among pregnant women has exceeded the target of 85%. However, cases of anemia still occur, mainly due to inadequate maternal nutrition during pregnancy. Some mothers believe that simply increasing protein intake is sufficient to meet their nutritional needs. In addition, some mothers are not yet able to process locally available protein sources from the Bungus coastal area.

The role of mothers is a key factor in preventing stunting. Mothers are the primary source of nutrition for children during the critical first 1,000 days of life, particularly during the first six months when exclusive breastfeeding is recommended. Mothers play a crucial role in shaping children's nutritional intake through both maternal diet and feeding practices. They are also primarily responsible for planning and preparing meals, making their role vital in ensuring adequate nutrition for children. Given the long-term health impacts of malnutrition, early intervention is essential, and maternal involvement from the earliest stages is crucial in preventing stunting (Saleh et al., 2021). Therefore, this community service program aimed to evaluate the effectiveness of health education in

improving pregnant women's knowledge regarding balanced nutrition as an effort to prevent stunting in the working area of Bungus Primary Health Center, Padang.

METHOD

Problem Solving Approach

Based on the situational analysis presented earlier and considering the potential of the partners, it is necessary to provide health promotion and education related to balanced nutrition. In general, the intervention strategy consists of delivering specific behavioral messages to mothers or caregivers, utilizing appropriate materials and communication channels, and implementing training and communication programs. These programs can be conducted through individual or group counseling. Interventions are typically delivered by trained community volunteers, health workers, and healthcare providers. In addition, mass media can serve as an effective platform for disseminating information. Programs that incorporate media channels as part of the intervention can lead to behavioral change (Sanghvi et al., 2017; Sanghvi et al., 2025).

The implementation of this community service program is expected to provide optimal outcomes for the target community involved as program partners. In line with the previously identified problems, the proposed solution is to enhance the capacity of pregnant women and mothers with infants and toddlers in achieving balanced nutrition as an effort to prevent stunting in children.

Implementation of Community Service Activities

The problems identified in the partner area can be managed by considering the availability of human resources such as community health volunteers (posyandu cadres), health workers, local government support, and adequate supporting facilities (primary health centers and auxiliary health centers). Based on the characteristics of the area and the community particularly pregnant women and mothers with infants and toddlers, this program is feasible to be implemented effectively, as all involved components can actively participate and contribute to its success.

The implementation of this community service program consists of: socialization, training, technology application, mentoring and evaluation, and program sustainability

Socialization

The socialization activity was conducted on July 30, 2025. It involved relevant stakeholders, including the Bungus Primary Health Center, posyandu cadres, groups of pregnant women, and mothers with infants and toddlers in the Bungus Health Center area. Prior to the activity, the service team coordinated to discuss task distribution, establish collaboration with stakeholders, appoint resource persons, and determine the training venue and schedule.

The socialization phase was conducted on July 30, 2025, involving key stakeholders, including staff from Bungus Primary Health Center, community health volunteers (posyandu cadres), pregnant women, and mothers of infants and toddlers. Prior to implementation, the community service team coordinated with stakeholders to discuss task distribution, determine the schedule and venue, and appoint resource persons. The activity was held on August 27, 2025, at Bungus Primary Health Center, Padang City, and was facilitated by Ns. Yanti Puspita Sari, M.Kep., Ph.D.

The activity consisted of several components, including pre-test and post-test assessments of maternal nutrition knowledge, health education on maternal nutrition, physical examinations, hemoglobin and blood glucose screening for pregnant women,

growth and development screening for toddlers, and counseling on child nutrition and developmental stimulation.

Training

At this stage, the team carried out community service activities (Community Partnership Program/PKM-BD) through training and socialization on balanced nutrition for pregnant women. This activity was conducted on Wednesday, August 27, 2025. It was a one-day activity using group learning methods (focus group discussions) and peer group approaches. The materials delivered included the concept of balanced nutrition, macronutrients and micronutrients, nutritional functions, food processing techniques to preserve nutrients, and methods to identify nutritional problems in pregnant women, infants, and toddlers. The activities carried out are described as follows:

1. Coordination with the health center

Before the training and mentoring activities began, the team coordinated with the health center regarding the series of activities. The head of the health center and several staff members participated in the PKM activities.

2. Delivery of materials by the speaker

The materials were delivered by Ns. Yanti Puspita Sari, M.Kep., PhD (Figure 1). During this session, participants received information regarding the importance of balanced nutrition during pregnancy, daily nutritional requirements, sources of macro- and micronutrients, prevention of anemia, and the role of maternal nutrition in preventing stunting. Interactive discussions were encouraged to allow participants to share their experiences and clarify misconceptions related to food consumption during pregnancy.



Figure 1. Delivery of materials about nutrition for pregnant women

3. Group discussion

Discussions were conducted regarding mothers' knowledge, attitudes, and readiness to meet balanced nutritional needs during pregnancy and for infants and toddlers at home using available resources.

4. Detection of nutritional problems in pregnant women

This was carried out through anthropometric measurements, hemoglobin (Hb) checks, and blood glucose testing. Nutritional screening among pregnant women was conducted in several stages. First, anthropometric measurements were obtained, including body weight and mid-upper arm circumference (MUAC), to identify nutritional status and the risk of chronic energy deficiency. Second, hemoglobin levels were measured using a portable hemoglobin testing device to detect anemia. Third, random blood glucose levels were assessed to identify possible gestational diabetes or abnormal glucose metabolism. The results were explained directly to participants, followed by individualized counseling (Figure 2).



Figure 2. Early detection of nutritional problem among pregnant women

5. Detection of nutritional problems in infants and toddlers

This included anthropometric measurements and growth and development screening. Growth assessment of infants and toddlers included measurements of body weight and height/length using standard anthropometric procedures. Nutritional status was interpreted using age-specific growth indicators. Developmental screening was performed using a pre-screening developmental questionnaire to identify possible developmental delays. Mothers were informed of the screening results and received recommendations according to their child's condition (Figure 3).



Figure 3. Early detection of growth and development of undevelope children

Technology Application

The applied technology involved training and educational methods delivered through small groups with assistance from community health volunteers (cadres). Dividing mothers into small groups facilitated better understanding and application of information in daily life. Additionally, to improve mothers' skills, supporting media such as modules and videos were provided as sources of information on maternal nutrition as well as infant and toddler nutrition.

Mentoring and Evaluation

Mentoring and evaluation were conducted after the training and technology application, on Wednesday, August 27, 2025. The following activities were carried out:

1. Providing mentoring to mothers

After assessing children's growth and development, mentoring and counseling were provided to mothers regarding toddler nutrition and stimulation of child growth and development (Figure 4).



Figure 4. Mentoring and counseling for mother of underfive children

2. Evaluating program success

Program success was assessed based on predetermined performance indicators and the alignment between objectives and outputs. Evaluation was conducted after all activities were completed by the task force team. The outcomes were assessed in terms of mothers' knowledge, skills, and readiness to meet nutritional needs using questionnaires, observation sheets, and direct questioning (Figure 5). Maternal knowledge was measured using a structured questionnaire developed by the research team based on the Indonesian Balanced Nutrition Guidelines. The questionnaire consisted of 10 multiple-choice questions covering nutritional requirements during pregnancy, sources of macro- and micronutrients, anemia prevention, and stunting prevention. The questionnaire was administered before and after the educational intervention. Descriptive statistics were used to summarize participant characteristics. Differences in knowledge scores before and after the intervention were analyzed using a paired t-test because the data were normally distributed. Statistical significance was set at $p < 0.05$.



Figure 5. The evaluation of mother's knowledge

3. During monitoring and evaluation, the team collaborated with the education office and the health center.

4. At the final stage, a follow-up action plan was developed if evaluation results indicated constraints that prevented achievement of performance targets.

Program Sustainability

This activity is planned to continue as a routine program within pregnant women classes at the Bungus Health Center. A comprehensive guidebook on maternal, infant, and toddler nutrition will also be developed to support program sustainability. This stage will be implemented in the coming months.

RESULTS AND DISCUSSION

The community service program was successfully implemented with the participation of ten pregnant women from the Bungus Health Center area. Participants actively attended all sessions, including health education, nutritional screening, and counseling activities. Overall, the program demonstrated positive outcomes, particularly in improving maternal knowledge regarding balanced nutrition during pregnancy.

In addition, screening activities identified several nutritional concerns among participants, including low hemoglobin levels and low blood glucose levels. These findings highlight the importance of continuous nutritional education and monitoring during antenatal care.

The results of the community service activities are as follows:

Characteristics of participating pregnant women

Table 1 provides information on the characteristics of pregnant women, including age, education, occupation, gravida status, blood glucose levels, and hemoglobin levels

Table 1. Characteristics of pregnant women

Variable	f	%
Age		
< 25 years	1	10.0
>= 25 years	9	90.0
Educational level		
Low	4	40.0
High	6	60.0
Occupation		
Unemployed	9	90.0
Employed	1	10.0
Gravida		
Primigravida	1	10.0
Multigravida	9	90.0
Blood glucose level		
Low	6	60.0
High	4	40.0
Hemoglobin level		
Low	4	40.0
Normal	6	60.0

Table 1 shows that most mothers were over 25 years old, had higher education levels, were not employed, and were multigravida. More than half of the mothers had low blood glucose levels (60%), and 40% experienced anemia.

Knowledge before and after education/ training

Table 2 illustrates the improvement in pregnant women's knowledge before and after health education. The mean knowledge score before the intervention was 7.10 (SD = 1.52), with a minimum of 4 and a maximum of 9. The 95% confidence interval ranged from 6.01 to 8.19. After the intervention, the mean score increased to 8.70 (SD = 0.94), with a minimum of 7.0 and a maximum of 10. The 95% confidence interval ranged from 8.02 to 9.38.

Tabel 2. Mean score of mother's knowledge before and after education

Variable	Mean	SD	n	Min-Max	95% CI
Knowledge					
<i>Pretest</i>	7.10	0.94	10	4-9	6.01 – 8.19
<i>Posttest</i>	8.70	1.52	10	7-10	8.02 – 9.38

Improvement in maternal knowledge of nutrition

Maternal knowledge increased after health education, as shown in Table 3.

Table 3. Analysis of Differences in Knowledge Before and After Training

Knowledge	n	Mean difference	t	p
<i>Pretest</i>	10	1.6	3.748	0.005
<i>Posttest</i>	10			

Based on the paired t-test results in Table 3, there was a significant difference in maternal knowledge before and after health education/ training ($t = 3.748$; $p = 0.005$).

The purpose of this community service activity was to enhance the capacity of pregnant women to provide balanced nutrition as an effort to prevent stunting through health education. The results showed an increase in maternal knowledge and improved skills in providing balanced nutrition.

Statistical analysis indicated a significant difference in mean knowledge scores before and after health education ($p = 0.005$). These findings are consistent with a study conducted in Bengkulu in 2024, where pregnant women received interventions on portion sizes, types and functions of nutritious food, and consumption frequency during pregnancy. The study also addressed nutritional problems such as chronic energy deficiency (CED) and its impact on fetal growth and development. The results showed a p-value of 0.001, indicating that health education significantly improved maternal knowledge (Suryani et al., 2024).

Adequate knowledge among pregnant women plays a crucial role in shaping positive health behaviors during pregnancy. When mothers understand nutritional needs, danger signs of pregnancy, and the importance of antenatal care, they are more likely to adopt balanced diets, consume recommended supplements, and maintain healthy lifestyles. This not only benefits maternal health but also supports optimal fetal growth and development. Therefore, improving maternal knowledge directly enhances awareness and adherence to healthy practices, helping to prevent complications such as anemia, preeclampsia, and preterm birth.

The improvement in maternal knowledge observed in this program may also be related to the clarification of several cultural misconceptions regarding maternal and child nutrition. Previous observations in the Bungus area revealed beliefs related to food restrictions and misconceptions about animal-source foods for infants and young children. Through educational sessions and group discussions, participants were encouraged to critically evaluate these beliefs and understand the scientific basis of balanced nutrition.

Addressing local cultural practices is important because such beliefs often influence feeding behaviors and may contribute to inadequate nutritional intake (Buser et al., 2020; Rakotomanana et al., 2020; Reynolds et al., 2021).

Health education improves knowledge because it provides participants with accurate information, corrects misconceptions, and strengthens understanding through interactive learning processes. The use of lectures, discussions, and question-and-answer sessions allows participants to actively engage with the material, which facilitates knowledge retention and behavior change. Previous studies have consistently shown that educational interventions are effective in improving maternal nutrition knowledge and health-related decision making (Sanghvi et al., 2017; Saleh et al., 2021).

CONCLUSION

Health education on maternal nutrition can improve pregnant women's knowledge. It is recommended that such education be routinely provided during antenatal visits for all pregnant women and that information be widely disseminated through social media to enhance public awareness and understanding of maternal nutrition.

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