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Family empowerment strategy and stunting prevention through moringa tree planting movement

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ABSTRACT

Stunting is a significant global health problem, with an estimated 149 million children under five experiencing this condition in 2018. Moringa is a nutrient-rich plant recommended by WHO as an alternative food to overcome nutritional problems or malnutrition. This service aims to increase knowledge about the use of moringa to prevent stunting, encourage active community participation in planting moringa trees in every home, and hone family skills in innovation in processing moringa-based food. The service method uses a Participatory Action Research (PAR) approach. This program is conducted through education, training, and mentoring using lecture, discussion, and direct practice methods. The results of the service showed a positive response from the community, as seen from their activeness during education and socialization of Moringa-based food innovations. This education succeeded in increasing public understanding about using Moringa leaves to prevent stunting, with pre-test and post-test data showing an increase in knowledge from 44.60 to 93.00. This program also distributed 500 Moringa tree seeds and trained people to make processed Moringa products into innovative foods, such as pudding and brownies, opening up economic opportunities. This program is expected to provide sustainable benefits for the health and welfare of the local economy.

ABSTRAK

Stunting merupakan masalah kesehatan global yang signifikan, dengan perkiraan 149 juta balita mengalami kondisi ini pada tahun 2018. Kelor merupakan tanaman kaya nutrisi yang direkomendasikan oleh WHO sebagai makanan alternatif untuk mengatasi masalah gizi atau malnutrisi. Pengabdian ini bertujuan untuk meningkatkan pengetahuan tentang pemanfaatan kelor sebagai pencegah stunting, mendorong partisipasi aktif masyarakat dalam menanam pohon kelor di setiap rumah, serta mengasah keterampilan keluarga dalam inovasi pengolahan makanan berbahan dasar kelor. Metode pengabdian menggunakan pendekatan Participatory Action Research (PAR). Program ini dilakukan melalui edukasi, pelatihan, dan pendampingan dengan metode ceramah, diskusi, dan praktik langsung. Hasil pengabdian menunjukkan respons positif dari masyarakat, terlihat dari keaktifan mereka selama edukasi dan sosialisasi inovasi makanan berbahan dasar kelor. Edukasi ini berhasil meningkatkan pemahaman masyarakat tentang pemanfaatan daun kelor untuk mencegah stunting, dengan data pre-test dan post-test menunjukkan peningkatan pengetahuan dari 44,60 menjadi 93,00. Selain itu, program ini membagikan 500 bibit pohon kelor dan melatih masyarakat membuat produk olahan kelor menjadi makanan yang inovatif, seperti puding dan brownies, yang juga membuka peluang ekonomi. Program ini diharapkan memberikan manfaat berkelanjutan bagi kesehatan dan kesejahteraan ekonomi lokal.

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INTRODUCTION

Malnutrition or growth failure is a horrendous public health problem, and continues to be a major child health issue nationally, especially in Southeast Asia and Africa. It is a pathological disorder caused by an imbalance, inadequacy or consumption of macronutrients (carbohydrates, proteins and fats) that supply dietary energy and micronutrients (vitamins and minerals) necessary for physical and cognitive development (Zungu, et. al., 2019). Stunting is a condition of growth failure in children under five due to chronic malnutrition, recurrent infections, and inadequate psychosocial stimulation (Anita, et al., 2023). Children who are stunted have a height that is lower than their age standard, and are at risk of cognitive and physical developmental delays (Davidson, et. al., 2023).

Stunting is a significant global health problem, with an estimated 149 million children under five having the condition in 2018. During the period 2000 to 2018, the global trend of stunting showed a decrease of 10.6%. In Indonesia, the prevalence of stunting also decreased by 6.4% between 2013 and 2019. Despite this progress, Indonesia is still classified as a country with a very high prevalence of stunting, placing it third highest in Southeast Asia according to WHO data (Maria, et. al., 2020).

In Indonesia, stunting is still a serious public health problem (Mulyaningsih, et al., 2021). The prevalence of stunting in Indonesia based on the Nutrition Status Survey in Indonesia (SSGI) in 2022 reached 21.6% (Arifin, et al., 2024). The highest stunting prevalence rate in South Sulawesi Province is in Jeneponto District at 39.8%, which exceeds the national average (Supardi, et al., 2024). This makes Jeneponto District one of the focus locations for stunting in South Sulawesi Province (Gayatri, et al., 2023). The high prevalence of stunting in Jeneponto is caused by several factors, including inadequate nutritional intake, low nutrition knowledge, and limited access to nutritious food (Alam et al., 2024).

One of the main challenges in stunting prevention programs is ensuring sustainable access to nutritious food for all families (Suhartatik et. al., 2024). Moringa leaves have great potential as a natural and sustainable solution to stunting (Perwitasari & Nurita, 2023).

Moringa plant (Moringa oleifera) is one of the foodstuffs that has a million benefits for health which has a high source of protein, while moringa leaves are a source of food that has high nutritional value (Nurdin, et al., 2022). Moringa is a nutrient-rich plant recommended by WHO as an alternative food to overcome nutritional problems or malnutrition (Khofifah and Mardiana, 2023). Moringa leaves contain 4 times the betakroten of carrots, 3 times the potassium of bananas, 25 times the iron of spinach, 7 times the vitamin C of oranges, 4 times the calcium of milk, 2 times the protein of yogurt. Moringa leaves are used as food to overcome the problem of malnutrition in children and efforts to improve the immune system. Currently, moringa leaves are easily available, but still very lacking in utilization. People generally only utilize moringa leaves as food processed into clear vegetables (Rohmawati et al., 2019).

The program "Movement to Plant One Moringa Leaf Tree in Every Home for Stunting Prevention in Jeneponto: A Strategy for Family Empowerment and Sustainable Nutrition" aims to utilize the potential of moringa leaves in Pallantikang Village for stunting prevention. The approach focuses on improving children's nutritional intake, family and community empowerment through planting and utilizing moringa independently.

METHODS

This community service method uses a Participatory Action Research (PAR) approach that involves active community participation in every stage of program implementation. This program aims to increase community knowledge about the use of moringa leaves as a stunting preventative, encourage the planting of moringa trees in every home, and hone family skills in processing moringa into innovative foods. The service was carried out through education, training, and mentoring with lecture methods, interactive discussions, and hands-on practice. This activity was attended by 50 participants consisting of community leaders, housewives, and village cadres in Pallantikang Village.

The preparation phase began with a survey of the location of the counseling and tree planting, prioritizing households with children at risk of stunting. Furthermore, a work team consisting of

students of the Public Health Study Program of FKIK UIN Alauddin Makassar was recruited to be actively involved in this activity. The service team also conducted focus group discussions (FGDs) and coordination with related parties, as well as taking care of permits for counseling and activity implementation. In addition, various supporting equipment were prepared, including educational materials, banners, health posters, moringa seeds, and necessary tools.

At the implementation stage, the activity began with giving a pre-test to participants to measure their initial knowledge. Next, counseling was conducted on the benefits of moringa leaves as a stunting preventer and socialization of the "Movement to Plant One Moringa Leaf Tree in Every Home" program. After the counseling, participants were given a post-test to evaluate their knowledge improvement. A total of 500 moringa tree seedlings were distributed to participating families, accompanied by a cooking demonstration of moringa leaf preparations such as pudding and brownies to encourage local food innovation.

The monitoring phase was carried out by working groups (pokja) or village cadres who had received special training. They are responsible for monitoring the growth of moringa trees and providing technical assistance to communities in each hamlet. This monitoring aims to ensure the sustainability of the program, both in terms of health and the economic potential of the community. The evaluation results showed a positive response from the community, as seen from the increase in participants' knowledge score from the pre-test score of 44.60 to 93.00 in the post-test. In addition to contributing to stunting prevention, this program also opens up economic opportunities through the development of processed moringa products, so it is expected to provide long-term benefits for health and local economic welfare.

RESULTS AND DISCUSSION

The implementation of this community service program was carried out in Pallantikang Village, Jeneponto Regency in October 2024. This activity begins with a forum group discussion (FGD) with several community leaders so that the planned activities are right on target and provide long-term sustainable benefits (see Figure 1). Then, coordination was carried out with several related agencies to ensure that all stages of the service were in line with the needs and development plans of the village.

Figure 1. FGD and Coordination of Service Activities

In the discussion, various inputs and aspirations of the community were accommodated, especially regarding specific aspects that were considered important to them. Some adjustments were made, such as adding a focus on the utilization of processed moringa leaves as a local product with economic value, as well as strengthening the development of cadres in charge of monitoring the sustainability of the program in the field.

Education on Moringa Leaf Utilization as an Effort to Prevent Stunting

The implementation of educational activities on the utilization of moringa leaves as an effort to prevent stunting was held on Saturday, October 12, 2024. This education is an important part of a series of community service activities that aim to provide a deep understanding of the importance of nutrition in preventing stunting in children. The target of this education is community representatives

from all hamlets in Pallantikang Village, Jeneponto Regency, who are expected to become agents of change in their respective environments (see Figure 2).

Figure 2. Education on Moringa Leaf Utilization to Prevent Stunting

In order for the benefits of the education carried out to be more measurable, the service implementation team conducted a pre-test and post-test to the participants. The pre-test was conducted before the education began to determine the participants' initial level of understanding of the benefits of moringa and its relation to stunting prevention. After the education session was completed, a post-test was conducted to evaluate how far the participants' understanding had increased after receiving the material. The results of these two tests are very important to see the effectiveness of the education that has been provided and at the same time become an evaluation material for future program development.

Based on Table 1 shows that the majority of respondents are women, with a percentage of 76% (38 people), while men are only 24% (12 people). In terms of age, the highest age group is 46-55 years old as much as 36% (18 people) and the lowest age is 56-65 years old as much as 16% (8 people). Based on Table 2 shows that the questions number 1 and 10 received the highest proportion of correct answers with a percentage of 76% and 72% respectively. This shows that most respondents already have a fairly good basic knowledge of the benefits of moringa in stunting prevention. However, there are some topics that are still poorly understood by respondents, as seen in question number 3. This question was only answered correctly by 18% of respondents, indicating that public understanding of the potential risks of inappropriate moringa consumption is still very low. This is an important note to further emphasize education on the safe and appropriate use of moringa leaves in the ongoing program.

Table 1. Characteristics of Respondents

Variable	Frequency	Percentage (%)
Gender		
Male	12	24.0
Female	38	76.0
Age (Year)		
26-35	9	18.0
36-45	15	30.0
46-55	18	36.0
56-65	8	16.0
Total (N)	50	100.0

After the education program, the post-test results showed a significant increase in almost all questions, indicating that the community's understanding of the benefits and uses of moringa to prevent stunting had improved substantially. However, question 2 still had a relatively lower number of correct answers at 66%. This suggests that although community understanding has improved, there is some specific information that still needs to be further emphasized in order to achieve a more comprehensive understanding.

Table 2. Pre and Post Test Frequency Distribution

No	Question	Pre-Test				Post-Test			
		True		False		True		False	
		n	%	N	%	n	%	n	%
1	Moringa leaf can address all the causes of stunting in children.	38	76.0	12	24.0	49	98.0	1	2.0
2	Moringa leaves have a higher calcium content than milk.	21	42.0	29	58.0	40	80.0	10	20.0
3	Overconsuming moringa can lead to iron buildup in the body. which is potentially dangerous.	9	18.0	41	82.0	48	96.0	2	4.0
4	Moringa leaves can only be used as a source of protein for toddlers.	17	34.0	33	66.0	50	100	0	0.0
5	Stunted children can only be reversed through medical intervention.	21	42.0	29	58.0	49	98.0	1	2.0
6	Moringa consumption may help prevent anemia in children.	26	52.0	24	48.0	50	100	0	0.0
7	Stunting only affects a child's height. not brain development.	22	44.0	28	56.0	47	94.0	3	6.0
8	Moringa leaves are the only natural solution scientifically proven to prevent stunting.	14	28.0	36	72.0	41	82.0	9	18.0
9	The use of moringa in the daily diet is only recommended for children over the age of 2 years.	19	38.0	31	62.0	41	82.0	9	18.0
10	The habit of growing and consuming moringa leaves at home can reduce the prevalence of stunting in rural areas.	36	72.0	14	28.0	50	100	0	0.0

Based on Table 3 shows that the pre-test average value is 44.60 indicating that the initial understanding of the community regarding the benefits of moringa leaves for stunting prevention is still relatively low. After being given education, there was a very significant increase of 93.00 with a p value of 0.000. This shows that almost all respondents managed to absorb and understand the educational material well. This significant increase shows that the education delivered is effective in increasing public awareness and is able to provide a deeper and more applicable understanding of how to utilize Moringa leaves in everyday life to prevent stunting.

Table 3. Effect of Education on Moringa Leaf Utilization to Prevent Stunting

Knowledge	N	Average	CI 95%		*p-value*
			Lower Limit	Upper Limit	
Pre-test	50	44.60	-52.351	-44.449	0.0000
Post-test	50	93.00			

After the education session, the activity continued with the handover of moringa seedlings to the community represented by representatives from each hamlet in Pallantikang Village. A total of 500 moringa tree seedlings were handed over directly by the service team as part of a real effort to support stunting prevention in the region. The handover of these seedlings reflects a long-term commitment to improving food security and family nutrition. Moringa trees are known for their very high nutritional content, especially rich in vitamins, minerals, and proteins that are important for child growth, so their utilization is very relevant in preventing stunting.

The benefits of planting moringa trees are very diverse. Apart from being a source of highly nutritious food, moringa also has economic potential that can be developed by the community. By cultivating moringa in every home, the community gets better nutritional intake and has the opportunity to make moringa as a processed product that can be sold to help improve economic welfare. The formation of cadres in each hamlet is carried out to properly monitor the sustainability of the program, so that the expected benefits can be achieved optimally.

In addition, the donation of moringa seedlings is also expected to build collective awareness in the community about the importance of protecting the environment by planting trees. Planting moringa

trees is not only a short-term solution to the problem of stunting, but also a step to improve the overall quality of life of the community. By involving all levels of society, this program is expected to be a successful example of a sustainable locally-based community empowerment movement.

Moringa Leaf Processed Food Creation

The socialization of moringa-based processed food creations was held on Sunday, October 13, 2024, as a continuation of a series of service activities in Pallantikang Village. The main purpose of this activity is to provide practical knowledge to the community on how to process moringa leaves into healthy and attractive food for children. Based on the results of previous discussions, many people already know the benefits of moringa leaves, but face challenges in how to present them to make them more attractive to children who dislike vegetables.

Information dissemination was maximized by distributing flyers containing various simple moringa recipes. The flyers were designed for easy understanding by the community and included a variety of recipes ranging from everyday dishes to snacks that child could enjoy. The distribution of these flyers is part of the strategy to ensure the sustainability of the program and expand the reach of education to more families in the village.

The socialization of moringa-based processed food creations was carried out with a cooking demonstration of moringa leaf pudding and sponge. Pudding was chosen because it is a food that is generally favored by children. In this demonstration, practical steps were shown, starting from how to process moringa leaves into powder to mixing them into the pudding mixture. Secondly, the community was taught how to mix moringa leaves into brownie batter without changing the expected texture or flavor. Through this demonstration, the community gained new inspiration on how they can introduce moringa into their family meals in a creative and fun way.

The long-term benefits of this socialization activity are enormous. In addition to increasing public awareness of the importance of moringa utilization, this activity also provides opportunities for the community to develop small businesses based on moringa preparations. With this new knowledge, the community can try to make and sell processed moringa products such as pudding and brownies to the local market. This activity fosters collective awareness that moringa is a natural ingredient that is rich in nutrition and has high economic value. The sustainability of this program can foster independence in creating healthy food products as the village's flagship product.

Overall, this socialization activity provides direct benefits in terms of knowledge and skills, as well as opening wider economic opportunities for the community. With the ability to process moringa leaves into a variety of foods, the people of Pallantikang Village have the opportunity to improve family nutrition and improve economic welfare through moringa-based small businesses. Hopefully, this activity can be a trigger for the emergence of other new innovations that can be adopted by the village community in the long run.

Moringa oleifera, often referred to as the "miracle tree," has garnered significant attention for its potential to combat malnutrition, particularly in vulnerable populations such as pregnant women, nursing mothers, and children. The nutritional profile of Moringa is rich in essential vitamins, minerals, and proteins, making it a valuable dietary supplement in regions plagued by food insecurity and malnutrition. One of the primary benefits of Moringa is its high nutritional content. The leaves of Moringa are known to contain substantial amounts of protein, calcium, iron, and vitamins A, C, and E, which are crucial for maintaining health and preventing deficiencies (Salihu et al., 2024; Elgendy et al., 2021; Khan & Ali, 2023). For instance, a study highlighted that 100 grams of fresh Moringa leaves can provide the nutritional equivalent of 8 grams of dried leaves, effectively aiding in weight gain among malnourished children under five years old (Sembiring et al., 2023). Furthermore, Moringa has been recognized by the World Health Organization as a food supplement that can help alleviate hunger and malnutrition in impoverished communities (Elgendy et al., 2021).

Research indicates that Moringa supplementation can significantly improve maternal and child health outcomes. For example, a study demonstrated that Moringa extracts administered during pregnancy positively influenced fetal growth and reduced the incidence of low birth weight (Basri et al., 2021; Hadju et al., 2020). Additionally, Moringa has been shown to enhance the nutritional status of mothers,

which directly correlates with improved health for their offspring (Basri et al., 2021; Musaidah et al., 2022). The presence of bioactive compounds in Moringa also contributes to its ability to combat oxidative stress and inflammation, which are common issues in malnutrition (Hadju et al., 2020).

Moreover, Moringa's impact on immune function is noteworthy. A study involving malnourished mice indicated that Moringa supplementation increased the activation of CD4+ T cells, which are vital for a robust immune response (Pilotos et al., 2020). This immune enhancement is particularly important in malnourished populations, where immune deficiencies can lead to higher susceptibility to infections and diseases (Pilotos et al., 2020; Gambo et al., 2021). The ability of Moringa to bolster immune function further underscores its role in preventing malnutrition-related health complications.

In addition to its direct nutritional benefits, Moringa has been integrated into various dietary interventions aimed at improving food security. Countries like Senegal, India, and Zimbabwe have adopted Moringa leaves in nutrition improvement programs, highlighting its versatility as a food source (Musaidah et al., 2022; Chiu et al., 2021). The leaves can be consumed fresh, dried, or as a powder, making them a practical addition to various diets, especially in regions where access to diverse food sources is limited (Chiu et al., 2021).

CONCLUSION

The results of this community service education activity show that there is an increase in knowledge after nutrition counseling on snacks made from moringa leaves to prevent stunting children. Based on the results of this activity, it has been found that counseling plays a very important role in increasing stunting prevention. This is evidenced by the pre-test result of 44.60 which increased to 93.00 in the post-test. A total of 500 Moringa tree seedlings have also been distributed to every house in Pallantikang Village as a long-term measure to ensure the availability of highly nutritious food in every family. Health and economy can be sustainable by utilizing moringa optimally in the future. The socialization of moringa-based food creations went well, where active participation of the community is the main key in the success of this program. Socialization activities through demonstrations of making moringa-based puddings and brownies provide practical skills that can be directly applied by the community.

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