ABDIMAS: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang
Vol.9(1) February 2024, 12-21
p-ISSN: 2721-138X e-ISSN: 2548-7159
http://jurnal.unmer.ac.id/index.php/jpkm

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MALANG

Empowerment Posyandu cadres in the transfer of spinach-based technology for early stunting prevention

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ARTICLE INFO:

Received: 2023-12-12
Revised: 2024-01-05
Accepted: 2024-02-01
Published: 2024-02-29

Keywords:

Posyandu-cadre, Spinach based technology, Stunting

ABSTRACT

The issue of nutritional health among toddlers has become a concern for the Indonesian government. The aim of this initiative is twofold: firstly, to prevent and early detect stunting in toddlers by leveraging local food resources through spinach-based technology, and secondly, to enhance the skills of posyandu health cadres in spinach-based technology and improve their knowledge on stunting prevention. The service team will provide health education on stunting prevention using lecture and discussion methods and conduct anthropometric measurements. Practical or demonstration methods will be used to make cakes and jelly candies. The next stage is evaluation. Findings from the community empowerment evaluation show that health cadres are able to make jelly candy and spinach biscuits. The level of knowledge and skills of cadres on early stunting prevention and anthropometric measurements increased compared to before community empowerment. The evaluation results for knowledge and skill levels after training were 79.4 versus 66.5 before training. Paired t-test analysis found that the p-value was 0.002, so it was concluded that there was a significant increase in knowledge and skills scores in transferring spinach technology before and after training.

How to cite: Qodir, A., Soelistyoningsih, D., Daramatasia, W., Wahyuningrum, A. D., Rachmadhani, R., & Yulianti, S. D. (2024). Empowerment Posyandu cadres in the transfer of spinach-based technology for early stunting prevention. *Abdimas: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang, 9*(1), 12-21.
https://doi.org/10.26905/abdimas.v9i1.11898

1. INTRODUCTION

Stunting is a condition of growth failure in children under the age of five (toddlers) due to chronic malnutrition and recurrent infections, especially during the first 1000 days of life. It encompasses the period from conception to 23 months of age. A child is categorized as stunted if their height falls below minus two standard deviations from the height of children of the same age (Sekretariat Percepatan Pencegahan Stunting, 2019). Stunting is a global health issue, including in Indonesia. Despite the data from the Ministry of Health indicating a decrease in the prevalence of stunting in Indonesia from 24.4% in 2021 to 21.6% in 2022, the incidence of stunting in Indonesia remains relatively high. The government aims to reduce the prevalence of stunting by 14% in 2024. The prevalence of stunting in 2021 is 24.4%, so to achieve this target, a reduction of 2.7% is required each year. According to the Malang District Health

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Office, the incidence of stunting in Malang District was 23% in 2022, showing an 8% decrease from the previous year (Sekretariat Percepatan Pencegahan Stunting, 2019). Although there was a decrease in Malang district, the rate was higher in Indonesia.

In order to reduce the incidence of stunting, the government cannot work alone and must involve various stakeholders, including health Posyandu cadres, to ensure that health education effectively reaches the village level. Prolonged deficiencies in both macro and micro nutrients, especially during the first 1000 days of life, can lead to the occurrence of stunting (Khan et al., 2019). Several factors influence the adequacy of macro- and micronutrient intake in pregnant mothers and toddlers, such as economic, educational, and knowledge-related factors (Ernawati, 2020; Yuwanti et al., 2021). Maternal knowledge regarding nutrition and reproductive health plays a crucial role in determining nutritional intake, the digestion process of food during pregnancy, and the provision of nutrition to their children (Permatasari et al., 2021). In order to reduce stunting, the role of the Posyandu cadres is crucial in providing education on reproductive health, balanced nutrition during pregnancy and child nutrition.

The appropriate introduction of complementary feeding (MP-ASI) after 6 months of age until the age of 2 is also crucial to early stunting prevention for toddlers (Rosita, 2021). The provision of nutrition is based on the principle of balanced nutrition, according to nutritional adequacy based on age and gender. According to the Stunting Prevention Acceleration team, nutrition and food security are two of the five pillars implemented to accelerate the prevention of stunting in toddlers, carried out through a multi-sectoral approach (Permanasari et al., 2020) Proper nutrition is crucial for optimal growth and development in children, particularly those in vulnerable environments.

The utilization of organic food technology transfer, particularly based on local food sources, is one of the efforts to prevent stunting. This approach not only aims to fulfill macronutrient requirements but also micronutrient needs. Organic food technology transfer involves the transformation of spinach to provide daily micronutrient adequacy. Spinach contains nutritional value, including 41 calories of energy, 2.2 grams of protein, 0.08 grams of fat, 2.2 grams of fiber, 520 mg of calcium, 80 mg of phosphorus, 7 mg of iron, 20 mg of sodium, 60 mg of potassium, 72 mg of anthocyanins, and 62 mg of vitamin C. The comprehensive nutritional content of red spinach supports the growth and development of toddlers. Spinach technology transfer is a method for processing spinach into child-friendly products such as noodles, cookies, chips, jelly candies, puree, dumplings, soup, tea, nuggets, porridge, sticks, and fried rice (Wahyuningrum & Qodir, 2022). This service involves the processing of spinach into jelly sweets and biscuits.

This requires community empowerment, especially for health cadres, to provide nutrition to toddlers during each Posyandu session. The target of community service (community-based empowerment) is the health cadre of toddler Posyandu in Klampok Village, Singosari Subdistrict, Malang District. In one Klampok village, there are 8 toddler Posyandu with the names Nusa Indah 1–8. Each Posyandu conducts activities once a month. Klampok Village is part of the Singosari Subdistrict in Malang Regency. Klampok village is situated on the eastern side of Mt. Arjuna and is predominantly characterized by agricultural areas. It boasts a cool climate and amazing natural scenery. Unfortunately, all of these potentials have not been fully utilized by local residents or the local government, thus not fully stimulating the local economy.

The majority of the population in Klampok village earns their livelihood through farming and animal husbandry. Their agricultural produce includes rice and various vegetables, including spinach, as well as other agricultural products. Most of the villagers in Klampok fall into the category of low-income families, with an income of less than IDR 1,000,000 per month. The average size of a residential

building is less than 8 square meters per person, with floors primarily made of soil and walls constructed from bamboo or bare bricks without plaster. Most heads of households have low levels of education, with the majority completing only junior high or elementary school. On average, people in Klampok Village marry at a young age, often below 18 years, particularly among women. Interviews with the village midwives and Posyandu cadres revealed that the majority of the population in Klampok Village has limited knowledge about health, including stunting. The health cadre of Posyandu and the midwife conduct Posyandu activities once a month. The activities include weight measurement, immunization, nutrition improvement, and diarrhea management.

Routine weight measurement at Posyandu is conducted for growth monitoring and early detection of growth deviations in toddlers. Nutrition improvement activities typically involve offering green bean porridge, although some toddlers may not find it appealing. Health cadres also provide education to mothers with toddlers during Posyandu activities, but its effectiveness is not yet optimal. One of the reasons is the suboptimal and incomplete delivery of information, as well as varying levels of knowledge among mothers of toddlers. The ability of cadres to convey information and material related to health education and nutrition counseling is considered inadequate, both in terms of educational media and the substance of the material provided. The condition of the cadres and the community, characterized by insufficient training, low knowledge, and low educational levels, contributes to the cadres' ability to provide education to the community. Additionally, the inadequacy of Posyandu management and equipment impacts the attendance of mothers and toddlers for health check-ups at Posyandu.

A pre-study with the health cadres revealed that there were four young children whose height and weight did not correspond to their age. The findings were based on monthly measurements or monitoring during Posyandu activities. The community-based empowerment program aims to prevent and detect stunting early on in toddlers by training cadres on stunting prevention and transferring spinach technology to utilize local food.

2. METHODS

Location

The partner in this community empowerment project is Klampok village in Singosari subdistrict, Malang district. Its proximity to STIKES Widyagama Husada, only 12.7 km away and a 24-minute car ride, facilitates the proposing team's community service activities. The service has only one partner, which is the Klampok village government. The targeted community empowerment is the Nusa Indah Posyandu health cadres in Klampok Village, which consists of 8 Posyandu. The number of health cadres in this community empowerment activity is 24 cadres. The method for implementing community empowerment activities consists of 3 stages as shown in Figure 1.

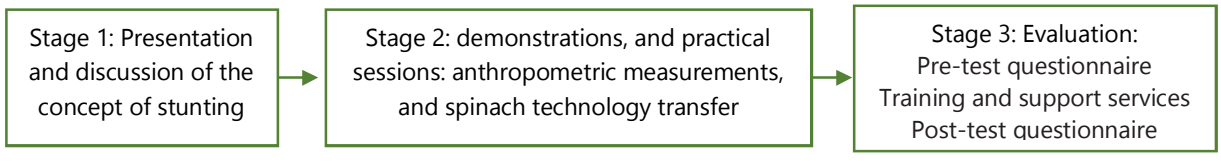

Figure 1. The stages of implementing work to resolve the problem

Preparation Stage

The community service team conducted a situation analysis and assessed the problems of the partners. The team, together with the partners, discussed and decided on the priority of the problems to

be solved. The following activities were carried out to analyze the situation and the partners' problems, as shown in Table 1:

Table 1. Situation analysis and problem solution

	Analysis
Description	- Preparation and signing of a memorandum of agreement with partners - Conducting a pilot study to assess community conditions and analyze the problems of partners. - Make a list of problems and prioritize them with partners to find solutions to the identified problems. - Submitting a permit application to Singosari Public Health Center
Propose	- Identifying and prioritizing the problems of partners - Identify solutions to prioritized problems.
Time	- 2023, the first Sunday in April - Duration: 3 hours.

Method of Implementation

In order to address the priority problems agreed upon with the partners, the community empowerment activity is implemented in several stages. The following are the stages for implementing work to solve partner problems: (1) Providing health education on stunting prevention, anthropometric measurements, and their interpretation to posyandu health cadres; (2) Training in spinach processing technology, especially for use in biscuits and jellies; and (3) Improving how Posyandu equipment is managed and procured. The service team will present health education on stunting prevention using lecture and discussion methods and will also conduct anthropometric measurements. Practical or demonstration methods will be used to make cookies and jelly candy. The next stage is evaluation. This includes evaluating stunting prevention knowledge using questionnaires, as well as evaluating anthropometric measurements and spinach technology transfer. Health cadres will re-demonstrate anthropometric measurements and their interpretation and provide spinach technology transfer. After this activity, the proposing team continued to provide assistance to posyandu cadres with relevant parties, such as village midwives.

During the implementation phase, effective collaboration between the service team and partners will be critical to ensuring a seamless process. Partner support in the form of preparing the necessary equipment and helping to set up the location. The service utilizes different methods, such as material presentations, discussions, demonstrations, and practical sessions. The material is presented by three resource persons. They have expertise in stunting, anthropometric measurements, and spinach technology transfer.

In this community empowerment, the tools and materials needed are as follows: The equipment for the transfer of the spinach technology into biscuits consists of an oven, a mixer, a stove pan, and a basin. The ingredients required to make cookies are spinach juice, sugar, margarine, cheese, flour, agar-agar, jelly, eggs, cornstarch, baking powder, vanilla, and strawberry essence. To make jelly candy, spinach juice, sugar, jelly, and agar-agar are needed. The next step in detecting and measuring anthropometry is to weigh yourself and measure your height. To detect/measure anthropometry using a stature meter and digital baby scale. The implementation method is described in Table 2.

Table 2. Implementation method

Method	
Description	**Opening ceremony** - Community Empowerment Activities Opened by Village Head's Mother - Schedule for Community Socialisation and Empowerment Activities - introduction of service team members and partners **Health education on stunting prevention** - The material will be delivered interactively using PowerPoint media. - Methods: lectures and discussions **Anthropometric measurements and Training in spinach processing technology** - The language used in the delivery was easy to understand and included standard operating procedures (SOPs) and supporting tools. - The health cadres were enthusiastic about practicing anthropometric measurements and making cookies and jelly candy. - Methods: Demonstration, hands-on experience, and discussions
Propose	- Improve knowledge and skills of health cadres on early stunting prevention - Increase knowledge and skills of cadres on spinach technology transfer for stunting prevention
Time	- 2023, the third Sunday in August - Duration: 6 hours.

Method of Evaluation

The evaluation stage occurs at the end of the activity. It includes the level of knowledge of the health cadres about stunting, measuring atropomteri and spinach production, and technology transfer into cookies and jelly sweets. An evaluation is also carried out to assess partner satisfaction with this community empowerment program. The next evaluation will take place during the implementation of Posyandu. The evaluation stages are described in Table 3.

Table 3. Evaluation

Implementation	Evaluation
The pre-test of health cadres' understanding of the concept of stunting, clinical signs of stunting, nutritional therapies, the impact of stunting, and atropometry.	Pre-test questionnaire
Practice of the athropometric measurements and the transfer of the spinach technology	Training and support services
The post-test of health cadres' understanding of the concept of stunting, clinical signs of stunting, nutritional therapies, the impact of stunting, and atropometry.	Post-test questionnaire

3. RESULTS AND DISCUSSION

Results

Program implementation

Providing spinach technology transfer training

On the implementation phase, which took place on 19 August 2023 at the Arts Building in Klampok village, Singosari subdistrict, the service team conducted a pre-test on stunting prevention and measured height and weight. Training on making jelly candy and cookies was conducted using the

demonstration method. Health cadres were then given the opportunity to practice what was delivered by the speaker. This community empowerment activity enables partners to produce supplementary food for toddlers in the form of jelly sweets and spinach cookies as shown in Figure 2. Process technology transfer of processed spinach in several variants that can be given to toddlers such as cookies and jelly candy as shown in Figure 3.

Figure 2. Product jelly candy and cookies from spinach in Kelampok Village
Figure 3. Process of transferring spinach technology in Kelampok Village

Providing health education about stunting prevention to Posyandu health cadres

Delivery of material using the FGD (Focus Group Discusiion) method. The material provided includes the use of local product technology transfer, the incidence of stunting, the definition of stunting, clinical manifestations of stunting, types of nutritional interventions, the impact of stunting as shown in Figure 4.

Measurements of baby's height and weight

Material and practice for measuring height and weight and analyzing the results of these measurements to detect stunting early as shown in Figure 5.

Figure 4. Material for early prevention of stunting in Kelampok Village
Figure 5. Measurements of baby's height and weight in Kelampok Village

Evaluation

Before carrying out the training, health cadres take a pre-test and after the activity they are given a post-test consisting of 20 questions. To measure height and weight skills and interpret the measurement

results using an observation sheet as an evaluation of the training and education that has been provided. The measurement results were analyzed using SPSS descriptively to determine target characteristics and bivariate tests using paired t tests to determine differences in the level of knowledge and skills of health cadres before and after training. There were 24 health cadres present from 8 Nusa Indah Posyandu, Klampok Village. The following are the results of data analysis of the characteristics of Posyandu cadres which are pesented in Table 3.

Table 3. The characteristics of health-cadres

Characteristics		f	%
Age	Early adult	8	33.3
	Late Adult	16	66.6
Education	Elementary School	4	16.7
	Junior High School	10	41.7
	Senior High School	10	41.7
Work	Housewife	22	91.7
	Entrepreneur	2	8.3
How long they become cadre	1-5 years	6	25
	6-10 years	7	29.2
	>10 years	11	45.8

The results of data analysis of respondent characteristics found that the majority of respondents were late adults, namely 16 (66.6%) health cadres. Late adulthood has a lot of free time compared to early or productive adulthood. Most of the health cadres have a final education level of high school and middle school, namely 10 (41.7%), 22 (91.7%) of the health cadres are housewives or do not work. Most of the health cadres have been active health cadres for more than 10 years, namely 11 (45.8%).

Table 4. Evaluation of levels of knowledge and skills in technology transfer to health cadres before and after training

Knowledge and skills	Average	Min	Max	p-value
Pre-test	66.5	50	86.4	0.002
Post-test	79.4	63.6	95.5	

The analysis results in Table 4 show that the average score of knowledge and skills for Posyandu cadres after training was 79.4 compared to 66.5 before training. Paired t test analysis shoed that p-value=0.002 which can be concluded that there was a significant increase in knowledge and skills scores in technology transfer over spinach before and after training.

Discussion

The role of health cadres is very important in improving the health status of mothers and toddlers, including early prevention of stunting. Health cadres are the spearhead for stunting prevention because they directly interact through various Posyandu programs which are routinely held in the community (Adistie et al., 2018). One of the main activities that is routinlely carried out is the monthly weighing of toddlers, where education is also provided regarding nutrition and reproductive health. The acceleration

of stunting reduction must be realized in a massive social movement with clear direction, so that cadres health, family planning cadres, human development cadres, must participate in the family assistance scheme in order to accelerate stunting reduction as part of the team family companion (Sekretariat Percepatan Pencegahan Stunting, 2019).

We found a significant change in anthropometric measurement skills before the training, health cadres on average were unable to measure anthropometry and categorize stunting with a score of 24.3 and after the training they got a score of 83.3. Cadre explained that so far there has been no training in anthropometry and interpretation of measurement results. Policy related to increase cadre skills specifically related to measurement skills anthropometry is still not optimal (Herlina, 2021). Educational methods using Focus group discussion (FGD) and assistance in anthropometry measurements and their interpretation have been proven to increase cadres' knowledge and skills. These results are in line with previous research with quasi-experimental research design and 97 respondents (Permatasari et al., 2021).

This result is also consistent with previous research (Erawati et al., 2022; Kirana et al., 2021; Permatasari et al., 2021; Sari et al. 2023). These results can be a solution to increase the knowledge and skills of health cadres in early detection so that health cadres can provide appropriate education to the community and minimize errors in measurement and interpretation of the results (Purnami, 2020). The process of training and guidance in spinach technology transfer was carried out after providing stunting education and anthropometric measurement. Following the simulation of making cookies and jelly candy from spinach by the service team, the cadres then practice the production process themselves. The observation of the creation of both products from spinach materials indicates that the cadres were able to make cookies well. The cadres explained that during previous training, the utilization of spinach usually resulted in food products such as spinach crackers or chips.

The results of spinach technology transfer are expected to be a solution to meet the nutritional needs of toddlers as complementary feeding. Inadequate nutritional intake, especially in terms of protein and energy, can inhibit both body and brain growth. A deficiency in essential micronutrients such as vitamin D and iron can also have impact on impaired growth and development (Permatasari et al., 2021).

Spinach is one of the readily available sources of local micronutrients in Indonesia, including in Klampok Village, Malang Regency. While spinach is already utilized by the community for their dietary needs in the form of vegetables, it is not particularly favored by children. Transforming spinach into cookies and jelly candies through spinach technology transfer can be a solution to support food security in Indonesia and meet the macro and micro nutritional requirements of toddlers. Previous research has demonstrated that food fortification including spinach fortification on a large scale, has been beneficial in reducing nutritional problems, thus, it is hoped to prevent and decrease the incidence of stunting (Wahyuningrum & Qodir, 2022).

4. CONCLUSION AND RECOMMENDATIONS

The aim of this community empowerment is to train health cadres to transfer spinach technology into foods that children like, such as cookies and jelly candy. We also provide health education regarding early detection of stunting and anthropometric measurements including height and weight. The findings of the community empowerment evaluation showed that health cadres were able to make jelly sweets and spinach biscuits. The level of knowledge and skills of the cadres on early stunting prevention and anthropometric measurements increased compared to before community empowerment. The conversion of spinach into foods that children love such as jelly candy and cookies can be an additional food to prevent stunting.

ACKNOWLEDGEMENTS

Thank you to the Ministry of Education and Culture, Research and Technology with contract number No. 061/ SP2H/PKM/LL7/2023, dated June 19, 2023., STIKES Widyagama Husada, and all health cadres of Klampok Village for carrying out this research.

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