Nutrition Education and Local Food Processing Training as a Strategy to Address Undernutrition among Children under Five

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Abstract: Undernutrition among children under five remains a major public health challenge requiring continuous intervention. This study aimed to improve the knowledge and skills of posyandu cadres through nutrition education and demonstrations of local food processing in the working area of Medokan Ayu Public Health Center, Surabaya. An observational study with a cross-sectional design was employed, and samples were selected using cluster random sampling. Primary data were obtained from pre-tests, post-tests, and observations of cadre participation, while secondary data included the health center profile, socioeconomic conditions, and child nutrition data. The intervention consisted of nutrition education and demonstrations of local supplementary feeding (PMT) in the form of moringa leaf and turmeric dim sum. The results showed a significant increase in cadre knowledge, with mean pre-test scores rising from 80.33 to 88.00 in the post-test (a difference of 7.67 points). The Wilcoxon test produced a p-value of 0.001 (<0.05), indicating a statistically significant improvement. A total of 53.3% of respondents experienced increased knowledge, 40% remained unchanged, and 6.7% decreased. These findings demonstrate that nutrition education combined with local PMT cooking demonstrations is effective in enhancing the knowledge and skills of posyandu cadres as community change agents to reduce the prevalence of undernutrition among children under five.

1 INTRODUCTION

Toddlers are children under the age of 5. This period is referred to as the golden age, when development and growth occur rapidly (Krisnanto et al., 2022). The development and growth of children under the age of 5 is very important to pay attention to because it can affect the child's future life. Toddler development is usually associated with the development of thinking patterns, language and speech skills, social development, independence, and so on (Yahya et al., 2024). Meanwhile, growth in toddlers is usually associated with toddler z-scores obtained from measurements of weight and height. The z-score results are then evaluated to determine nutritional status, with the aim of early detection of nutritional problems, both malnutrition and overnutrition in toddlers (Dewi & Sumi, 2024) because nutritional problems in toddlers, if not properly addressed, can cause ongoing nutritional problems in children. There are two types of nutritional problems in toddlers, namely malnutrition and overnutrition. Both have adverse effects on the future of toddlers. Malnutrition in toddlers, if not properly addressed, can cause them to be short,

susceptible to disease, anemia, reduced brain development, and so on. Meanwhile, toddlers who are overnourished can become obese later in life, which increases the risk of degenerative diseases such as diabetes mellitus, cardiovascular disease, hypertension, and many more.

Malnutrition remains a nutritional problem of concern because the number of toddlers increases every year, so the prevalence of malnutrition is constantly monitored. The percentage of malnutrition in Indonesia was 16.3% in 2019. Furthermore, the percentage of malnutrition increased to 17% in 2021 and increased again in 2022 to 17.1%. This means that the handling and prevention of malnutrition in Indonesia is insufficient, causing the rate of malnutrition to increase every year (Mashuri, 2024). In addition, according to the results of the 2022 Indonesian Nutrition Status Survey (SSGI), around 6.1% of toddlers in Surabaya suffer from wasting or malnutrition based on the weight-for-height index. This prevalence then decreased in the following year to 1.56%. The prevalence of malnutrition indicators in toddlers according to the 2023 Surabaya Community Health Profile shows that the prevalence of malnutrition in toddlers based on weight-for-age is 2.01%, and based on height-for-age is 0.66%. One of the long-term effects that can trigger nutritional problems is the result of insufficient intake of energy, protein, other macro nutrients, and micronutrients. This chronic nutrient deficiency can interfere with the growth and development of toddlers (Fitri et al., 2021).

Nutritional problems are also common among toddlers in the Medokan Ayu Community Health Center area in Surabaya. According to data from the March 2025 health center, out of a total of 3,094 toddlers measured, 41 toddlers were malnourished, 27 toddlers were stunted, and 205 toddlers were underweight. One of the causes of the high rate of nutritional problems is a lack of knowledge about how to treat toddlers with nutritional problems. Therefore, a program to treat toddlers with malnutrition needs to be implemented in the Medokan Ayu Community Health Center area by creating an educational program to increase knowledge about treating malnutrition in toddlers. According to government recommendations, one way to treat toddlers with malnutrition is to implement a Supplementary Feeding Program (PMT). The PMT that can be given to children is usually in the form of snacks that are high in nutrients and attractive to children, such as dim sum, pudding, nuggets, and others. Furthermore, PMT is made from local food ingredients that are high in nutrients from both plant and animal sources (Askandary et al., 2024). Some examples of ingredients for making PMT from local ingredients that are high in nutrients are moringa leaves, milkfish, catfish, ginger, tubers (Auliya et al., 2025), and many more.

In relation to local PMT as a means of addressing malnutrition, cooking demonstrations can also be provided to posyandu cadres as an extension of parents and health centers to increase skills and knowledge about how to address malnutrition in toddlers. This is the reason behind the creation of the program "Nutrition Education and Local Food Processing Training as a Strategy for Handling Malnutrition in Toddlers in the Medokan Ayu Health Center Area" with a series of educational materials followed by cooking demonstrations. The hope is that this program can broaden the knowledge and skills of

posyandu cadres regarding the preparation of local PMT for toddlers with malnutrition problems.

2 METHOD

This study used an observational method with a *cross- sectional* design, whereby data was collected at a single point in time with a single measurement. The study was conducted at the Medokan Ayu Community Health Center in Surabaya. Three samples from each sub-district within the Medokan Ayu Community Health Center area were selected using cluster random sampling, with the population consisting of all posyandu cadres from the three sub-districts within the Medokan Ayu Community Health Center area. The types of data collected included primary and secondary data. Secondary data consisted of health center profiles, socioeconomic conditions, nutritional problems, and geographical conditions. Meanwhile, the primary data obtained consisted of pre-test and post-test results as well as participant participation in educational activities and demonstrations of local PMT cooking.

The activities were carried out on April 26, 2025, using lectures and demonstrations. The lectures were delivered using the concept of important regarding the importance of knowing the nutritional status of toddlers, the risks of toddler nutritional problems, and the handling of toddler nutritional problems. During the lecture, primary data was obtained by administering pre- tests and post-tests used to measure the increase in knowledge of posyandu cadres before and after receiving education nutrituin. The instrument used was a multiple-choice questionnaire. The event continued with a demonstration of cooking local PMT dishes, specifically dimsum made from moringa leaves and turmeric, as an effort to enhance the knowledge and skills of posyandu cadres.

3 RESULT

The results of this study indicate an increase in knowledge obtained from the following data :

Variable	*Kolomogorov-Smirnov*		
	Statistik	df	Sig.
Before Education and Demonstration of Local PMT Cooking as an Effort to Address Malnutrition	0,224	30	0,000
After Providing Education and Demonstrations on Cooking Local PMT as an Effort to Address Malnutrition	0,241	30	0,000

Table 1 Results of Normality Test for Education and Demonstration of Local Food Cooking as an Effort to Address Malnutrition in the Medokan Ayu PKM Area

The table shows that the *Kolmogorov-Smirnov* statistical test results obtained a significance value for the knowledge of Posyandu cadres before and after being given education and demonstration of cooking local PMT is less than 0.05. This means that the data

is not normally distributed. Therefore, the statistical difference test uses the *Wilcoxon T-Test*.

Variable	Treatment		*Mean*	*Std. Deviation*	*Min-Max*	Difference
Knowledge of Posyandu Cadres	Local PMT Education	Pre test	80,33	14.499	40-100	7,67
		Post test	88,00	10.635	70-100	

Table 2 Average knowledge scores before and after education and demonstration of local PMT cooking as an effort to address malnutrition in the Medokan Ayu PKM Area

The table shows that there was a difference in the mean scores between the knowledge of posyandu cadres before and after receiving education and demonstration of local PMT cooking. The results of the study show that the average knowledge score before and after the intervention increased by 7.67 points. The mean before the intervention was 80.33 and after the intervention was 88.00.

Knowladge Level	Post test	
	Frequency	Percentage (%)
Decreased *(negative ranks)*	2	6,7
Increasing *(positive ranks)*	16	53,3
Ties	12	40
Total	**30**	**100**

Table 3 Frequency Distribution of Knowledge in Education and Demonstration of Local PMT Cooking as an Effort to Address Malnutrition in the Medokan Ayu PKM Area

The table shows that of the 30 respondents who received health education through video media, 16 (53%) respondents showed an increase in knowledge, 12 (40%) respondents remained unchanged in their knowledge, and 2 (6.7%) respondents showed a decrease in their knowledge.

Knowladge Level	z-score	*p*-value
Post-test	-3,274	0,001

Table 4 Comparison of Knowledge Levels of Education and Demonstration of Local PMT Cooking as an Effort to Address Malnutrition in the Medokan Ayu PKM Area

The table has been tested using *the Wilcoxon T-Test* on *pre-test* and *post-test* respondents, showing a *p-value = 0.001 < 0.05*. Therefore, it can be statistically concluded that there is a significant difference in knowledge between posyandu cadres before and after being given education and demonstration of cooking

local PMT as an effort to handle malnutrition in the Medokan Ayu PKM Area.

Figure 1 Implementation of Nutrition Education

Figure 2 Pre-Test Completion

Figure 3 Documentation with participants after the Activity

4 DISCUSSION

Malnutrition is a condition in which a child experiences weight loss over time until their total weight is below the standard growth curve or the child's condition or weight based on their height is low and shows weight loss (Zulfiana et al., 2024). Malnutrition is evidenced by the weight/body lenght or weight/height index, which shows that a child's weight must be in accordance with their height/length growth. This is evidenced by a *z-score* ranging from *– 3 SD to. <- 2 SD.* Malnutrition is also

characterized by the body not getting enough nutrients, such as calories, protein, fat, and micronutrients such as vitamins and minerals. Malnutrition can lead to various problems such as wasting and stunting (Suriani et al., 2021).

Malnutrition (wasting) is the highest risk of child mortality among other nutritional problems. Children who are classified as wasting but do not receive proper care are three times more likely to experience stunting than children who have good nutrition (Deswinta & Prasetyo, 2024). Carbohydrates are a source of energy to support all daily activities and can be obtained from sugars, rice, potatoes, and tubers. Protein is a building block that is a *macronutrient* indicator that regenerates damaged cells and forms enzymes and hormones. Protein is obtained from red meat such as beef, goat, and buffalo, white meat such as fish, chicken, and duck, as well as eggs produced by livestock and plant-based protein obtained from plants, such as processed soybeans, tofu, and tempeh. Fat is also used to produce energy for the body's metabolic processes and stimulate the production of various hormones. Essential omega 3 and omega 6 fats play a very important role in the growth and development of brain nerve cells for toddler intelligence. The fat circulating in the body comes from two sources, namely food and the liver (Sari, 2020).

The nutritional status of toddlers is generally influenced by two factors: direct factors and indirect factors. Direct factors consist of food intake, disease Infections and indirect factors consist of knowledge, economic status, and the role of health workers (Alpin, 2021). Infectious diseases often occur in children, such as urinary tract infections, respiratory tract infections, and diarrhea, which reduce appetite (Wahyuni et al., 2022). The short-term effects of malnutrition in toddlers include impaired brain development, intelligence disorders, stunted physical growth and development, and metabolic disorders. In addition to short-term effects, there are long- term effects of nutritional problems in toddlers, including decreased cognitive abilities and learning achievement, decreased immunity, making them susceptible to disease, and a high risk of developing several diseases such as cardiovascular and heart disease, diabetes mellitus, obesity, cancer, stroke, and disability in old age (Nuradhiani, 2023).

To identify nutritional problems, data collection and processing are carried out. Data collection includes primary and secondary data. Primary data is data obtained directly by the researcher. The primary data collected included data on posyandu cadres and data on knowledge related to local PMT and strategies for reducing malnutrition in toddlers. Then, secondary data collection was carried out. Secondary data is data obtained by researchers from existing sources that is used to support situation analysis. The secondary data obtained included the profile of the Medokan Ayu PKM UPTD, a list of malnourished toddlers in the Medokan Ayu PKM area, demographics, population, and socio-economic culture, including educational facilities, health facilities, and the number of health workers at the Medokan Ayu PKM and also included posyandu cadres representing the Medokan Ayu PKM area.

Based on the data collection results, four nutritional problems were found in the Medokan Ayu PKM area: four pregnant women with KEK, 41 toddlers with severe malnutrition, 208 toddlers with moderate malnutrition, and 27 cases of stunting. Then, a narrowing down process was carried out to

identify the priority nutritional problems that would be used as the theme for our nutrition program. To determine the priority of nutritional problems, the Urgency, Seriousness, Growth (USG) method was used. The USG method is a way of determining the order of priority of problems using a scoring technique. Urgency, Seriousness, and Growth were determined using a scale of 1-5. The issue with the highest score would become the top priority. The results of the nutritional issue prioritization showed that malnutrition had the highest score.

Based on the results of the prioritization of nutritional problems and their risk factors, a nutrition program was held with the aim of increasing the understanding of posyandu cadres by providing education and demonstrations on cooking local PMT as a treatment for malnutrition in the Medokan Ayu PKM area, which covers the villages of Medokan Ayu, Wonorejo, and Penjaringan Sari. This activity was held on April 26, 2025, in the Medokan Ayu PKM Meeting Room. The nutrition program was implemented starting from the initial data assessment, data processing, and nutrition program implementation. The nutrition program activities included education related to local PMT and demonstrations of cooking local PMT. This activity used several media, such as PowerPoint materials and recipe guides. Therefore, knowledge is very much needed by cadres in efforts to improve the nutritional status of toddlers. In efforts to improve the nutritional status of toddlers, the knowledge of posyandu cadres plays an important role in supporting the successful implementation of activities. The broader the knowledge of posyandu cadres, the greater the probability of improving their performance in terms of improving the nutritional status of toddlers.

Education and Local PMT Cooking Demonstrations as Efforts to Address Malnutrition

Based on the results of the study, the pre-test and post-test results showed a significant increase in comprehensive understanding of healthy local PMT through the implementation of cooking demonstrations. Another study also stated that there was an increase in the knowledge and attitudes of posyandu cadres regarding local food-based PMT menu standards in the working area of the UPTD PKM Ranto Peureulah, East Aceh (Nurbaya et al., 2022).

In this context, posyandu cadres play a vital role as liaisons between health workers and the community. Therefore, increasing the capacity of cadres in terms of nutrition knowledge and skills is a strategic step to reduce malnutrition rates in a sustainable manner. According to previous research, posyandu cadres act as planners, implementers, mentors, and educators to motivate the community to participate in posyandu activities in their area (Yunita et al., 2021).

To address these challenges and achieve the target of reducing malnutrition prevalence, the Medokan Ayu Community Health Center conducted educational activities and demonstrations on cooking locally sourced supplementary foods, with posyandu cadres as the main target. This activity aims to strengthen the role of cadres as agents of change in their respective environments, particularly in terms of nutrition counseling and monitoring the nutritional status of toddlers. Efforts to address this include providing guidance to cadres on using language that is easily understood by the community, providing evaluations, and briefly explaining the material

presented at previous meetings. This program is supported by other research, including a posyandu revitalization program that aims to ensure that family posyandu activities are carried out in a sustainable and continuous manner and that the vision of the family posyandu is achieved (Nurbaya et al., 2022).

The education provided includes a basic understanding of balanced nutrition for early childhood, the causes and effects of malnutrition, and the importance of providing supplementary food as a nutritional intervention measure. Cadres are also given explanations about the types of nutrients (carbohydrates, proteins, fats, vitamins, and minerals) and their functions in supporting toddler growth. The material is delivered interactively through discussions and examples of cases in the field that cadres often encounter while on duty at the posyandu.

Local PMT Cooking Demonstration

After the educational session, the activity continued with a local PMT cooking demonstration. In this session, cadres were directly involved in the process of selecting ingredients, processing, and serving supplementary foods made from local foods. A cooking demonstration of dim sum made from moringa leaves and turmeric was carried out as part of educational and promotional activities aimed at posyandu cadres and mothers of toddlers. This activity aimed to introduce local PMT menus that are not only highly nutritious but also practical in processing and appealing in appearance and taste to toddlers. This is supported by other research, namely the provision of nutrient-rich local PMT, which requires creativity in processing food to attract children's interest in consuming PMT (Anugrah & Suryani, 2020).

Figure 4 Result of Moringa Leaf Dimsum

Dimsum was chosen as the dish because of its soft texture, which is easy for toddlers to chew. In this demonstration, moringa leaves and turmeric were used as supporting ingredients for chicken, which was the main ingredient used in the dim sum dough. Moringa leaves (Moringa oleifera) are known as a local "superfood" because of their high nutritional content (Barakel et al., 2025). Meanwhile, turmeric (Curcuma longa) is added in small amounts as a natural coloring and health enhancer because it contains curcumin, which has anti-inflammatory properties and helps increase children's appetite (Yahya et al., 2024).

Participants were also taught proper processing techniques to prevent nutrient loss, such as not overcooking and using just enough water. In addition, the importance of maintaining hygiene during the cooking and food storage processes to prevent contamination was discussed. After the dimsum was cooked, the cadres were invited to taste the results and were given examples of attractive ways to serve it to children, such as shaping the dimsum into cute characters or using colorful containers to stimulate children's appetite. With PMT menu innovations such as this, the community is encouraged not to rely solely on instant food assistance, but to actively develop creativity in providing healthy food for children. In the long term, this strategy is expected to

significantly reduce the prevalence of malnutrition at the community level.

5 CONCLUSIONS

Based on the results and discussion above, providing nutrition education and training on local food processing through cooking demonstrations as an effort to treat toddlers with malnutrition in the Medokan Ayu Surabaya Community Health Center area has proven to have positive results for the community. It is hoped that this community service program will increase the knowledge and skills of posyandu cadres as the direct link between the health center and parents of malnourished infants in conveying knowledge and carrying out their duties as posyandu cadres.

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