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Developing healthy food for toddlers based on local purple sweet potato food

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ABSTRACT

Nutritional issues in toddlers, particularly stunting, are crucial and align with the fourth point of Asta Cita (Association of Indonesians), namely improving the quality of life of the Indonesian people. This condition not only impacts children's height but also their cognitive development, productivity, and the long-term quality of human resources. To address this, innovation is needed to meet the nutritional needs of toddlers through the use of readily available and nutritious local foods. One potential local food that can be utilized is purple sweet potatoes. Purple sweet potatoes contain natural antioxidants (anthocyanins), vitamins A, C, and E, and dietary fiber, which are good for supporting growth and strengthening children's immune systems. This study aims to provide alternative local food ingredients that are highly nutritious and acceptable, readily available, and easy to process by the wider community. This study used a quasi-experimental design with a one-group pretest-posttest design on mothers of toddlers. The study variables were knowledge and skills, which were measured twice: before and after the purple sweet potato processing practice. The results showed a significant difference. (2-tailed) at knowledge 0.000 < 0.05 and skills significance value 0.000 < 0.05 then there is a significant difference between knowledge and skills before and after the purple sweet potato processing practice. The conclusion is that the purple sweet potato processing practice is effective in increasing the knowledge and skills of mothers of toddlers. The implication is that similar educational or training programs can be implemented more widely in the community to improve mothers' ability to provide nutritious food for their toddlers.

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INTRODUCTION

Linear growth failure, also known as stunting, has become a global issue and is a form of long-term malnutrition (Rani Suraya et al., 2025). The estimated number of children experiencing stunting

continues to rise, with most of them coming from low- and middle-income countries (Permata Sari Br Sembiring, 2023). Stunting syndrome is a pathological change characterized by linear growth retardation in early life, associated with increased morbidity and mortality, reduced physical capacity, neurodevelopment, and economic well-being, as well as an increased risk of metabolic diseases into adulthood. Growth failure, or stunting, is a common form of malnutrition globally (Patimah, 2021). Stunting in children, characterized by stunted growth in height relative to their age, is a factor in chronic malnutrition. This occurs when children do not receive enough energy or nutrients needed for growth and is also caused by problems absorbing nutrients (Ernauli Meliyana, 2024). Lack of nutrition needed to support optimal growth can hinder children's physical and cognitive development (Hilda Ayu et al., 2025).

Meeting the nutritional needs of stunted children is a key focus for achieving recovery and supporting the Global Nutrition Targets for 2025. This is a key factor in achieving the Sustainable Development Goals (SDGs). Stunting has been identified as a top priority in public health, with a target of reducing its prevalence by 40% between 2010 and 2025 (Shekar et al., 2017). Nutritional problems in Indonesia have a significant impact on the quality of human resources (HR) (Hariani et al., 2023). One of the most concerning nutritional issues is the high incidence of stunting, or the condition of toddlers whose height is below the standard for their age (Fikri et al., 2025). Stunting is caused by various factors, but insufficient nutritional intake during pregnancy and the first two years of life (the First 1,000 Days of Life) is the main cause (Ruaida, 2018). Low food security further exacerbates this situation, as many families, especially those living in rural and remote areas, face difficulties in obtaining nutritious food (Juansa et al., 2025). In this regard, the provision of supplementary food based on local food ingredients plays a crucial role in reducing the prevalence of stunting in Indonesia. This nutritious intake not only covers macronutrient needs such as protein and carbohydrates, but also provides important micronutrients such as iron, zinc, and vitamin A which are very much needed to support optimal growth and development, especially in the 1,000 HPK period (M.Sc et al., 2025).

The prevalence of stunting in Humbang Hasundutan Regency based on the 2024 SSGI was 18.3%, only down 0.1% from 2023 (18.4%) from the RPJMN target in 2024, the national figure requires a maximum of 14%, so this is still the target in realizing a stunting-free Humbang Hasundutan Regency (*SSGI_DALAM_ANGKA_LAUNCHING_250526_signed*, n.d.). The Humbang Hasundutan Regency Government, through the Health Office, has undertaken collaborative efforts with all integrated health posts (Posyandu) and related parties to implement an integrated stunting reduction program. In Humbang Hasundutan, one of the programs to address malnutrition in children is the Supplementary Feeding Recovery Program (PMT-Pemulangan). PMT is provided daily to children aged 6-59 months as a supplement, not a substitute for, the main meal. PMT is produced based on local ingredients with regional specialties to adapt to local conditions (Hadju et al., 2023). In addition to PMT provision, recovery of malnutrition in toddlers is also supported by effective nutrition counseling strategies. Nutrition education aims to provide mothers with knowledge about appropriate food and toddler growth and development (Prasetyo et al., 2023). Mothers' knowledge about food can help them find alternatives and variations of food that are suitable and preferred by toddlers (Wakkary & Hutapea, 2025a). By processing purple sweet potatoes into cookies as a supplementary food, this can be an innovative solution in the PMT-Pemulangan program. Purple sweet potatoes can be a source of vitamins and minerals, including vitamin A, vitamin C, thiamin (vitamin B1), and riboflavin (Ranteallo et al., 2023).

Previous research by Simamora et al. (2024) has identified various contributing factors to stunting in Humbang Hasundutan Regency, including the importance of providing a balanced diet. In line with the research (Brahmana et al., 2021), the most dominant factor in the incidence of stunting in toddlers in Marbun Tonga Village, Marbun Dolok, Baktiraja District, Humbang Hasundutan Regency is knowledge with an exponent (β) of 4.558 which is greater than the exponent (β) of the parenting pattern, socio-economics and breastfeeding variables. Several

previous studies have also demonstrated the potential of sweet potato processing as a complementary food to improve the nutritional intake of toddlers. Adetola et al., (2021) developed two types of sweet potato-based complementary foods rich in vitamin A, iron, and zinc, as a local solution to micronutrient deficiencies in developing countries. Rahman et al. studied the use of purple sweet potatoes and moringa leaves as a base for nutritious biscuits with a high level of child acceptance. Meanwhile, (Masrurotullaily et al., 2024) developed purple sweet potato sponge cake as a supplementary food for pregnant and breastfeeding mothers and stunted toddlers in Sumberpakem Village. Although various sweet potato-based food innovations have been developed, research examining the long-term effectiveness of these locally processed products on the nutritional status of toddlers (Girard et al., 2021), particularly in a specific regional context like Humbang Hasundutan, is still limited. This indicates a gap in the evaluation of the impact of local food-based socialization interventions involving purple sweet potatoes on sustainably meeting the nutritional needs of stunted toddlers.

Processing purple sweet potatoes into cookies has the potential to contribute to achieving SDG 2 (health and well-being). Consuming purple sweet potato cookies as part of a basic food supplement (PMT) can help meet children's nutritional needs (Rahmawati et al., 2024). Integrating purple sweet potato cookies into daily diets can reduce the risk of malnutrition and hunger in children. This initiative, called Innovative Product Processing, focuses on understanding and utilizing the potential of purple sweet potatoes in a health context, particularly in the provision of supplementary feeding and nutrition education in Simangulappe Village, Baktiraja District. The success of this approach is expected to serve as an inspiring example for other communities in adopting sustainable practices, which will ultimately contribute to improving overall quality of life and strengthening independent capacity in managing their own health.

RESEARCH METHOD

This research problem-solving approach uses a quantitative approach with a one-group pretest-posttest design within a quasi-experimental framework. The primary strategy formulated to address stunting is through educational interventions and direct practice with mothers of toddlers aged 1–5 years regarding the use of purple sweet potato as a nutritious local food ingredient. This education is conducted through demonstrations on how to process healthy supplementary foods from purple sweet potato, tailored to children's tastes and considering practical aspects for housewives. The expected outcome of this study is a significant increase in mothers' knowledge and skills in processing purple sweet potato into nutritious supplementary foods for toddlers, which is ultimately expected to serve as a preventative measure in meeting toddlers' nutritional needs. The population in this study was all productive-age mothers in Simangulappe Village, Baktiraja District, Humbang Hasundutan Regency, totaling 98 people in 2025. The research sample was determined with the criteria of mothers with toddlers aged ≤ 2 years, totaling 35 mothers.

The type of research used was a quasi-experimental study, which involves conducting an intervention (treatment) on the research subjects to determine the changes after the intervention. This quasi-experimental study used a one-group pretest-posttest design. The first observation (pre- test) was conducted, allowing the researcher to examine the changes that occurred by administering a questionnaire to respondents (post-test) after the intervention, which provided an understanding of purple sweet potato processing. However, this design did not include a control group because we wanted to measure the knowledge and skills of mothers before and after practicing or demonstrating the processing of purple sweet potatoes into cookies with assistance.

The variables used were the activities or interventions, including mothers' understanding and skills in utilizing/processing purple sweet potatoes to meet toddlers'

nutritional needs, as the independent variable, and knowledge and skills in processing purple sweet potatoes as the dependent variable. Knowledge was measured using a questionnaire containing 15 statements, and skills using 15 statements, using an ordinal scale. To assess the quality of the questionnaire research instrument, validity and reliability tests were conducted on 30 respondents who had toddlers in Pakkat Dolok village, using questions that had been declared valid in the validity test and whose reliability would be determined. Data collection was conducted in several stages, starting with research preparation and obtaining respondent consent. The first stage involved a pre- test to determine mothers' knowledge and skills in processing purple sweet potatoes. The second stage involved a processing intervention conducted on the same day as the pre-test. The intervention lasted approximately 100 minutes, followed by practical guidance for respondents for approximately 120 minutes. The third stage involved a post-test, conducted three days after the intervention (treatment), by completing a questionnaire and practicing processing sweet potatoes.

Next, the questionnaire was developed and validated, as were the pre-test, intervention, and post-test. The instruments used included practical materials, an identity questionnaire, and a knowledge and skills questionnaire. Data were analyzed through editing, coding, data entry, cleaning, and scoring. Univariate analysis was used to describe respondent data, while bivariate analysis examined relationships between variables. The Kolmogorov-Smirnov normality test was used to determine the type of follow-up test. If the data were normally distributed, a paired sample t-test was used; if not, a Wilcoxon test was used. Differences in pre- and post-treatment scores were analyzed to measure the effectiveness of the purple sweet potato processing intervention on mothers' knowledge and skills in preparing healthy food for toddlers. The number of respondents who actively participated in the pre- and post-research was 35 people. The first stage was a pre-test to measure mothers' knowledge and skills in processing purple sweet potatoes into cookies. Next, education was carried out on optimal growth and development with balanced nutrition for toddlers and processing purple sweet potatoes into cookies, followed by one demonstration of processing purple sweet potatoes into purple sweet potato cookies and a redemonstration for all participants, which was assessed by the resource person and the results of filling out the post-test. This research was conducted from March to August 2025.

RESULTS AND DISCUSSIONS

The results of the study on optimizing the use of local purple sweet potato as a food ingredient in the production of healthy food for toddlers are as follows: The characteristics of respondents in this study include age, education, and occupation. The following is a frequency distribution table of the characteristics of the respondents in this study:

Table 1. Respondent Characteristics

Respondent Characteristics	Category	Distribution	
		F	%
Education	Primary Education	23	65,7
	Higher Education	12	34,3
Mother's Age	21-30 Years	14	40
	>30 Years	21	60
Mother's Occupation	Farmers	15	42,9
	Civil Servant	6	17,1
	Self-Employed	11	31,4
	Housewife	3	8,6

The results in Table 1 show that the characteristics of respondents by category: the majority of respondents had a primary education (65.7%), the majority of respondents were over 30 years old (60%), and the majority of respondents worked as farmers (42.9%).

Univariate analysis was conducted to present data from several variables in the form of a frequency distribution table, including knowledge and skills. Based on the research results, the collected data was entered into a tabular presentation to simplify each variable being studied. The results of the data collection conducted through questionnaire distribution are shown in the following table:

Table 2. Respondents' Knowledge and Skills Before and After Treatment

	N	Minimum	Maximum	Mean	Std. Deviation
Knowledge					
Pretest	35	4	10	7.0571	1.66173
Posttest	35	5	10	7.8286	1.42428
Skill					
Pretest	35	5	15	9.4857	2.52483
Posttest	35	9	15	12.4286	1.71988

The table shows that the descriptive analysis of the research data shows the results before and after treatment. The minimum score for knowledge before the practice was 4 and the maximum score was 10. For knowledge after the practice, the minimum score was 5 and the maximum score was 10. For the skill variable, the minimum score before the practice was 5 and the maximum score was 15, and for skill after the practice, the minimum score was 9 and the maximum score was 15. There was a significant difference in the scores for knowledge and skills.

Data normality was tested using the One Sample Kolmogorov-Smirnov test using computer software. This test was conducted to determine whether the data were normally distributed before proceeding to the difference test.

Table 3. Normality Test Table

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Pretest knowledge	.143	35	.101
Posttest knowledge	.148	35	.062
Pretest skill	.091	35	.325
Posttest skill	.173	35	.051

The table above shows that the knowledge and skills data before and after the purple sweet potato cookie making practice were normally distributed. The significance value for the knowledge pretest was 0.101, the knowledge posttest was 0.62; and the significance value for the skills pretest was 0.325, and the skills posttest was 0.051. These significance values (sig) are greater than α 0.05, thus concluding that the data in this study are normally distributed. The interpretation of the paired samples statistics table in this study is as follows:

Table 4. Paired Samples Statistics Table

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest knowledge	7.0571	35	1.66173	.28088
	Posttest knowledge	7.8286	35	1.42428	.24075
Pair 2	Pretest skill	9.4857	35	2.52483	.42677
	Posttest skill	12.4286	35	1.71988	.29071

From the data output from 35 respondents, the average pretest knowledge score was 7.0571 < posttest knowledge score of 7.8286, indicating a descriptive difference in average knowledge between the pretest and posttest. The average pretest skills score was 9.4857 < posttest practice score of 12.4286, indicating a descriptive difference in average skills between the pretest and posttest.

To determine whether the difference is significant, a paired sample t-test will be conducted, as shown in the Paired Samples Test output table.

Table 5. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest knowledge & Posttest knowledge	35	.812	.000
Pair 2	Pretest skill & Posttest skill	35	.465	.005

The results in the table show the correlation test, or relationship, between the pretest and posttest data. Based on the results, the correlation coefficient for knowledge is 0.812 with a significance value (sig) of 0.000. A sig value of 0.000 < a probability of 0.05, thus concluding that there is a significant difference between the respondents' knowledge in the pretest and posttest. The correlation coefficient for skills is 0.465 with a significance value (sig) of 0.005, and a sig value of 0.005 < a probability of 0.05, thus concluding that there is a significant difference between the mothers' skills in the pretest and posttest.

Table 6. Pair Table

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pretest knowledge Posttest knowledge	-.77143	.97274	.16442	-1.10558	-.43728	-4.692	34	.000
Pair 2	Pretest skill Posttest skill	-2.94286	2.30016	.38880	-3.73299	-2.15272	-7.569	34	.000

Based on the output table above, it is known that the sig. (2-tailed) value for knowledge is 0.000 < 0.05 and for skills is 0.000 < 0.05, indicating a significant difference between knowledge and skills before and after the purple sweet potato processing experience. There was an increase in respondents' knowledge and skills after the purple sweet potato processing experience.

Based on the research results, there were 35 toddlers, 3 of whom had stunting, living in Simangulappe village. Purple sweet potato processing included a demonstration of supplementary food cooking. The main ingredient for making cookies is purple sweet potato, which is readily available in the Simangulappe village community. This research activity is considered very important as it provides the community, especially mothers with toddlers, with the opportunity to prepare nutritious food for their children in Simangulappe Village. The participating mothers were very enthusiastic about participating in the healthy food cooking demonstration.

The data processing results revealed a significant difference between knowledge and skills in preparing healthy food before and after the purple sweet potato processing practice, with a significance value of 0.000 < 0.05. Sweet potatoes have good potential to be developed as a staple food, primarily due to their complete nutritional content, including carbohydrates, fat, protein, water, crude fiber, vitamins, minerals, anthocyanins, and

antioxidant compounds (Maharani et al., 2023). This research aligns with the article by (Zulfiana et al., 2025) in the Proceedings of the National Seminar on Discussion, which states that one effort that can be made to increase public insight into nutritionally balanced food intake is through cooking demonstrations One of the successes of cooking demonstrations is providing information through face-to-face interaction using real-life media or through direct examples (Putri et al., 2023). Cooking demonstrations are used to improve food quality and change behavior (Hasan et al., 2019). Cooking demonstrations are also a nutritional education format that can be applied to increase toddler weight and have been proven effective in influencing toddler weight (Wangi & Nurus Sakinah, 2023).

Mothers' knowledge of nutrition is directly related to toddlers' nutritional status (Jamila et al., 2024). Inadequate maternal knowledge will negatively impact and contribute to stunting in toddlers (Hasnawati et al., 2021). This is because mothers who lack adequate knowledge about the importance of balanced nutrition tend to be unable to provide adequate food intake for their toddlers, resulting in inadequate protein, vitamins, and minerals essential for their growth and development (Silva et al., 2023).

Researchers believe that health education, including demonstrations, is highly effective because mothers can replicate what has been explained or seen (Nurhayati et al., 2023). This method serves as a learning tool or medium for conveying health information to convey important information (Ginting et al., n.d.) Improving maternal knowledge includes: increasing mothers' knowledge and awareness of providing supplementary foods, increasing mothers' knowledge of child feeding practices, increasing mothers' knowledge of the importance of fruit and vegetable intake, as well as animal and plant proteins for nutritional fulfillment, and increasing mothers' knowledge of providing balanced nutrition for toddlers (Wakkary & Hutapea, 2025b).

According to researchers, practical food processing methods can stimulate two senses, namely the eyes and ears, simultaneously producing imagination in imitation so that mothers are more focused on the practice given (Ifyati & Inganah, 2025). Conveying through words alone is very ineffective or at the lowest intensity. The use of practical/demonstration methods is an experience of one of the principles of the Health Education process. Practice/demonstration is very helpful in conveying information about balanced nutrition processing for toddlers to mothers so that the information can be conveyed more clearly and precisely (Asykari et al., 2023). In accordance with the research (Zuraidah et al., 2025) results of the cookie processing demonstration activity, based on the organoleptic assessment observations carried out, it can be seen that the processed products obtained from the processing practices carried out by the target group: are appropriate and adequate. Demonstrations also explain an object that can be given, for example, food consumed contains carbohydrates, protein, minerals and so on. The level of knowledge and skills of mothers regarding nutritional processing is one factor that can influence the occurrence of stunting in toddlers (Maharani et al., 2023). Increased knowledge occurs due to the willingness of mothers to follow and understand stunting prevention efforts (Marlina et al., 2025). This practice is also part of the management of diseases/health problems carried out as a support for medical/conventional treatment or as an alternative treatment outside of conventional medical treatment.

This research is expected to produce an innovative product in the form of purple sweet potato-based cookies that can be used as supplementary food for toddlers. Strategically, the research results will make a real contribution to efforts to achieve the Sustainable Development Goals (SDGs), particularly goal two, namely ending hunger and improving food security. Furthermore, this research promises direct benefits for the Health Office and the Child Development and Family Planning Office, both in strengthening specific nutrition interventions

and in developing evidence-based educational materials for the Toddler Family Development (BKB) program.

CONCLUSION

The research results showed that training in local food processing, specifically making purple sweet potato cookies, significantly improved mothers' knowledge and skills in utilizing nutritious local food ingredients. This increased knowledge was reflected in mothers' understanding of the nutritional value of purple sweet potatoes, processing methods that maintain nutrient content, and the importance of food variety in toddlers' diets. Furthermore, improved skills were evident in mothers' ability to independently practice making purple sweet potato cookies using correct and hygienic procedures. The potential for sustainable improvement in this knowledge and skills is significant, given that purple sweet potato raw materials are readily available locally, the processing process is simple, and the resulting product is popular with children. This allows mothers to continue practicing these skills at home and potentially even develop small businesses based on local foods. Thus, this practice not only improves mothers' nutritional literacy but also supports family food self-sufficiency. Indirectly, increasing mothers' knowledge and skills in processing nutritious local foods has the potential to improve the nutritional status of toddlers. By increasing the frequency of consumption of nutritious snacks made from purple sweet potatoes, which are rich in fiber, vitamins, and antioxidants, toddlers receive additional, high-quality nutritional intake. With the continuation of this practice, it is hoped that there will be improvements in the overall food consumption patterns of toddlers, which in the long term can have a positive impact on their nutritional status.

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