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# Evaluation of the Effectiveness of Local Food-Based Supplementation (*Pemberian Makanan Tambahan*) in Improving the Nutritional Status of Underweight Children under Five at a Public Health Center

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## ABSTRACT

**Background:** Malnutrition in children under five is a major public health concern in Indonesia. The government's Supplementary Feeding Program or *Pemberian Makanan Tambahan* (PMT) aims to improve nutritional status, but its effectiveness needs further evaluation, especially in areas with persistent undernutrition.

**Objectives:** This study aimed to evaluate the effectiveness of the local PMT intervention in improving the nutritional status of undernourished children under five years old.

**Method:** An experimental one-group pre- and post-test design with a cross-sectional approach was used. The Wilcoxon Signed Rank Test facilitated statistical analysis. The study involved a total sample of 50 respondents who received locally sourced supplementary food over 60 days.

**Results:** The study included 50 respondents, with a majority being male (26 toddlers, 52%) and female (24 toddlers, 48%). The findings revealed a statistically significant improvement ( $p < 0.001$ ) in the children's nutritional status, demonstrating the positive impact of the PMT intervention.

**Conclusion:** Although the PMT program effectively enhanced nutritional status, its success is influenced by factors like adherence to dietary guidelines, parental involvement, and education. Integrating nutrition education and regular health monitoring is crucial to sustain long-term nutritional improvements in children.

**Keywords:** PMT, Stunting, Nutrition, Local Food

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## INTRODUCTION

Malnutrition among children under five remains a pressing global health challenge, undermining optimal growth and the achievement of public health goals. Despite extensive international efforts, improving nutrition in young children—particularly in low- and middle-income countries—continues to be a critical priority. According to the World Health Organization (2025), stunting is the most prevalent form of malnutrition in this age group. Caused by chronic nutritional deficiencies, stunting impairs linear growth and affects approximately 150 million children worldwide as of 2024, underscoring its widespread severity. Beyond restricting physical development, stunting negatively influences cognitive capacity, school

performance, and future economic productivity. If not addressed early, its effects are often irreversible, perpetuating cycles of poverty and poor health across generations (Vaozia, 2016).

In Indonesia, findings from the National Nutrition Status Survey (SSGI) indicate that undernutrition among children under five remains a significant concern, although notable progress has been achieved. The national stunting rate declined from 37.6% in 2013 to 30.8% in 2018, and further to 21.6% in 2022. These improvements reflect the impact of effective policies and community-based interventions, including enhanced health education, expanded access to maternal and child health services, and targeted nutrition programs. Nevertheless, Indonesia has not yet reached its target of reducing stunting to 14% by 2024, highlighting persistent challenges in ensuring adequate and nutritious food intake for vulnerable populations.

Children suffering from caloric deficiency, poor diet, or inadequate feeding practices are at heightened risk of stunting, which compromises physical growth and long-term cognitive, educational, and economic outcomes. Evidence from Malawi demonstrates that exclusive breastfeeding during the first six months is associated with improved height and reduced risk of underweight (Kuchenbecker et al., 2015). Undernutrition also weakens immune function, increasing susceptibility to infections (Maulidah & Duvita Wahyani, 2020; Jalilah et al., 2022). Left unaddressed, undernutrition diminishes the future workforce by limiting individuals' physical and cognitive abilities, thereby constraining national development. As emphasized by Masnah and Saputri (2020), tackling undernutrition represents a strategic investment in a nation's resilience and productivity. Early detection, targeted interventions, and sustainable community-based programs are essential to improving child nutrition and achieving national health objectives.

The government's Supplementary Feeding (PMT) program seeks to enhance nutrition among children under five by providing locally sourced foods that promote community participation and strengthen food security (Naelasari & Nurmaningsih, 2022; Sofais et al., 2019). Program success depends on several factors, including the quality of ingredients, accurate targeting, timely distribution, adequate infrastructure, sufficient funding, and the availability of skilled health workers (Amala & Ruhana, 2023). Despite these efforts, program outcomes remain uneven. Recent data reveal that undernutrition persists, with a 6.9% underweight prevalence in Buleleng, Bali (SSGI, 2024). At one Public Health Center, the local PMT initiative attempts to address this issue using community resources; however, limited evaluation data hinder a full understanding of its effectiveness. Routine monitoring and systematic data collection are therefore essential to assess program outcomes and guide improvements. This study evaluates whether the local PMT program improves the nutritional status of children under five in Banjar 1 over a 60-day period. The findings provide evidence to strengthen future nutrition strategies and inform regional health policies.

## **METHODS**

### **Study Setting and Duration**

This study was conducted across four villages within the service coverage area of Community Health Center Banjar 1, which serves as the primary health facility for these communities. The research was carried out over a 60-day period, beginning in August 2024 and concluding at the end of September 2024. This timeframe was chosen to allow sufficient observation of participants throughout the intervention.

### **Study Design**

A quasi-experimental one-group pre-test and post-test design was employed. This design is widely accepted for evaluating intervention effectiveness in real-world settings, as it enables measurement of outcomes in the same group before and after the intervention. Direct comparisons between pre- and post-intervention data allowed identification of changes attributable to the program.

### **Population and Sampling**

The study population consisted of all toddlers aged 6 to 59 months who were actively enrolled in the local Supplementary Feeding Program (Program Makanan Tambahan/PMT) facilitated by Community Health Center Banjar 1 during the research period. A total of 50 toddlers met the inclusion criteria and were included in the study. To ensure representativeness, a total sampling technique was applied, whereby all eligible participants were selected. This approach allowed comprehensive coverage and enabled detailed description of both baseline characteristics and post-intervention outcomes.

### **Data Collection**

Data were collected at two defined points in time, before and after the intervention, using a cross-sectional approach. Primary data included demographic and anthropometric information such as name, age, gender, body weight, and height, which were essential for assessing nutritional status using standardized growth indicators. Secondary data sources, including medical records and official PMT program documentation, were also reviewed to provide contextual support and validate primary findings. These documents included records of target recipients and compiled weight and height data before and after the program. The integration of primary and secondary data strengthened the validity and depth of the analysis.

### **Outcome Measures**

The primary outcome measure was the nutritional status of toddlers, assessed through changes in weight and height before and after the 60-day PMT intervention. Improvements in these indicators were interpreted as evidence of positive growth and health outcomes.

### **Statistical Analysis**

A descriptive analytical framework was applied, consisting of both univariate and bivariate analyses. Univariate analysis was used to describe demographic characteristics such as age, gender, and nutritional status before and after the intervention, with nutritional status assessed using weight-for-height (BB/TB) indicators. Bivariate analysis was conducted to examine differences between pre- and post-intervention outcomes. The Wilcoxon Signed-Rank Test, a non-parametric test, was employed to determine whether statistically significant differences existed in weight and height measurements before and after the intervention. This test was

appropriate given the paired nature of the data and the ordinal measurement scale. To assess normality of the data distribution, the Kolmogorov–Smirnov test was applied, as the sample size exceeded 30, making it suitable for evaluating normality in larger samples (Adiputra et al., 2021). The results of these analyses provided the foundation for interpreting the effectiveness of the PMT program in improving child nutrition within the study population.

**RESULTS**

Table 1 presented the age distribution of respondents who received local PMT in the Banjar 1 Health Center area. None of the toddlers (0%) were aged 6–11 months, 1 toddler (2%) was aged 12–23 months, 14 toddlers (28%) were aged 24–35 months, 15 toddlers (30%) were aged 36–47 months, and 20 toddlers (40%) were aged 48–59 months, resulting in a total of 50 toddlers who received the intervention.

**Tabel 1.** Age Distribution of Respondents Receiving PMT with Local Food in the Working Area of Banjar 1 Community Health Center.

Age (Months)	Frequency	Percentage
6-11	0	0%
12-23	1	2%
24-35	14	28%
36-47	15	30%
48-59	20	40%
<b>Total</b>	<b>50</b>	<b>100%</b>

Table 2 presented the gender distribution of respondents who received local food-based PMT in the Banjar 1 Community Health Center working area. The respondents consisted of 26 male toddlers (52%) and 24 female toddlers (48%). This finding showed that the gender distribution of respondents was relatively balanced, providing a proportional representation between male and female groups in evaluating the impact of PMT provision.

**Table 2.** Gender distribution of respondents who received PMT with local food in the Banjar 1 Community Health Center Working Area

Variable	Pain Scale	P
BMI	r = 0. 654	0.001**
Age	r = 0. 130	0.676
Gender	r = 0. 009	0.876
Osteoporosis	r = 0.552	0.002**
Type of surgery	r = 0.691	<0.001*

Table 3 presented the distribution of the nutritional status of respondents before receiving the intervention in the form of PMT with local food in the Banjar 1 Community Health Center working area. All respondents in this study were categorized as undernourished, namely 50 toddlers (100%). This result illustrated that prior to the implementation of the PMT program, all toddlers experienced nutritional problems that required treatment.

**Table 3.** Distribution of the Nutritional Status of Respondents Before Receiving PMT with Local Food in the Banjar 1 Community Health Center Working Area

Nutritional Status	Frequency	Percentase
Lack of Nutrition	50	100%
<b>Total</b>	<b>50</b>	<b>100%</b>

Table 4 presented the distribution of the nutritional status of respondents after receiving the intervention in the form of supplementary feeding (PMT) with local food in the Banjar 1 Community Health Center working area. Of the total 50 toddlers, 36 (72%) experienced improvement in nutritional status and were categorized as having good nutrition, while 14 (28%) remained in the undernourished category. This finding indicated that most respondents showed improvement in nutritional status after the intervention.

**Table 4.** Distribution of Respondents' Nutritional Status after Receiving PMT with Local Food in Banjar 1 Community Health Center Working Area

Nutritional Status	Frequency	Percentase
Lack of Nutrition	14	28%
Good Nutrition	36	72%
<b>Total</b>	<b>50</b>	<b>100%</b>

The results of the Wilcoxon Signed-Rank Test showed that the p-value was less than 0.05, signifying a significant difference in nutritional status before and after the provision of supplementary food (PMT) for underweight toddlers at Community Health Center Banjar 1. These results confirmed that there were differences in nutritional status values based on the BB/TB index before and after supplementary feeding with local food over the 60-day period.

**Table 5.** Comparison of Respondents' Nutritional Status Before and After Receiving PMT with Local Food in the Banjar 1 Health Center Working Area Based on the Wilcoxon Signed Rank Test

Nutritional Status (BB/TB)	Before PMT		After PMT		Value (p)
	n	Percentage	n	Percentage	
Lack of Nutrition	50	100%	14	28%	<0.001
Good Nutrition	0	0%	36	72%	

### DISCUSSION

Based on the results of the current study, it was found that the majority of toddlers who received Supplementary Feeding (PMT) from local food sources within the operational area of Community Health Center Banjar 1 were in the older age groups, specifically between 48 and 59 months, which accounted for 40% of the total respondents. This was followed by children aged 36 to 47 months (30%) and those between 24 and 35 months (28%). In contrast, only a small proportion—2%—were between 12 and 23 months of age, and notably, none of the participating toddlers were between 6 and 11 months of age.

These findings clearly suggest that the local PMT program is more heavily accessed by or oriented toward children aged 12 to 59 months. This age distribution likely reflects practical and developmental considerations, as toddlers in this age range are generally more active in community-based programs such as posyandu (integrated service posts), and are also physiologically and developmentally prepared to consume a greater variety of local solid foods prepared as PMT. This makes them ideal beneficiaries for community-based feeding interventions using regionally available food resources.

Furthermore, the study highlights that among the several factors influencing the nutritional status of children aged 1 to 5 years, one of the most critical is the mother's involvement in posyandu activities (Putri & Sudarmilah, 2020). Maternal participation plays a pivotal role in ensuring children receive adequate nutrition, as it provides mothers with knowledge and guidance regarding appropriate feeding practices, the importance of balanced nutrition, and ways to support healthy growth and development (Weder et al., 2019). Mothers who actively participate in posyandu are more likely to have a better understanding of nutritional needs, meal preparation, and health-seeking behaviors, which directly contributes to improved nutritional outcomes for their children (Purnasari & Susindra, 2022). This is consistent with the findings of Wati (2020), who emphasized the importance of maternal engagement and health education in achieving and maintaining optimal nutritional status among young children.

The distribution of respondents by gender in this study was relatively balanced, with male toddlers accounting for 52% of the sample and female toddlers comprising 48%. This slight difference in proportions is statistically minor and reflects a satisfactory gender representation within the study population. Such balance is important in research involving nutritional interventions, as it allows for a more comprehensive and equitable assessment of any potential differences in response between boys and girls (Sambo et al., 2020). According to Merkiel-Pawłowska & Chalcarz (2017), biological and physiological differences between gender may influence how children respond to dietary changes or nutritional interventions; thus, a gender-balanced sample strengthens the reliability and relevance of findings across both groups. Moreover, the balanced gender distribution enhances the generalizability of the study's outcomes, particularly in the context of regional nutrition programs that aim to serve all children regardless of gender. This demographic parity ensures that the insights gained from the study can be applied broadly to the wider population of young children within the Banjar 1 service area and potentially to similar populations in comparable rural health settings.

In addition to gender distribution, another key finding of the study was that 100% of participating children were identified as undernourished prior to receiving the local food-based Supplementary Feeding (PMT) intervention. This is also directly proportional to the data from UNICEF that one-third of children who are undernourished are under the age of 3 years (Hosang et al., 2017). This indicates a uniform state of nutritional deficiency among all participants, underscoring the urgency of implementing timely and appropriate nutritional support (Sulistiyorini & Sandy, 2021). The identification of universal undernutrition among respondents points to a broader systemic issue within the region, and this is consistent with prior

health reports from Community Health Center Banjar 1, which have documented a high prevalence of undernourished children within its jurisdiction. Given this nutritional vulnerability, it is imperative that interventions be both immediate and contextually relevant. While short-term strategies such as the provision of calorie-dense, locally sourced PMT are essential for addressing acute nutritional deficits, there is also a pressing need for long-term, sustainable solutions. These should include community education on child nutrition, promotion of balanced diets using local food sources, and continuous monitoring of growth and development.

Engaging local families and community stakeholders in the planning and implementation of these interventions is essential. Their involvement not only increases program adherence and cultural acceptability but also fosters a sense of ownership that is vital for the sustainability and long-term success of nutrition programs. By combining immediate supplementation efforts with educational and community-driven initiatives, public health stakeholders can work toward meaningful and lasting improvements in the health and well-being of children in the Banjar 1 health center's service area.

The statistical analysis conducted using the Wilcoxon Signed Rank Test revealed a p-value of 0.000 ( $p < 0.05$ ), indicating a statistically significant difference in the nutritional status of toddlers before and after the 60-day intervention with Supplementary Feeding (PMT) based on local food sources. This result demonstrates that the intervention had a meaningful impact on the health outcomes of the participating children.

At the beginning of the study, 100% of the respondents were categorized as undernourished based on their Body Weight-for-Height (BB/TB) index. However, following the 60-day PMT intervention, there was a notable improvement: 72% of the children showed progress and were reclassified as having a normal (good) nutritional status, while the remaining 28% continued to be classified as undernourished. This shift reflects a substantial improvement and suggests that the locally sourced PMT was effective in improving nutritional outcomes for a majority of the children involved.

These findings align with previous studies, including research by Yosefa (2022), which confirmed that the provision of PMT using local ingredients positively influences the nutritional status of toddlers, particularly those categorized as underweight. High protein content is the key to weight gain in children under five (Chandradewi, 2015). Examples of foods that are high in protein and easy to obtain are milk and eggs, which can be the main ingredients in supplementary feeding (Sugiyono et al, 2017). The consistency between current and prior findings reinforces the potential of local PMT interventions as viable, community-based strategies for tackling undernutrition in early childhood, particularly in resource-limited or rural settings where access to commercial supplements may be constrained.

However, it is important to acknowledge that 28% of the participants did not experience a sufficient nutritional improvement after the intervention period. This suggests that while the PMT intervention demonstrated effectiveness for most, it may not be adequate as a standalone solution for all cases of undernutrition. Several additional factors may contribute to the limited response in some children, including

but not limited to: duration of the intervention, level of compliance with food consumption, presence of comorbidities or underlying health conditions, and variations in parenting practices or feeding behavior at home (Siswati et al., 2022);(Panjaitan et al., 2019).These variables highlight the complex and multifactorial nature of nutritional recovery in young children.

Furthermore, parental education and the knowledge and skills of community health cadres are also considered critical components influencing the success rate of local PMT programs. As noted by (Ramadhania et al., n.d.), increased awareness and understanding among caregivers about the importance of nutrition, feeding practices, and monitoring growth can significantly enhance the impact of supplementation programs. Cadres, as the frontline implementers, must also be equipped with adequate training and support to guide and motivate families effectively.

Therefore, while the current intervention has shown promising results, it is recommended that future PMT programs incorporate a more comprehensive, integrated approach. This may include educational components for parents, routine health screenings, and individualized follow-up, in addition to food supplementation. By combining nutritional interventions with behavior change communication and continuous health monitoring, such programs can maximize their impact and better address the persistent challenges of childhood undernutrition in the community.

## **CONCLUSION**

The results of this study showed that supplementary feeding (PMT) made from local food for 60 days proved to produce significant differences in the nutritional status of underweight toddlers based on the Wilcoxon Signed Rank Test ( $p < 0.05$ ). These findings indicate that implementing PMT can effectively improve the health and growth of vulnerable children, suggesting that local food resources can be leveraged to address malnutrition in similar populations. The long-term effects of such interventions on child development and overall well-being require further research.

## **CONFLICT OF INTEREST**

The authors stated there is no conflict of interest in this study.

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