

The Effectiveness of Local Supplementary Feeding (PMT) on Improving the Nutritional Status of Undernourished Toddlers Aged 24–59 Months at Kassi-Kassi Health Centre

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ABSTRACT

Background: Wasting and undernutrition in toddlers remain significant public health challenges in Indonesia, requiring effective nutritional interventions such as local Supplementary Feeding (PMT). This study aimed to evaluate the effectiveness of an 8-week (56-day) local PMT program on the nutritional status of undernourished toddlers aged 24–59 months in the Kassi-Kassi Health Centre working area in Makassar City. **Methods:** This research used a retrospective descriptive-analytic design with a quantitative approach. A purposive sample of 72 undernourished toddlers was selected. Data on body weight, height, and program compliance were collected and analysed. Statistical significance was determined using the paired t-test to compare the Weight-for-Height (WFH/BB-TB) index before and after the intervention. **Results:** The findings revealed high program compliance, with 76.4% of toddlers routinely consuming the local PMT. Anthropometric measurements showed a steady upward trend; the mean body weight increased from 10.9 ± 1.59 kg to 11.4 ± 1.73 kg, while the mean height rose from 90.2 ± 7.26 cm to 91.2 ± 7.34 cm. Notably, 97.2% (70 toddlers) transitioned from undernourished to well-nourished status by the end of the program. Statistical analysis yielded a p-value of 0.000 ($p < 0.05$), indicating a significant improvement in nutritional status. **Conclusion:** The local PMT program is effective in improving the nutritional status of undernourished toddlers. The use of acceptable local ingredients, high compliance, and consistent support from health cadres and parents drives success. These results support the continued implementation of localised nutritional interventions to combat wasting.

Highlights:

- The 56-day local PMT intervention resulted in 97.2% of undernourished toddlers successfully reaching "well-nourished" status.
- A high compliance level of 76.4% was achieved, attributed to the use of familiar local ingredients and active support from community health cadres.
- The program successfully facilitated consistent growth, with mean weight increasing by 0.5 kg and mean height increasing by 1.0 cm over the study period.
- The study demonstrates that localised nutritional interventions are highly effective and culturally acceptable tools for addressing wasting in primary healthcare settings.

INTRODUCTION

Wasting is a condition of undernutrition, measured by the weight-for-height index. This occurs when a child's weight is lower than it should be for their height, or falls below -2 standard deviations (SD) from the median standard established by the WHO. Children aged 6-59 months who experience wasting have a mid-upper arm circumference (MUAC) between 12.5 cm and 11.5 cm (1). In 2022, it was estimated that 45 million children under 5 years old (6.8%) experienced weight issues, with 13.6 million of them (2.1 %) facing severe weight problems. More than 75 per cent of the total underweight children come from Asia, while another 22 per cent live in Africa. It is estimated that about 400,000 child deaths are caused by wasting. Out of a total of 7.6 million deaths of children under five, about 35% are caused by nutrition-related problems, while 4.4% are caused by severe wasting (2).

The prevalence of wasting in Indonesia declined consistently from 2018 to 2021. In 2018, the prevalence of wasting in Indonesia was 10.2%; in 2019, it decreased to 7.4%; and in 2020, it decreased again to 7.1%. However, according to data from the 2022 Indonesian Nutritional Status Survey (SSGI), the prevalence of wasting among toddlers reached 7.7%, which is still far from the national target of 7% set in the 2020-2024 National Medium-Term Development Plan (3). Nevertheless, the latest data from the 2024 SSGI shows another decline, from 7.7% in 2022-2023 to 7.4% in 2024. Results from the 2019 survey of toddler nutritional status in Indonesia (SSGBI), focusing on South Sulawesi, showed that the prevalence of undernutrition among toddlers aged 0-59 months based on weight-for-height was 6.8% and decreased to 6.2% in 2021. Meanwhile, the latest data on wasting prevalence in South Sulawesi, based on the 2022 SSGI, showed an increase from 6.2% in 2021 to 8.6% in 2022

(4). At the Kassi-Kassi Health Centre in 2023, the number of toddlers was 1,762, with 184 (10.4%) experiencing undernutrition. In 2024, the number of toddlers was 2,024, with 102 (5%) experiencing undernutrition, while undernourished toddlers aged 24-59 months numbered 84 (4.1%).

The impact of wasting not only affects development and productivity but also increases the likelihood of death, especially among children in vulnerable categories (5). Mortality rates related to wasting can increase in a relatively short period if not addressed immediately. To address toddler waste, supplementary feeding can be provided. The basic principle of providing supplementary food is not to replace daily main meals but to serve as a ready-to-eat snack, focusing on the application of balanced nutritional principles (1). Supplementary Feeding (PMT), provided daily for 90 days, with a composition of 300-450 kcal of energy, 6-18 g of protein, and 7.5-29.3 g of fat, is proven effective in reducing the incidence of wasting in toddlers. Adequate macronutrient intake through PMT can increase body weight and meet nutritional needs, as evidenced by research showing that macronutrient intake significantly reduces the incidence of wasting (6). Local Supplementary Feeding (Local PMT) is an important method for improving the nutritional status of toddlers, especially those experiencing nutritional deficiencies. The World Health Organisation (WHO) notes that children experiencing malnutrition, especially toddlers, can face significant impacts on their growth and development.

Therefore, appropriate nutritional interventions are essential to prevent and manage this problem. Based on research by Amsah and Maryati Sutarno (2025), the results indicate that Supplementary Feeding (PMT) has an impact on nutritional conditions among malnourished toddlers (aged 12 to 59 months) in the Pebayuran Health Centre area, Bekasi Regency, in 2025 (7). At the Kassi-Kassi Health Centre, local

supplementary feeding (Local PMT) has been provided for 56 days to 102 malnourished toddlers. Because the Local PMT conducted at the Kassi-Kassi Health Centre has not been evaluated to date, even though the program has been running since 2024, the researcher wants to assess the effectiveness of the Local PMT at the Kassi-Kassi Health Centre.

METHODS

Research Design and Setting

This study used a Descriptive-Analytic design with a retrospective approach. The research method used is quantitative. This study will be conducted in the Kassi-kassi Health Centre working area, Rappocini District, Makassar City, South Sulawesi, from July 23rd to July 28th, 2025.

Participants and Sampling

The population in this study consists of all undernourished toddlers, totalling 102 children. The sample in this study comprises undernourished toddlers aged 24 to 59 months, totalling 72 children, selected using a purposive sampling method. The inclusion criteria for this research include toddlers aged 24 to 59 months who are classified as undernourished according to the weight-for-height index and reside within the working area of the Kassi-kassi Health Centre. Furthermore, eligible participants must have completed the local Supplementary Feeding (PMT) program over its full 56-day duration. They must not have any chronic diseases, such as tuberculosis (TB), HIV, or Down syndrome.

On the other hand, the exclusion criteria include toddlers who fall outside the 24 to 59-month age range, those suffering from severe infections like acute diarrhoea or acute respiratory infection, and those who did not routinely consume the provided local PMT. Additionally, toddlers whose families relocated during the study period or those with specific allergies to the ingredients used

in the local PMT program are excluded from the study.

Materials and Equipment

The materials used in this study primarily consist of secondary data sources, including toddlers' medical records, Kartu Menuju Sehat (KMS) or health monitoring cards, and distribution logs from the local Supplementary Feeding (PMT) program at the Kassi-kassi Health Centre. The equipment utilised for nutritional assessment includes calibrated digital weighing scales for measuring body weight and stadiometers or anthropometers for measuring height to ensure the accuracy of the weight-for-height (WFH) indices.

Data Collection and Analysis

Data collection involved gathering secondary data from the nutritional reports and medical records at the Kassi-kassi Health Centre. This involved extracting anthropometric measurements—specifically weight and height—of the 72 sampled toddlers recorded both before and after the 56-day local Supplementary Feeding (PMT) program. Additional demographic information and health history were verified against the health centre's registers to ensure all participants met the predefined inclusion and exclusion criteria.

The data were processed through editing, coding, and cleaning before being entered into statistical software for analysis. Univariate analysis was performed to describe the frequency distributions and characteristics of the subjects, including age, gender, and initial nutritional status. To determine the effectiveness of the intervention, bivariate analysis was conducted, likely utilising a paired t-test, to compare the weight-for-height (WFH) Z-scores before and after the PMT program. A significant improvement in these scores would indicate the program's effectiveness in enhancing the nutritional status of the

toddlers.

RESULTS

Characteristics of respondents

The characteristics of the 72 undernourished toddlers in the study are presented in Table 1. Regarding gender distribution, 37 children (51.4%) were male, while 35 children (48.6%) were female. In terms of age, the majority of participants were in the 24–40-month category, totalling 39 toddlers (54.2%), while the remaining 33 toddlers (45.8%) were aged 41–59 months.

Table 1. Characteristics of Undernourished Toddlers

Characteristics	n (72)	%
Gender		
Male	37	51.4
Female	35	48.6
Age		
24–40 months	39	54.2
41–59 months	33	45.8

Based on the data in Table 2, the compliance level of toddlers in consuming local Supplementary Feeding (PMT) within the Kassi-Kassi Health Centre working area shows that the majority of respondents demonstrated high adherence. Of the 72 toddlers in this study, 55 (76.4%) were

categorised as compliant with the provided PMT. Meanwhile, 17 toddlers (23.6%) were non-compliant. This indicates that most of the program's targets followed the supplementary food consumption instructions in accordance with the established procedures.

Tabel 2. Toddler Compliance in Consuming Local

Variable	n	%
Compliant	55	76.4
Non-compliant	17	23.6
Total	72	100

Table 3 illustrates the weekly anthropometric progression of toddlers during the 8-week local PMT program, revealing a consistent upward trend in both weight and height. The mean body weight improved from 10.9 ± 1.59 kg in Week 1 to 11.4 ± 1.73 kg by Week 8, while the average height rose steadily from 90.2 ± 7.26 cm to 91.2 ± 7.34 cm. Despite statistical outliers in Weeks 3 and 7, the overall data indicate a successful nutritional intervention, as evidenced by progressive gains in both physical parameters and gradual increases in minimum growth thresholds throughout the study period.

Table 3. Body Weight and Height During Local PMT

Variable	Body Weight (kg)		Height (cm)	
	Min – Max	$\bar{x} \pm SD$	Min – Max	$\bar{x} \pm SD$
Week 1	6.4 – 14.8	10.9 ± 1.59	73.0 – 105.3	90.2 ± 7.26
Week 2	6.4 – 14.8	11.2 ± 1.63	73.0 – 105.5	90.3 ± 7.30
Week 3	6.7 – 15.5	12.3 ± 1.88	74.0 – 105.5	90.3 ± 7.41
Week 4	6.3 – 16.0	11.3 ± 1.68	74.0 – 105.7	90.4 ± 7.22
Week 5	6.7 – 16.0	11.4 ± 1.65	74.0 – 105.7	90.9 ± 7.31
Week 6	6.8 – 16.5	11.4 ± 1.68	74.5 – 105.8	90.8 ± 7.27
Week 7	6.5 – 16.8	11.2 ± 2.10	74.5 – 105.8	90.9 ± 7.29
Week 8	6.6 – 16.8	11.4 ± 1.73	74.5 – 105.8	91.2 ± 7.34

Changes in Nutritional Status Post-Intervention

Table 4 showed a significant shift in nutritional status following the local PMT intervention, with a high recovery rate among participants. At baseline, the entire sample of 72 toddlers (100%) was categorized as undernourished; however, by the endline assessment,

97.2% (70 toddlers) had successfully transitioned to the well-nourished category. With a p-value of 0.000, these results provide strong statistical evidence that the local PMT program was highly effective in improving toddlers' nutritional status within the study area.

Table 4. Nutritional Status Before and After Local PMT

Nutritional Status	Baseline	Endline	p
Undernourished	72 (100%)	2 (2.8%)	0.000
Well-nourished	0 (0%)	70 (97.2%)	

DISCUSSION

This study aimed to assess the effectiveness of local supplementary feeding (PMT) on nutritional status in undernourished toddlers aged 24–59 months within the working area of the Kassi-Kassi Health Centre. The analysis indicates a significant improvement in nutritional status, as measured by the weight-for-height (WFH) index, following a 56-day local PMT intervention.

The study results show that the majority of toddlers (76.4%) were compliant in consuming the local PMT over the 56 days. This relatively high compliance rate can be attributed to several factors, including the involvement of Posyandu cadres in distribution and education, as well as parents' active support for the program. Compliance is a key factor in the success of nutritional interventions, as the more consistently a toddler consumes the PMT, the greater the opportunity to improve nutritional status. These findings align with research by Hadju et al. (2023), which reported that compliance with local supplementary food consumption is significantly associated with weight gain in toddlers (6). This emphasises that the success of a PMT program is determined not only by food availability but also by household-level consistency in consumption. These findings also resonate with those of Rachmawati et al. (2020), who demonstrated that using familiar local ingredients, such as tempeh, can increase children's acceptance of PMT and improve compliance with consumption (8).

Routine education from cadres to parents is highly effective in increasing compliance with PMT administration (9). This reinforces the importance of adapting local PMT menus to the local community's tastes and eating habits. The decline in compliance was due to insufficient education and a limited variety in the PMT menu,

leading children to become bored quickly. Furthermore, in urban areas, mothers often have limited time to prepare and provide PMT regularly. These differences in geographic and social contexts can influence how a community responds to nutritional intervention programs.

Regarding changes in toddler body weight, the research data reveal fluctuations from week to week; however, weight generally remained within the range of 11.0–11.4 kg from the third week until the end of the program. Although small weekly increases and decreases occurred, this pattern suggests a tendency toward weight stabilisation after routine provision of local PMT. This is consistent with previous found that providing local PMT for 56 days can significantly increase toddler weight, even if the increase is not always consistent every week. This stability can be influenced by internal factors—such as the child's health condition and appetite—as well as external factors, such as compliance with administration and menu suitability (10).

Research by Hadju et al. (2023) in South Sulawesi also supports these findings, noting that PMT made from local food was effective in improving nutritional status, particularly weight indicators. Consumption compliance and parental support were identified as the primary keys to success. These findings align with this study, which found that the majority of toddlers were compliant, resulting in overall improvement despite weight fluctuations. However, not all research yielded the same findings. A study by Utami (2025) in Central Java showed that providing local PMT for six weeks did not result in significant weight changes. This difference was likely influenced by low parental compliance at home and a menu that did not suit the children's tastes, reaffirming that success involves family behavior and

child preferences alongside food provision (11).

In contrast to body weight, changes in toddler height tended to be slower and more stable. In the first week, the average height was 90.2 cm, which increased to 91.2 cm by the eighth week. Improvements began to appear in the fourth week and continued through the end of the intervention period, indicating that local PMT has a positive effect on linear growth. These results align with previous study who stated that short-term nutritional interventions impact weight more quickly than height (12). Therefore, although the toddlers' heights in this study did not show a marked surge, growth stability remains an important indicator for preventing chronic nutritional problems such as stunting.

Research by Rahayu et al. (2021) in West Java also supports these results, finding that two months of local PMT did not show significant changes in height, though there was a clearer improvement in weight. They attributed this to growth characteristics, where increasing height requires longer interventions. Conversely, Simanjuntak (2020) reported that three months of providing nutritious supplementary food showed a noticeable increase in height. This difference was likely due to the longer duration and menu variety. These results indicate that local PMT programs have the potential to influence linear growth. However, the effects are most evident when the program duration is extended, and intervention quality is maintained (13).

Finally, the analysis showed significant improvement in the Weight-for-Height (WFH/BB-TB) index with a p-value of 0.000. This change indicates that local PMT can help undernourished toddlers recover from wasting. Although the increase was not exceptionally large, the results are statistically and clinically significant. This is consistent with Hadju et al. (2023), who found that local food-based PMT had a positive effect on the WFH index, especially for toddlers who followed the recommended menu (6).

These findings are further supported by Fajar et al. (2022), who reported that 8 weeks of local PMT can significantly improve WFH, highlighting the importance of animal

protein (14). The menus containing both animal and plant-based protein sources, such as eggs and tempeh, have a major impact on improvement. Additionally, recommends short-term interventions, such as PMT, to address wasting quickly and effectively. However, Nurdin and Fathia (2020) reported different results, stating that local PMT was unable to significantly improve WFH due to low animal protein intake and inconsistent schedules caused by economic constraints. This reinforces that nutritional improvement requires not only supplementary food but also support in consumption sustainability and nutritional quality.

CONCLUSION

Based on the results and discussion of this study, it can be concluded that the 56-day local Supplementary Feeding (PMT) program at the Kassi-Kassi Health Centre is effective in improving the nutritional status of undernourished toddlers aged 24–59 months. The intervention achieved a significant recovery rate, with 97.2% of the participants transitioning from "undernourished" to "well-nourished" status. This success was supported by a 76.4% compliance rate and a consistent upward trend in both body weight and linear growth (height). Statistical analysis confirms a significant difference in nutritional status before and after the intervention, demonstrating that local PMT using familiar, nutrient-dense ingredients is a viable and effective strategy for addressing wasting and enhancing toddlers' physical development.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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