

Effectiveness of SEMPAS Supplementary Feeding in Improving Weight-for Height Status Among Wasting Children Under Five in East Martapura

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Abstract

Introduction: Wasting is an acute form of malnutrition characterized by low weight-for-height due to inadequate energy and protein intake, increasing the risk of impaired growth, morbidity, and mortality among children under five years of age. SEMPAS, a locally developed supplementary food made from fish, chicken, and vegetables, is rich in protein and essential nutrients that may support nutritional recovery. **Objective:** This study aimed to determine the effect of SEMPAS supplementary recovery feeding on the nutritional status of wasted children under five years of age in the East Martapura Community Health Center catchment area, Indonesia.

Method: A pre-experimental study using a one-group pretest–posttest design was conducted among five wasted children selected through purposive sampling. Nutritional status was assessed using the weight-for-height indicator before and after the intervention. **Results:** Before the intervention, all participants (100%) were classified as wasted. After receiving SEMPAS, 60% showed improvement and were no longer classified as wasted, while 40% remained wasted. **Conclusion:** SEMPAS supplementary feeding demonstrated potential benefits in improving the nutritional status of wasted children and may serve as an alternative locally sourced supplementary food in nutritional rehabilitation programs.

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Introduction

Wasting remains a major public health concern among children under five years of age worldwide. Wasting is a form of acute malnutrition characterized by low weight-for-height resulting from inadequate dietary intake, recurrent infections, or a combination of both. Children affected by wasting are at a substantially higher risk of impaired physical growth, delayed cognitive development, weakened immune function, and mortality than well-nourished children. Recent evidence indicates that wasting often begins during early infancy and continues to contribute significantly to the global burden of child undernutrition, particularly in low- and middle-income countries (Victora et al., 2021).

Despite considerable efforts to reduce child malnutrition, wasting continues to represent a significant public health challenge worldwide. Recent evidence indicates that acute malnutrition remains highly prevalent in low- and middle-income countries, where inadequate dietary intake, food insecurity, infectious diseases, and limited access to healthcare services contribute to poor nutritional outcomes among children under five years of age. Systematic review findings demonstrate that wasting remains one of the most common forms of undernutrition and continues to affect millions of children globally, particularly in vulnerable populations (Dassie et al., 2024).

In Indonesia, wasting continues to be a significant nutritional problem among children under five years of age. National survey data indicate that the prevalence of wasting remains a public health concern despite gradual improvements over recent years. Studies conducted using Indonesian nutritional surveillance data have reported that wasting is associated with inadequate dietary intake, infectious diseases, low socioeconomic status, and poor maternal and child health practices (Koritelu et al., 2024).

To address acute malnutrition, the Indonesian government has implemented Supplementary Recovery Feeding Programs aimed at improving energy and nutrient intake among undernourished children. Evidence suggests that nutrition interventions providing adequate energy, protein, and essential micronutrients can contribute to improved nutritional outcomes and support catch-up growth among children experiencing acute malnutrition (Vilar-Compte et al., 2025). However, the sustainability of such interventions depends on the availability of affordable, culturally acceptable, and locally sourced food products.

The utilization of local food resources has increasingly been promoted as a sustainable approach to nutritional rehabilitation, as locally available foods are generally more accessible, affordable, and culturally acceptable for communities while providing essential nutrients needed for child growth and development (Bezner Kerr et al., 2021). Locally produced supplementary foods can therefore contribute to improving dietary quality and nutritional outcomes among vulnerable populations. Foods derived from animal sources, such as fish and poultry, provide high-quality protein, essential amino acids, and bioavailable micronutrients that play a critical role in supporting growth, tissue repair, and immune function among young children (Eaton et al., 2019). Furthermore, when combined with vegetables, these foods can supply additional vitamins, minerals, and dietary fiber necessary for maintaining optimal nutritional status and supporting healthy growth and development (Cao et al., 2021).

SEMPAS (Fish, Chicken, and Vegetable Sempol) is a locally developed supplementary food designed to support the nutritional rehabilitation of children experiencing wasting. The product combines fish, chicken, and vegetables to provide a balanced source of protein, energy, vitamins, and minerals. The inclusion of animal-source foods such as fish and poultry is particularly important because they provide high-

quality protein, essential amino acids, and bioavailable micronutrients that are critical for child growth, development, and nutritional recovery (Parikh et al., 2022); (Sheffield et al., 2024). In addition to its nutritional value, SEMPAS utilizes locally available ingredients, making it affordable and potentially sustainable for community-based nutrition programs. Food-based interventions that incorporate locally available nutrient-dense foods have been shown to improve nutritional outcomes and support child growth, particularly in low- and middle-income settings (Mamun et al., n.d.). Furthermore, its appealing texture and taste may improve acceptability among young children, thereby enhancing dietary intake and adherence during nutritional rehabilitation.

Preliminary observations conducted in the East Martapura Community Health Center catchment area identified the continued presence of wasting among children under five years of age. Although supplementary feeding programs are widely implemented, evidence regarding the effectiveness of locally developed food-based interventions such as SEMPAS remains limited. Most studies have focused on commercial or nationally standardized supplementary foods, while research evaluating community-based products utilizing local ingredients is still scarce. Therefore, investigating the effectiveness of SEMPAS is important to provide evidence-based recommendations for sustainable nutritional rehabilitation strategies at the community level. Therefore, this study aimed to evaluate the effect of SEMPAS supplementary recovery feeding on the nutritional status of wasted children under five years of age in the East Martapura Community Health Center catchment area, Indonesia.

Method

This study employed a pre-experimental research design using a one-group pretest–posttest approach to evaluate the effect of SEMPAS supplementary recovery feeding on the nutritional status of children under five years of age experiencing wasting. A one-group pretest–posttest design is commonly used to assess changes in outcomes before and after an intervention when a control group is not available (Nuriannisa et al., 2022). The study was conducted in 2026 within the catchment area of the East Martapura Community Health Center, South Kalimantan, Indonesia.

The study population consisted of all children aged 6–59 months diagnosed with wasting within the study area. Participants were selected using purposive sampling based on predefined inclusion criteria. A total of five children who met the eligibility criteria were enrolled in the study. Inclusion criteria included children aged 6–59 months classified as wasted according to the weight-for-height indicator and whose parents or guardians provided informed consent to participate.

The intervention consisted of providing SEMPAS (Fish, Chicken, and Vegetable Sempol), a locally developed supplementary food formulated from fish, chicken, and vegetables as sources of protein, energy, vitamins, and minerals. The supplementary food was administered regularly according to the predetermined schedule and portion size throughout the intervention period. Mothers or caregivers accompanied the children during the intervention and received education regarding the nutritional benefits, preparation, and appropriate administration of supplementary foods to support nutritional recovery.

The independent variable was the provision of SEMPAS supplementary recovery feeding, whereas the dependent variable was the nutritional status of children experiencing wasting. Nutritional status was assessed using the weight-for-height indicator based on the World Health Organization Child Growth Standards (Oliveira et

al., 2022). Anthropometric measurements were conducted before the intervention (pretest) and after completion of the intervention (post test). Body weight was measured using a calibrated digital scale, while body length or height was measured using standardized anthropometric equipment. Data collection also included direct observation of children's acceptance of SEMPAS and monitoring of their general health condition throughout the intervention period.

Data were analyzed descriptively by comparing the nutritional status of participants before and after the intervention. Changes in the proportion of children classified as wasted were assessed based on pretest and posttest measurements. The findings were presented in the form of frequencies, percentages, and narrative descriptions to evaluate the potential effectiveness of SEMPAS supplementary recovery feeding in improving nutritional status among children under five years of age. Prior to participation, informed consent was obtained from parents or legal guardians of all participants. Confidentiality and anonymity of participant information were maintained throughout the study, and all procedures were conducted in accordance with ethical principles for research involving human participants.

Result and Discussion

1. Result

A total of five children under five years of age diagnosed with wasting participated in this study. Nutritional status was assessed before and after the administration of SEMPAS supplementary recovery feeding using anthropometric indicators, including body weight, weight-for-height z-score (WHZ), and wasting status.

Table 1
 Changes in Nutritional Status Before and After SEMPAS Supplementary Recovery Feeding

Indicator	Pretest	Posttest	Change
Mean Body Weight (kg)	8.2	9.9	+1.7 kg
Mean Weight-for-Height Z-Score (WHZ)	-2.45	-1.85	+0.60
Wasted Children (%)	100 %	40 %	-60
Non-Wasted Children (%)	0 %	60 %	+60

Source: Primary Data, 2026

As presented in Table 1, improvements were observed across all measured anthropometric indicators following the intervention period. The mean body weight increased from 8.2 kg at baseline to 9.9 kg at posttest, representing an average weight gain of 1.7 kg. This increase was consistently reflected in the overall nutritional profile of the study participants. Similarly, the mean weight-for-height z-score (WHZ) improved from -2.45 before the intervention to -1.85 after the intervention, corresponding to an increase of 0.60 z-score points. The baseline mean WHZ indicated that the participants, on average, met the criteria for wasting. Following the intervention, the mean WHZ moved closer to the normal reference range, although the average value remained below the WHO threshold for optimal nutritional status.

Changes in wasting status are illustrated in Figure 1. Prior to the intervention, all five participants (100%) were classified as wasted. After the intervention period, two participants (40%) remained in the wasted category, whereas three participants (60%) no longer met the criteria for wasting and were classified as non-wasted. Thus, the proportion of children with wasting decreased by 60 percentage points, while the proportion of non-wasted children increased by the same magnitude.

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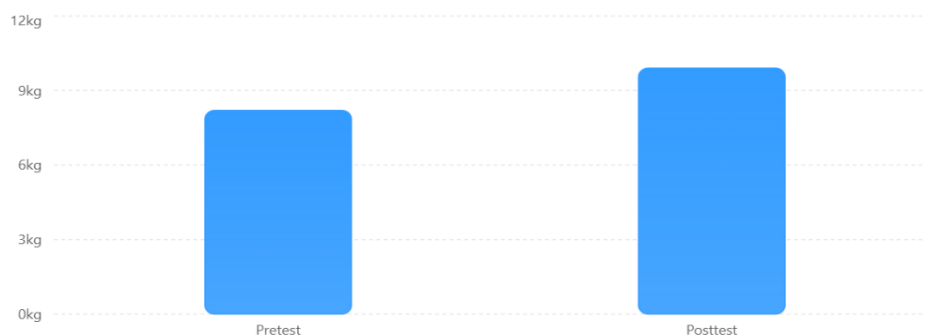


Figure 1. Changes in Wasting Status Before and After SEMPAS Supplementary Recovery Feeding

Figure 2 presents the comparison of mean body weight before and after the intervention. The post-test mean body weight was higher than the baseline value, indicating that all measurements at the group level shifted in a positive direction during the study period. The observed mean increase of 1.7 kg represented approximately a 20.7% increase relative to the baseline mean body weight.

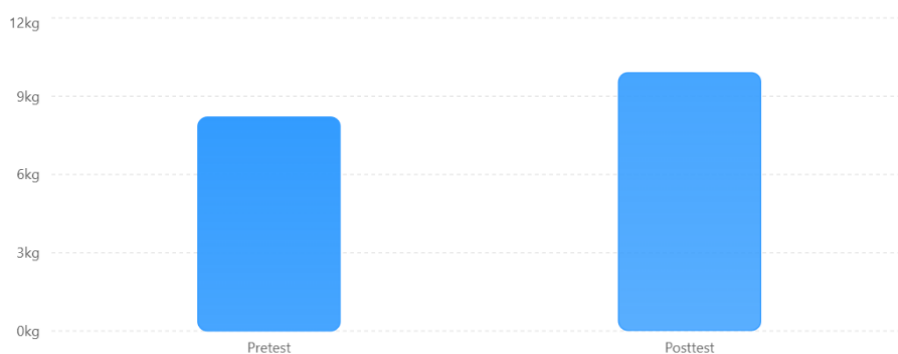


Figure 2. Changes in Mean Body Weight Before and After SEMPAS Supplementary Recovery Feeding

Figure 3 shows the changes in mean WHZ between the pretest and posttest assessments. The improvement of 0.60 z-score points reflects a shift toward better nutritional status among the participants. Although individual responses varied, the group mean demonstrated a favorable trend during the intervention period.



Figure 3. Changes in Mean Weight-for-Height Z-Score (WHZ) Before and After SEMPAS Supplementary Recovery Feeding

Overall, the descriptive findings indicate that improvements were observed in body weight, WHZ, and wasting status among the participating children following the period of SEMPAS supplementary recovery feeding. Specifically, three out of five participants (60%) transitioned from wasted to non-wasted status, while two participants (40%) remained classified as wasted at the end of the study period

2. Discussion

The present study demonstrated improvements in all measured anthropometric indicators among children under five years of age experiencing wasting following the administration of SEMPAS supplementary recovery feeding. Mean body weight increased by 1.7 kg, mean WHZ improved by 0.60 z-score points, and the prevalence of wasting decreased from 100% to 40%. At the individual level, three of the five participants (60%) were no longer classified as wasted after the intervention, whereas two participants (40%) remained within the wasting category. Although the small sample size precludes broad conclusions, these findings suggest that the intervention period was accompanied by favorable changes in nutritional status among most participants.

The increase in mean body weight from 8.2 kg to 9.9 kg represents approximately a 20.7% improvement relative to baseline body weight. In children with acute malnutrition, weight gain is commonly used as an early indicator of recovery because body weight responds more rapidly to nutritional interventions than linear growth indicators. Therefore, the observed increase may indicate an improvement in short-term nutritional adequacy during the intervention period. However, the extent of weight gain varied among participants, highlighting the heterogeneity of responses that frequently characterizes nutritional rehabilitation programs.

Similarly, the improvement in mean WHZ from -2.45 to -1.85 reflects movement toward recovery from acute malnutrition. WHZ is the primary anthropometric indicator recommended by the World Health Organization for identifying wasting and monitoring recovery. Nevertheless, although the average WHZ improved, the post-intervention value remained relatively close to the threshold for wasting. This finding suggests that the intervention period may have initiated nutritional recovery but may not have been sufficient to restore optimal nutritional status in all children. Additional intervention time, continued monitoring, and ongoing dietary support may therefore be necessary to achieve sustained recovery.

An important finding of this study is that nutritional improvement was not observed uniformly across all participants. While three children transitioned from wasted to non-wasted status, two children remained wasted despite receiving the same supplementary feeding intervention. This variation underscores the multifactorial nature of wasting and suggests that recovery is influenced not only by the nutritional intervention itself but also by individual, household, and environmental factors. Children entering the study with different degrees of nutritional deficits, varying appetites, differences in nutrient absorption, or underlying health conditions may respond differently to supplementary feeding.

The persistence of wasting among two participants may indicate that supplementary feeding alone is insufficient for certain children with more complex nutritional needs. Recurrent infections, subclinical illnesses, intestinal parasitic infestations, environmental enteric dysfunction, or poor caregiver feeding practices may interfere with nutrient utilization and limit the effectiveness of nutritional interventions. In such circumstances, a more comprehensive approach integrating nutritional support, infection control,

caregiver counseling, and regular growth monitoring may be required to optimize recovery outcomes.

The finding that 60% of participants recovered from wasting should also be interpreted with caution because of the study design employed. The absence of a control group limits the ability to establish a direct causal relationship between SEMPAS and the observed improvements. Some degree of improvement may reflect natural growth processes, as children under five years of age normally gain weight as part of physiological development. Consequently, it cannot be excluded that a portion of the observed changes would have occurred even in the absence of the intervention.

Another methodological issue that warrants consideration is regression toward the mean. Participants were selected because they met the criteria for wasting at baseline, representing relatively extreme anthropometric measurements. When repeated measurements are performed, individuals with extreme baseline values often demonstrate movement toward more average values due to random measurement error, biological variability, or temporary fluctuations in nutritional status. Therefore, part of the observed improvement may have resulted from statistical phenomena rather than a true intervention effect. Acknowledging this possibility is important to avoid overestimating the effectiveness of SEMPAS.

Furthermore, several confounding factors were not measured or controlled in this study. Dietary intake outside the intervention period was not assessed, making it impossible to determine the contribution of foods consumed at home to the observed changes. Continued breastfeeding practices, complementary feeding patterns, caregiver knowledge regarding child nutrition, episodes of diarrhea or respiratory infections, household food security, socioeconomic status, and participation in other nutrition-related programs may all have influenced children's nutritional trajectories during the study period. These unmeasured factors may partly explain the differing responses among participants.

Despite these limitations, the consistency of improvement across multiple anthropometric indicators suggests that SEMPAS warrants further investigation as a locally based supplementary feeding option. One of the notable strengths of SEMPAS is its reliance on locally available ingredients. Community-based interventions utilizing local foods are often more feasible to implement because they are relatively affordable, culturally acceptable, and easier to access than commercially produced therapeutic foods. Such characteristics may improve caregiver acceptance and increase the likelihood of long-term adoption within routine community nutrition programs.

From a public health perspective, the development of locally sourced supplementary foods aligns with efforts to strengthen sustainable nutrition interventions in resource-limited settings. Dependence on imported or commercially manufactured products may present financial and logistical challenges, particularly in rural communities. In contrast, locally produced formulations such as SEMPAS may empower communities to utilize existing food resources while supporting local food systems. If future studies confirm its effectiveness, SEMPAS could potentially complement existing nutritional rehabilitation strategies implemented through primary healthcare services.

The findings of this study should therefore be regarded as preliminary evidence rather than definitive proof of effectiveness. The small sample size ($n = 5$) substantially limits statistical power and generalizability, while the one-group pretest–posttest design restricts causal inference. Consequently, the positive changes observed should be interpreted as an indication of a possible beneficial association between SEMPAS

supplementation and improved nutritional outcomes, rather than confirmation that SEMPAS alone caused the improvements.

Future research should employ more rigorous methodologies, including randomized controlled trials with larger sample sizes and longer follow-up periods. Incorporating detailed assessments of dietary intake, morbidity status, caregiver adherence, household socioeconomic conditions, and participant acceptability would provide a more comprehensive understanding of the factors influencing recovery. Such studies would also help distinguish the specific contribution of SEMPAS from natural growth, regression toward the mean, and other confounding influences.

Overall, the present study provides initial evidence that SEMPAS supplementary recovery feeding may be associated with improvements in body weight, WHZ, and wasting status among children under five years of age experiencing acute malnutrition. While these findings are encouraging, they should be interpreted cautiously in view of the methodological limitations. Further well-designed studies are needed before firm conclusions regarding the effectiveness of SEMPAS as a nutritional rehabilitation strategy can be established.

Conclusion

The findings of this study indicate that SEMPAS (Fish, Chicken, and Vegetable Sempol) supplementary recovery feeding was associated with improvements in the nutritional status of children under five years of age experiencing wasting in the East Martapura Community Health Center catchment area. Following the intervention, the mean body weight increased from 8.2 kg to 9.9 kg, while the mean weight-for-height z-score improved from -2.45 to -1.85 . In addition, the prevalence of wasting decreased from 100% to 40%, and 60% of participants were no longer classified as wasted after the intervention. The positive outcomes observed may be attributed to the balanced nutritional composition of SEMPAS, which provides protein, energy, vitamins, and minerals derived from fish, chicken, and vegetables. Observational findings also indicated improved appetite, increased activity levels, and better overall health conditions among participants during the intervention period.

These findings suggest that SEMPAS has the potential to serve as a locally sourced supplementary feeding alternative for supporting the nutritional rehabilitation of children experiencing wasting. However, given the small sample size and pre-experimental study design, further research involving larger samples and controlled experimental methods is recommended to confirm the effectiveness of SEMPAS in reducing wasting among children under five years of age.

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