ISSN: 2528-066X (Print), 2599-2880 (Online)

Nutritional Status of Children Receiving Local Supplementary Feeding at Tawangrejo Public Health Center, Madiun

Dewi Komalawati*, Sugeng Iwan Setyobudi
Prodi Profesi Dietisien Poltekkes Kemenkes Malang
Corresponding author: dewikerja123@gmail.com

ARTICLE INFO

Article history:
Received: June 30th, 2025
Revised: November 22nd, 2025
Accepted: December 15th, 2025

Keywords:
Body height
Body weight
Local supplementary feeding
Nutritional status
Under-five children

ABSTRACT

Undernutrition among under-five children remains a major public health issue in Indonesia, particularly underweight which contributes to growth failure and increased morbidity. According to the 2022 Indonesian Nutrition Status Survey (SSGI), the prevalence of underweight in children is still above the national target, including in East Java. Locally-based supplementary feeding (LSF) is one of the strategies to address this problem, as it not only provides additional energy and protein but also involves nutrition education for parents to improve feeding practices. This study aimed to evaluate the effect of LSF on the nutritional status of underweight children under five at Tawangrejo Health Center, Madiun. An evaluative survey with a one-group pretest-posttest design was conducted involving 30 children aged 12–59 months (W/A < -2 SD). Intervention was carried out for 28 consecutive days with LSF menus containing an average of 318 kcal and 22.2 g protein per portion. Body weight and height were measured at baseline and post-intervention, and nutritional indices were analyzed using paired t-tests. Significant improvements were observed in body weight (mean +0.47 kg, p = 0.0001), height (mean +0.61 cm, p = 0.000), W/A z-score (p = 0.007), H/A (p = 0.042), and W/H (p = 0.001). Locally-based supplementary feeding effectively improved the nutritional status of underweight children, suggesting its potential as a community-based strategy to reduce undernutrition in Indonesia.

I. Introduction

Malnutrition in early childhood continues to be a pressing public health issue in Indonesia. Children who suffer from undernutrition—particularly those with underweight status—are at higher risk of developmental delays, weakened immunity, and long-term health complications. National data show that in 2022, 17.1% of Indonesian children under five were underweight, highlighting the persistent challenge of inadequate nutrition during the critical growth period (Ministry of Health, 2022).

Efforts to combat child malnutrition have been implemented through various strategies, one of which is the Supplementary Feeding Program (*Program Makanan Tambahan*, LSF). LSF is designed to provide additional nutrients to children at risk of or already experiencing malnutrition by offering energy- and protein-rich foods. These interventions are especially emphasized at the community level, where public health centers play a key role in reaching vulnerable populations (Kemenkes RI, 2016).

The Ministry of Health encourages the use of locally sourced food in LSF, considering its accessibility, cost-efficiency, and cultural appropriateness. Utilizing local food sources not only supports sustainable interventions but also promotes community involvement in improving children's nutrition

(Hardinsyah & Supariasa, 2016). Moreover, local ingredients can be optimized to meet the energy and nutrient density required for growth and recovery among undernourished children (Waryana, 2010).

Several studies have demonstrated the effectiveness of LSF in improving children's anthropometric outcomes. Research indicates that consistent LSF delivery over a short period, typically 28 days, can lead to significant improvements in weight gain and general nutritional status (Yuliarti et al., 2021; Pertiwi & Siregar, 2020). However, the impact of LSF may vary by region due to differences in implementation, food composition, and household participation.

In the working area of Tawangrejo Health Center**,** Madiun City, undernutrition remains a concern. As of the latest monitoring data, 10.06% of toddlers were identified as underweight. This figure underscores the need for targeted intervention to address the nutritional gaps among children. This study was conducted to evaluate the changes in nutritional status of underweight children aged 12–59 months after receiving local food-based LSF for 28 consecutive days. The findings are expected to strengthen the evidence base for local government initiatives in reducing child malnutrition through sustainable community-based programs.

Therefore, this study aimed to evaluate the effect of locally-based supplementary feeding on the nutritional status of underweight children under five at Tawangrejo Health Center, Madiun.

II. Methods

This study employed an analytical survey with an evaluative study design using a one-group pretest-posttest approach. The intervention was carried out over 28 consecutive days, aiming to assess changes in nutritional status following supplementary feeding. A total of 30 underweight children aged 12–59 months were recruited from the working area of Tawangrejo Health Center, Madiun City. Inclusion criteria included children with weight-for-age Z-score < -2 SD based on WHO standards, currently not experiencing any acute illness, and whose caregivers provided informed consent and agreed to participate in the full intervention period. The study was conducted between May and June 2025. Each participant received a daily portion of locally developed supplementary food for 28 days. The LSF (Local Supplementary Feeding Program) menus were prepared using local ingredients and designed to meet nutritional needs. Each serving contained approximately 265–378 kcal of energy, 20.4–24.8 g of protein, 12.8–24.2 g of fat, and 8.4–24.1 g of carbohydrates.

The local PMT menu given to toddlers is a menu with a ten-day cycle with the following structure:

Table 1. Local Supplementary Feeding Menu Arrangement

Menu Cycle	Name of Menu
1	Chicken Crunchy
	Quail Egg Satay
2	Chicken Balls
	Egg Omelette
3	Chicken Stick
	Vegetable Egg Team
4	Chicken Dragon Legs
	Catfish Fillet
5	Egg Rolls
	Chicken Braised In Coconut Milk
6	Meat Roll
	Tofu And Quail Egg Fritters
7	Chicken Roulade
	Catfish Balls
8	Fried Chicken
	Egg Omelette
9	Tofu Egg Roll
	Catfish Nuggets

10	Chicken Fillet With Breadcrumbs
	Chicken Egg Opor

Anthropometric measurements were taken at baseline (Day 0) and after the intervention period (Day 28). Body weight was measured using a calibrated digital scale with 0.1 kg precision, while height was measured using a portable stadiometer with 0.1 cm precision. Measurements followed WHO standard procedures.The collected data were analyzed using paired t-tests to compare pre- and post-intervention weight and height. Statistical significance was set at $p < 0.05$.

This study was conducted under the supervision of an academic advisor and followed ethical principles for research involving human participants. Written informed consent was obtained from the parents or legal guardians of all participating children. The intervention involved the provision of local supplementary foods commonly consumed in the community, which posed no risk to the participants.

III. Results and Discussion

Table 2. Characteristics of Children Based on Sex

Sex	Frequency (n)	Percentage (%)
Male	16	53.3%
Female	14	46.7%
Total	30	100%

Based on Table 2, the respondents consisted of 16 male children (53.3%) and 14 female children (46.7%).

Table 3. Nutritional Status of Respondents Before the Intervention

Initial Nutritional Status	Number (n)	Percentage (%)
W/A		
Underweight (< -2 SD)	30	100
H/A		
Normal (−2 SD to +3 SD)	16	53.3
Stunted (−3 SD to −2 SD)	14	46.7

Table 3 shows that 100% of the children had an underweight nutritional status before the intervention. Additionally, 53.3% had normal height-for-age, while 46.7% were classified as stunted.

Table 4. Changes in Body Weight of Children Before and After the Intervention

No	Respondent	Weight Before (kg)	Weight After (kg)	Change (kg)
1	A	9.9	10.0	0.1
2	B	11.3	11.5	0.2
3	C	13.1	14.8	1.7
4	D	10.6	10.9	0.3
5	E	9.8	10.1	0.3
6	F	8.1	8.1	0.0
7	G	8.3	8.6	0.3
8	H	9.8	9.9	0.1
9	I	13.5	14.1	0.6
10	J	10.8	10.8	0.0
11	K	8.6	8.9	0.3
12	L	10.3	10.5	0.2
13	M	11.1	11.3	0.2
14	N	12.2	12.5	0.3
15	O	7.2	7.4	0.2
16	P	11.7	12.7	1.0

17	Q	11.6	12.1	0.5
18	R	7.7	8.5	0.8
19	S	10.0	10.5	0.5
20	T	13.1	13.5	0.4
21	U	11.0	11.0	0.0
22	V	11.3	11.6	0.3
23	W	10.3	10.3	0.0
24	X	9.2	9.6	0.4
25	Y	12.1	12.9	0.8
26	Z	11.0	11.1	0.1
27	AA	10.8	11.3	0.5
28	AB	11.6	13.1	1.5
29	AC	10.7	12.4	1.7
30	AD	9.1	9.9	0.8
	Average	10.53	11	0.47

Based on the table above, most children experienced changes in body weight before and after the intervention, although some showed no change. The Minimum Weight Gain (MWG) for children aged over 12 months is 200 grams. A total of thirteen children (76.67%) achieved weight gain according to the MWG standard, while the remaining 23.3% did not reach the expected gain.

Table 5. Changes in Body Height of Children Before and After the Intervention

No	Respondent	Height Before (kg)	Height After (kg)	Change (kg)
1	A	82	82,4	0,4
2	B	89,8	90	0,2
3	C	98,4	99,1	0,7
4	D	88,1	88,2	0,1
5	E	83	84	1
6	F	72	73	1
7	G	75	75,2	0,2
8	H	83	84	1
9	I	99	100	1
10	J	87,1	87,5	0,4
11	K	78	79,1	1,1
12	L	79	80	1
13	M	86,4	86,8	0,4
14	N	91,8	92,4	0,6
15	O	68,5	69	0,5
16	P	92,5	92,9	0,4
17	Q	96	96,8	0,8
18	R	77,8	77,9	0,1
19	S	87	88	1
20	T	98,5	99,5	1
21	U	89,1	89,2	0,1
22	V	88,8	89,5	0,7
23	W	88,5	89,5	1
24	X	80,3	81,2	0,9
25	Y	99	99,6	0,6
26	Z	88,5	89	0,5
27	AA	86,5	86,6	0,1
28	AB	101,1	101,7	0,6
29	AC	94	94,5	0,5
30	AD	82,3	82,6	0,3
	Average	87,03	87,64	0,61

Based on Table 5, changes in body height among children varied between 0.1 cm and 1.1 cm, with an average increase of 0.61 cm. Further statistical analysis was conducted to assess changes in body weight, body height, and z-scores of weight-for-age (W/A), height-for-age (H/A), and weight-for-height (W/H), with the results as follows:

Table 6. Mean Body Weight, Height, and Z-Scores Before and After Local LSF

Variable	Before LSF (Mean ± SD)	After LSF (Mean ± SD)	Change (Δ)	p-value
Body Weight (kg)	10.53 ± 1.58	11.00 ± 1.79	+0.47	<0.0001
Height (cm)	87.03 ± 8.34	87.64 ± 8.36	+0.61	0.000
W/A Z-score	-2.14 ± 0.92	-1.95 ± 0.58	+0.19	0.007
H/A Z-score	-2.01 ± 0.63	-1.89 ± 0.71	+0.12	0.042
W/H Z-score	-1.63 ± 0.61	-1.26 ± 0.70	+0.38	0.001

Normality of the data was tested using the Shapiro–Wilk test before applying the paired t-test. Based on the analysis of weight changes in Table 6, it can be concluded that there was a statistically significant increase in body weight ($p < 0.05$) after the provision of local supplementary feeding (LSF). This means that a 28-day LSF intervention was able to increase the children's body weight by an average of 0.47 kg. These findings are consistent with the study by Purbaningsih & Syafiq (2023), who reported that local food-based LSF was effective in increasing the body weight of 105 children in Serang, Banten, who had experienced weight stagnation or undernutrition ($p = 0.0005$). The provision of local food-based LSF in Taktakan Village, Serang City, was effective in addressing cases of weight faltering, underweight, and undernutrition.

All supplementary foods were consumed under supervision at the health center. Caregivers reported that the children generally accepted the local supplementary feeding menus, and no major complaints regarding taste or refusal of food were observed during the intervention period

There was also a statistically significant increase in height during the 28-day intervention ($p = 0.000$). This indicates that the local LSF intervention containing animal protein, provided daily for 28 days, was effective in improving child height by an average of 0.61 cm.

These findings are supported by Susianto et al. (2023), who conducted a study using tempeh nuggets as local LSF on 60 children (30 intervention and 30 control). The results showed a significant increase in height ($p = 0.000$), with a very strong correlation coefficient ($r \approx 0.998$). The findings of this study are consistent with fundamental nutrition theory, which states that weight gain is the fastest indicator for assessing the effectiveness of nutritional interventions in young children. According to Almatsier (2019), weight gain occurs when energy intake exceeds the body's needs, causing the excess energy to be stored in body tissues. This aligns with the average weight gain of 0.47 kg observed among children receiving locally based supplementary feeding (PMT) over the 28-day intervention. Furthermore, the increase in height found in this study is supported by the theory of Hardinsyah and Supariasa (2016), who emphasize that protein—particularly from animal sources—plays a crucial role in linear growth and tissue formation. The protein content in the local PMT used in this study (20–24 g per serving) contributed to the average height increase of 0.61 cm. Waryana (2010) also states that energy-protein deficiency can lead to growth retardation and impaired immunity; therefore, providing local supplementary foods such as eggs, chicken, tempeh, or fish can accelerate nutritional recovery in children. The use of locally sourced foods is considered a sustainable strategy because it is accessible, affordable, and culturally acceptable, which improves family adherence to supplementary feeding programs (Hardinsyah & Supariasa, 2016). Thus, the results of this study reinforce previous literature showing that locally based PMT interventions can positively improve nutritional status, as reflected in the increased W/A and H/A z-scores following the intervention.

Similarly, Sumarlan et al. (2023) studied 16 children aged 24–60 months and found an increase in height from a mean of 87.97 cm to 88.24 cm after a 10-day local LSF intervention. Statistical analysis revealed a significant difference ($p = 0.002$). In addition, Sumarni (2025) reported that fish-based local

LSF also positively correlated with improvements in height and weight among stunted children in Sumenep Regency.

Furthermore, a significant increase was observed in the weight-for-height (W/H) index, suggesting a recovery from acute malnutrition or mild wasting. This study has several limitations. The relatively small sample size and short intervention period of 28 days may limit the generalizability of the findings. In addition, potential confounding factors such as variations in dietary intake at home and levels of physical activity were not fully controlled, which may have influenced the outcomes.

IV. Conclusion

Based on the findings of this study, the following conclusions can be drawn that the provision of locally-based supplementary feeding (LSF) for 28 days in underweight children had a significant impact on weight gain, with an average increase of 0.47 kg. There was an improvement in the height-for-age (H/A) index among children receiving local LSF, indicating a short-term effect on linear growth. The average height gain observed during the 28-day intervention was 0.61 cm. A significant improvement was also observed in the weight-for-height (W/H) index, indicating positive changes in acute nutritional status among children receiving local LSF.

V. References

Almatsier, S. (2019). *Prinsip dasar ilmu gizi*. Jakarta: Gramedia Pustaka Utama.

Andayani, T. R. (2020). Peningkatan status gizi balita melalui LSF lokal berbasis protein hewani. *Jurnal Gizi Indonesia*, *8*(2), 102–108.

Apriliani, F., et al. (2024). Efektivitas pemberian makanan tambahan berbahan pangan lokal terhadap status gizi balita stunting: Systematic review. *Media Informasi Unit Penelitian dan Pengabdian Masyarakat Politeknik Kesehatan Kementerian Kesehatan Tasikmalaya*.

Hardinsyah, & Supariasa, I. D. N. (2016). *Ilmu gizi untuk mahasiswa dan profesi*. Jakarta: EGC.

Irwan, et al. (2020). Efektivitas pemberian LSF modif berbasis kearifan lokal terhadap peningkatan status gizi balita gizi kurang dan stunting. *Journal Health and Science; Gorontalo Journal Health & Science Community*, *4*(2).

Iskandar. (2017). Pengaruh pemberian makanan tambahan modifikasi terhadap status gizi balita. *Jurnal AcTion: Aceh Nutrition Journal*, *2*(2).

Kementerian Kesehatan Republik Indonesia. (2016). *Pedoman pemberian makanan tambahan bagi balita dan ibu hamil di daerah bermasalah gizi*. Jakarta: Direktorat Gizi.

Kementerian Kesehatan Republik Indonesia. (2020). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2020 tentang Standar Antropometri Anak*. Jakarta: Kemenkes RI.

Kementerian Kesehatan Republik Indonesia. (2022). *Hasil Survei Status Gizi Indonesia (SSGI) Tahun 2022*. Jakarta: Kemenkes RI.

Kementerian Kesehatan Republik Indonesia. (2023). *Juknis LSF Lokal untuk Balita dan Ibu Hamil*. Jakarta: Direktorat Gizi.

Kementerian Kesehatan Republik Indonesia. (2024). *Perdirjen Kesprimkom No. 576 Tahun 2025: Petunjuk teknis LSF berbasis pangan lokal*. Direktorat Gizi Masyarakat.

Latifahanun, M., Rina, & Fithriyah, A. (2024). Pengaruh pemberian makanan tambahan terhadap peningkatan tinggi badan pada balita stunting di Desa Jragan, Temanggung. *Jurnal Pengabdian Profesi Kesehatan Masyarakat*, *3*(1), 56–63. https://journal.unpacti.ac.id/index.php/JPP/article/view/1611

Masri, E., Sari, W. K., & Yensasnidar, Y. (2020). Efektivitas pemberian makanan tambahan dan konseling gizi dalam perbaikan status gizi balita. *Jurnal Kesehatan Perintis*, *7*(2).

Patmawati, A., Aswan, A., & Jannah, M. (2022). Pengaruh pemberian makanan tambahan terhadap peningkatan berat badan, tinggi badan, dan lingkar lengan atas pada balita stunting. *Buletin Ilmiah Kesehatan*, *2*(1), 15–22. https://journal.unimma.ac.id/index.php/bnur/article/view/12732

Pertiwi, N. A., & Siregar, E. (2020). Effectiveness of LSF on weight gain among undernourished toddlers. *Jurnal Gizi dan Kesehatan Indonesia*, *8*(1), 24–30.

Pramesthi, N. R., Sari, M. P., & Wulandari, F. A. (2021). Efektivitas LSF lokal terhadap perubahan status gizi balita. *Media Gizi Indonesia*, *20*(1), 45–52.

Purbaningsih, H., & Syafiq, A. (2023). Efektivitas pemberian makanan tambahan (LSF) berbahan pangan lokal terhadap kenaikan berat badan balita. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, *6*(12).

Sumarlan, M., Nurhikmah, N., & Cahyono, E. (2023). Efektivitas pemberian LSF terhadap peningkatan tinggi badan pada anak stunting. *Jurnal Pengabdian Profesi Kesehatan Masyarakat*, *2*(2), 88–95. https://journal.unpacti.ac.id/index.php/JPP/article/view/679

Sumarni, R. (2025). Pengaruh LSF berbasis olahan ikan laut terhadap tinggi badan dan berat badan balita stunting. *Jurnal Karaton*, *5*(1), 12–18. https://bappeda.sumenepkab.go.id/jurnal/index.php/karaton/article/view/94

Susianto, H., Handayani, D., & Nuraeni, E. (2023). Pengaruh pemberian makanan tambahan nugget tempe sebagai pangan lokal terhadap berat badan dan tinggi badan balita stunting. *Jurnal STIKKU: Kesehatan Masyarakat*, *6*(1), 33–41. https://ejournal.stikku.ac.id/index.php/stikku/article/view/850

Waryana. (2010). *Gizi kesehatan masyarakat*. Yogyakarta: Nuha Medika.

Yuliarti, M., Lestari, W., & Setyowati, A. (2021). The effect of supplementary feeding on nutritional status of underweight children. *Indonesian Journal of Nutrition*, *10*(2), 55–60.