

Implementation of Local Food-Based Balanced Nutrition Guidelines and the Healthy-Smart Children Program: A Collaborative Community Empowerment Model for Stunting Prevention

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Abstract

Stunting remains a complex public health issue in Indonesia, including in Bengkulu Province, where its prevalence increased to 20.2% in 2023. Kampung Melayu District is among the high-risk areas. This community service initiative aimed to strengthen the capacity of health cadres and early childhood education center (ECEC) teachers in implementing local food-based balanced nutrition guidelines and the Healthy-Smart Children Program for community-level stunting prevention. The main methodology used was community empowerment integrated with structured training and mentoring. The activity was implemented through six phases: preparation and stakeholder coordination, partner organization, intensive training, field-based mentoring, cross-sector coordination, and monitoring and evaluation. The results showed clear improvements in partner capacity after the intervention. Knowledge of local food-based balanced nutrition increased by 13.18%, understanding of child nutritional status assessment increased by 50.08%, and knowledge of child development achievement standards increased by 28.22%. ECEC teachers were also able to develop a one-week balanced menu cycle and conduct basic nutrition and development assessments. The program generated active participation from teachers, parents, children, health cadres, and local stakeholders. These findings indicate that local food-based nutrition education, when combined with empowerment and formal multi-sector collaboration, can become a scalable community model and should be considered in regional stunting prevention policies. The results of the activities have implications for the achievement of the SDGs by strengthening community capacity in local food-based balanced nutrition, child nutritional status and development monitoring, early childhood education, and multisectoral collaboration to support sustainable stunting prevention.

Keywords: balanced nutrition, early childhood education, health cadres, local food, stunting
SDGs: Goal 2 (Zero Hunger), Goal 3 (Good Health and Well-being), Goal 4 (Quality Education), Goal 17 (Partnerships for the Goals).

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INTRODUCTION

Stunting remains the main challenge in Indonesia's public health development. This condition is characterized by failure to grow in children under five due to chronic malnutrition that lasts for a long time, especially in the first 1,000 days of life. The Government of Indonesia, through the National Medium-Term Development Plan (RPJMN) 2020–2024, has set a target to reduce the prevalence of stunting to 14% by 2024, as part of the strategy to develop quality human resources (Bappenas, 2020). This policy is strengthened

through Presidential Regulation Number 72 of 2021 concerning the Acceleration of Stunting Reduction (BKKBN, 2021). Despite various efforts, data from the Indonesian Nutrition Status Survey (INSS) shows that stunting is still a problem in all provinces. In Bengkulu Province, the prevalence of stunting was 19.8% in 2022 (Kemenkes RI, 2023), which remains above the national target. In fact, this figure increased in 2023 to 20.2% according to local government reports, indicating the need for more effective and locally-based interventions (Dinas Kesehatan Provinsi Bengkulu, 2023). This is a serious concern because Bengkulu is also one of the provinces with a fairly high number of families at risk of stunting.

More specifically, Bengkulu City is showing positive progress. Based on data from the Indonesian Health Survey (IHS), the prevalence of stunting in Bengkulu City decreased from 12.9% in 2022 to 6.7% in 2023 (Kemenkes RI, 2024). This decline shows the effectiveness of various intervention programs at the city level. However, not all sub-districts show the same conditions. One of the areas that still has a high risk is Kampung Melayu District, especially in the working area of the Padang Serai Health Center. Factors such as high poverty rates, limited access to nutritious food, and low nutritional knowledge in the community have also worsened these conditions. Various studies show that the causes of stunting are very complex and are not only caused by a lack of nutritional intake, but also related to parenting patterns, age-inappropriate feeding practices, low exclusive breastfeeding coverage, and limited access to health services and nutritional information (Kemenkes RI, 2023). In the work area of the Padang Serai Health Center, there are still many practices of pre-lacteal feeding, delays in the provision of MP-ASI, and misperceptions related to stunting, which have an impact on the low level of preventive measures at the household level. In addition, the potential of local foods rich in nutrients such as fish, vegetables, and tubers has not been utilized to the fullest.

Facing this complexity, nutritional interventions are needed that are not only specific but also sensitive and based on local approaches. The Local Food-Based Balanced Nutrition Guidelines (LF-BNG) are one of the approaches developed to increase the use of local food that is nutritious, affordable, and in accordance with the community's culture (Dinas Kesehatan Provinsi Bengkulu, 2023). In addition, the Healthy-Smart Children Program integrates health and education interventions through parent education, assessment of children's nutritional status, and the establishment of mothers' support groups within the community. Such integrated approaches have been recognized as effective strategies for improving family engagement, parental knowledge, and community participation in child nutrition and development programs (Yousafzai et al., 2014; WHO et al., 2023). The selection of this approach is supported by findings from previous research and community service initiatives. Studies have shown that local food-based supplementary feeding interventions can improve child nutritional status while enhancing caregivers' knowledge and skills in preparing nutritious foods from locally available ingredients (Aspatiria, 2020; Yosefa and Tahun, 2022; Simbolon et al., 2023; Nur, 2025). Nutrition education combined with practical food preparation activities has also been associated with significant improvements in maternal nutrition knowledge and child dietary intake (Rachmi et al., 2021; Huriah et al., 2023). Furthermore, growth and development monitoring activities using SDIDTK, community-based developmental screening, and educational programs involving parents, health cadres, and early childhood education teachers have demonstrated high participation rates and increased awareness regarding the importance of regular growth monitoring and early detection of developmental problems (Hapsari & Yuliani, 2024; Ahun et al., 2023). Despite these advances, previous stunting interventions have frequently been constrained by weak cross-sector collaboration and insufficient utilization of local food resources as the foundation for integrated nutrition education and community-based intervention programs. Strengthening partnerships among health, education, and community sectors remains essential for achieving sustainable stunting reduction at the local level (UNICEF, 2024; Akbar & Huriah, 2022).

The main gap in previous stunting interventions is that many activities have focused on short-term nutrition education or supplementary feeding, while cross-sector collaboration has often remained informal and the potential of local food has not been systematically integrated into balanced nutrition education at the community level. In addition, cadres and ECEC teachers have not always been prepared as competent local change agents who can monitor child nutrition and development continuously. The novelty of this project lies in the integration of three components: community empowerment through capacity building for health cadres and ECEC teachers, a local food-based balanced nutrition approach through LF-BNG, and formal multi-sector collaboration involving health, education, community, and local government stakeholders. Through this integrated model, Kampung Melayu District is expected to become a pilot area for sustainable community-based stunting prevention in Bengkulu City.

The specific objectives of this activity were to: (1) improve the knowledge, attitudes, and skills of health cadres and ECEC teachers in applying local food-based balanced nutrition; (2) provide structured mentoring

for ECEC institutions in implementing the Local Food-Based Balanced Nutrition Guidelines (LF-BNG) and the Healthy-Smart Children Program; and (3) strengthen partner capacity in conducting anthropometric assessment and early childhood development assessment as part of community-level stunting prevention.

METHOD

This community service activity was carried out in Kampung Melayu District, Bengkulu City, within the working area of Padang Serai Health Center. The area was selected because it remains at risk of stunting and has active support from local stakeholders. The implementing partners consisted of Padang Serai Health Center, health cadres, and ECEC teachers. The target partners were six health cadres, six ECEC teachers, ECEC children, and parents. The program was implemented from July to September 2025.

The method used was a community empowerment approach based on collaboration between the health and education sectors. This approach was selected because stunting prevention requires active community participation, local ownership, and the development of competent change agents. Through empowerment, health cadres and ECEC teachers were trained to use local assets, including accessible local foods, as practical resources for nutrition education and monitoring. The program combined specific and nutrition-sensitive interventions through education, training, growth monitoring, development assessment, local food campaigns, and mentoring in ECEC institutions.

The program was implemented in six stages: (1) preparation and coordination with local stakeholders; (2) organization of health cadres and ECEC teachers as field implementers; (3) two-day intensive training on nutrition, anthropometry, child development, and LF-BNG; (4) field intervention through counseling, cooking demonstrations, food provision assessment, growth monitoring, and child development assessment; (5) cross-sector coordination through stakeholder forums; and (6) monitoring and evaluation of program achievements. These stages were designed to strengthen partner capacity, create shared commitment, and support program sustainability at the community level.

The educational tools and media used included training modules on LF-BNG and the Healthy-Smart Children Program, anthropometric tools for nutritional status assessment such as digital scales and height measuring devices, growth charts, and child development assessment forms based on Child Development Achievement Standards (CDAS). Students were involved in media development, training implementation, and field assistance. Education was delivered directly to mothers, ECEC teachers, and health cadres, while monitoring activities were conducted through posyandu and ECEC institutions.

Data were collected using structured pre-test and post-test instruments, observation checklists, and field documentation. Knowledge was assessed using structured questionnaires covering three domains: local food-based balanced nutrition, child nutritional status assessment, and Child Development Achievement Standards (CDAS). Each domain was scored on a 0-100 scale, with higher scores indicating better knowledge. Attitudes were measured using Likert-scale statements scored from 1 to 4, where higher scores represented more positive attitudes. Skills were assessed using numerical performance scores for anthropometric assessment and STPPA application, while menu-cycle development was assessed through observation using a checklist of nutritional completeness, food diversity, local food use, and menu feasibility.

The instruments were reviewed by nutrition and child development experts to ensure content validity and were tested before implementation to check clarity, consistency, and suitability for the target participants. The evaluation indicators included partner participation, completion of training, pre-post changes in knowledge and attitudes, practical skill performance, ability to prepare a one-week balanced menu cycle, implementation of ECEC mentoring, and results of child food provision and development assessments. Data were analyzed descriptively using minimum and maximum values, means, standard deviations, frequencies, and percentages. No inferential analysis was performed because this was a community service evaluation with a small number of partners and no control group.

RESULT AND DISCUSSION

Socialization and Advocacy

At the organizing stage, six health cadres and six ECEC teachers were formally involved in the preparation, implementation, and evaluation of the activity. Socialization and advocacy were conducted on Thursday, August 14, 2025, and were attended by the Head of Kampung Melayu District, Padang Serai Village Head, Sumber Jaya Village Head, Padang Serai Health Center leaders, nutrition program staff, health cadres, and ECEC teachers. The activity resulted in the formation of a partner group and the signing of meeting

minutes as a commitment to support program implementation. Digital weight scales and height measuring devices for toddlers were also handed over to support early stunting detection.

The findings demonstrate that the activity achieved its institutional and partnership objectives. The establishment of cross-sector commitment among the health center, local government, health cadres, ECEC teachers, and community leaders indicates that the program functioned not merely as a standalone training activity but as a coordinated community platform. This is particularly important because stunting prevention requires integration between nutrition-specific interventions and nutrition-sensitive actions across health, education, social protection, family, and community systems (UNICEF, 2020; Nuraini et al., 2025). The multi-sector agreement strengthened local governance by clarifying stakeholder roles, fostering local ownership, and creating a foundation for collaborative follow-up activities. Such findings are consistent with evidence showing that successful stunting reduction depends on effective coordination mechanisms, shared accountability, and alignment among multiple sectors operating at the community level (Nisbett et al., 2022; Santoso et al., 2021; Beal et al., 2018). Furthermore, multisectoral platforms have been identified as critical for addressing the underlying determinants of child undernutrition, including food security, caregiving practices, sanitation, education, and access to health services (Ruel et al., 2018). Sustaining collaboration requires institutionalization beyond initial agreements. Regular coordination meetings, shared performance indicators, and documented monitoring and evaluation mechanisms are necessary to ensure that commitments remain active beyond the project period (Nisbett et al., 2022). From a critical perspective, the main strength of the partnership was its engagement of stakeholders who directly influence child nutrition and development practices. Nevertheless, the collaboration remained limited to core local actors and did not yet fully involve other potentially influential stakeholders, such as farmer groups, local food producers, market vendors, women's organizations, and social protection agencies. Previous studies suggest that broader food-system and social-protection engagement can strengthen the availability, affordability, and sustainability of nutrition interventions at the community level (Beal et al., 2018). Future programs should expand partnership structures to support a more comprehensive and sustainable approach to stunting prevention.

Improving Target Partners' Knowledge, Attitudes, and Skills

Table 1 shows an increase in participants' knowledge after the training. The training was conducted to improve the knowledge, attitudes, and skills of health cadres and ECEC teachers and was held for two days, on August 14–15, 2025, at the Padang Serai Health Center. The training aimed to prepare cadres and ECEC teachers to assist mothers of under-five children and ECEC children in implementing LF-BNG and the Healthy-Smart Children Program. The first day consisted of a pre-test and material on child nutritional status assessment, while the second day covered local food-based balanced nutrition, Child Development Achievement Standards (CDAS), and the post-test.

Table 1. Knowledge Improvement of Health Cadres and Early Childhood Education Teachers

Knowledge of Balanced Nutrition Based on Local Food	Minimum-Maximum (Score)	$\bar{X} \pm SD$
Pre-Test	70-90	80.33 ± 0.98
Post-Test	90-100	90.92 ± 0.29
Knowledge of Early Childhood Nutritional Status Assessment	Minimum-Maximum (Score)	$\bar{X} \pm SD$
Pre-Test	30-90	60.08 ± 2.27
Post-Test	70-100	90.17 ± 1.19
Knowledge of Child Development Achievement Standards (CDAS)	Minimum-Maximum (Score)	$\bar{X} \pm SD$
Pre-Test	50-90	70.58 ± 1.56
Post-Test	80-100	90.50 ± 0.80

As presented in Table 1, participants' knowledge increased across all three assessed areas, namely local food-based balanced nutrition, early childhood nutritional status assessment, and CDAS. These observed changes indicate that the training was able to improve participants' understanding of balanced nutrition, anthropometric assessment, and child development assessment. Because this activity was designed as a descriptive community service evaluation without a control group, no inferential testing or control of confounding variables was conducted; therefore, the findings should be interpreted as observed changes among

participating partners. In addition to knowledge improvement, the training was also followed by positive changes in participants' attitudes, as presented in Table 2.

Table 2. Attitude Improvement of Health Cadres and Early Childhood Education Teachers

Attitude towards Balanced Nutrition Based on Local Food	Minimum-Maximum (Score)	$\bar{X} \pm SD$
Pre-Test	2.9-3.7	3.34 ± 0.33
Post-Test	3.0-3.9	3.56 ± 0.39
Attitudes towards Early Childhood Nutritional Status Assessment	Minimum-Maximum (Score)	$\bar{X} \pm SD$
Pre-Test	2.7-3.8	3.18 ± 0.31
Post-Test	3.1-4.0	3.29 ± 0.29
Attitudes towards Child Development Achievement Standards (CDAS)	Minimum-Maximum (Score)	$\bar{X} \pm SD$
Pre-Test	2.7-3.4	2.91 ± 0.22
Post-Test	3.0-3.9	3.24 ± 0.34

Table 2 shows an overall positive trend in participants' attitudes following the training. Improvements were observed across all three assessed areas, including attitudes toward local food-based balanced nutrition, early childhood nutritional status assessment, and Child Development Achievement Standards (CDAS). The most notable shift was observed in attitudes toward child development assessment, which moved from a near-positive level before the training to a more clearly positive level afterward. Overall, these findings suggest that the training strengthened participants' beliefs regarding the importance of utilizing local food, conducting regular nutritional status monitoring, and assessing child development as part of stunting prevention efforts. In addition to improvements in knowledge and attitudes, the training was also followed by improvements in participants' practical skills, as presented in Table 3.

Table 3. Skills Improvement of Health Cadres and Early Childhood Education Teachers

Skills of Balanced Nutrition Based on Local Food	Observation Results	
Pre-Test	Early childhood teachers stated that there are still many children who do not apply Balanced Nutrition.	
Post-Test	Early childhood teachers are able to create a 1-week menu cycle for early childhood education children	
Skills of Early Childhood Nutritional Status Assessment	Minimum-Maximum (Score)	$\bar{X} \pm SD$
Pre-Test	30-50	38.33 ± 9.37
Post-Test	70-90	80.0 ± 7.39
Skills in Applying Child Development Achievement Levels (CDAS)	Minimum-Maximum (Score)	$\bar{X} \pm SD$
Pre-Test	50-80	63.33 ± 7.78
Post-Test	80-100	90.83 ± 5.15

Table 3 demonstrates an overall improvement in the practical skills of health cadres and ECEC teachers following the training. In the area of local food-based balanced nutrition, the observed change indicates a shift from recognizing existing challenges in children's dietary practices to being able to develop a one-week balanced menu cycle for ECEC children. This suggests that the training provided participants with practical skills that could be applied in everyday settings.

A similar positive trend was observed in skills related to early childhood nutritional status assessment and the application of Child Development Achievement Standards (CDAS). Participants demonstrated higher post-training performance in both areas, accompanied by a narrower variation in scores, particularly in nutritional status assessment. These findings indicate improved and more consistent practical abilities in conducting nutritional status assessments and assessing child development according to the relevant standards. Overall, the observed changes suggest that the training contributed to strengthening participants' practical competencies across the three areas addressed and provide a basis for considering similar capacity-building activities in early childhood health and education.

The increase in knowledge, attitudes, and skills among health cadres and ECEC teachers indicates that the capacity-building objective of the program was successfully achieved. The mechanism most likely contributing to this improvement was the combination of contextual learning and hands-on practice. The LF-BNG module made the training relevant to locally available food resources, while practical exercises in anthropometric measurement, menu-cycle development, and the application of child development standards helped participants translate theoretical knowledge into practical competencies. Similar findings have been reported in community-based nutrition programs, where participatory and skills-oriented training significantly improved the competence of community health workers and nutrition cadres in delivering nutrition interventions and growth monitoring services (Hapsari & Yuliani, 2024). The most influential mechanism appeared to be practice-based training, followed by immediate field application. Cadres and ECEC teachers were not only exposed to information but also engaged in measuring children's growth, assessing nutritional status, developing balanced menus, and mentoring parents. Experiential learning approaches have been shown to enhance skill retention and self-efficacy among frontline community workers, thereby strengthening the implementation of nutrition and child development programs at the community level (Ahun et al., 2023; WHO, 2023). This approach facilitates the emergence of local change agents who can sustain nutrition education, growth monitoring, and early detection activities within routine community services. Community health cadres who receive adequate training have been shown to play an important role in improving community participation, strengthening nutrition education, supporting growth monitoring, and facilitating referrals for maternal and child health services. The community health programs have highlighted the critical role of trained community workers in improving maternal and child health outcomes through continuous engagement with families and communities. Studies have demonstrated that community-based interventions led by trained frontline workers contribute to improvements in child nutrition, developmental monitoring, caregiver practices, and access to health services, particularly in resource-limited settings (Ahun et al., 2023; Yousafzai et al., 2014). In Indonesia, community empowerment programs involving health cadres have also shown positive impacts on increasing mothers' knowledge and strengthening community participation in child growth and development monitoring activities (Hapsari & Yuliani, 2024; Jayanti & Mayasari, 2019). The findings should nevertheless be interpreted with caution. Because the program employed a one-group pre-post descriptive design, external influences such as participants' previous experience, intrinsic motivation, support from health professionals, and exposure to other nutrition-related information could not be distinguished from the effects of the intervention itself. Consequently, the observed improvements should be considered indicative of promising capacity enhancement rather than definitive causal evidence. Future studies should incorporate comparison groups, larger sample sizes, and longitudinal follow-up assessments to evaluate skill retention, behavioral changes, and the sustainability of program impacts over time (Skivington et al., 2021).

Nutrition Assistance and Education in ECEC

Nutrition mentoring and education activities were carried out in two partner ECEC institutions in Kampung Melayu District. ECEC Anggita had 50 registered children, of whom 36 attended the mentoring activity. ECEC Barunawati had 61 registered children, of whom 47 attended. The activities involved ECEC children, parents, and teachers. The mentoring consisted of balanced nutrition and healthy snack education, nutritional status assessment, child development assessment, a Healthy-Smart Children competition, and distribution of healthy snack examples. The high enthusiasm and active participation of teachers, parents, and children indicated strong community acceptance of the program. Nutrition assistance and education in the two ECECs demonstrated that the empowerment strategy was accepted by teachers, parents, and children. The use of local food increased the relevance and feasibility of nutrition messages because families could relate the recommendations to foods that are familiar, available, and culturally acceptable. This is consistent with Simbolon et al. (2023), who emphasized that local food utilization can increase the sustainability and acceptance of nutrition interventions, and with WHO (2021), which highlights community engagement as a foundation for health improvement. Routine monitoring of the growth and development of toddlers through posyandu and ECEC also supports the model of integrating health services and education in efforts to prevent stunting (Kemenkes RI, 2022). The food provision patterns observed among children at the two partner ECEC institutions are presented in Figure 1 and Table 4.

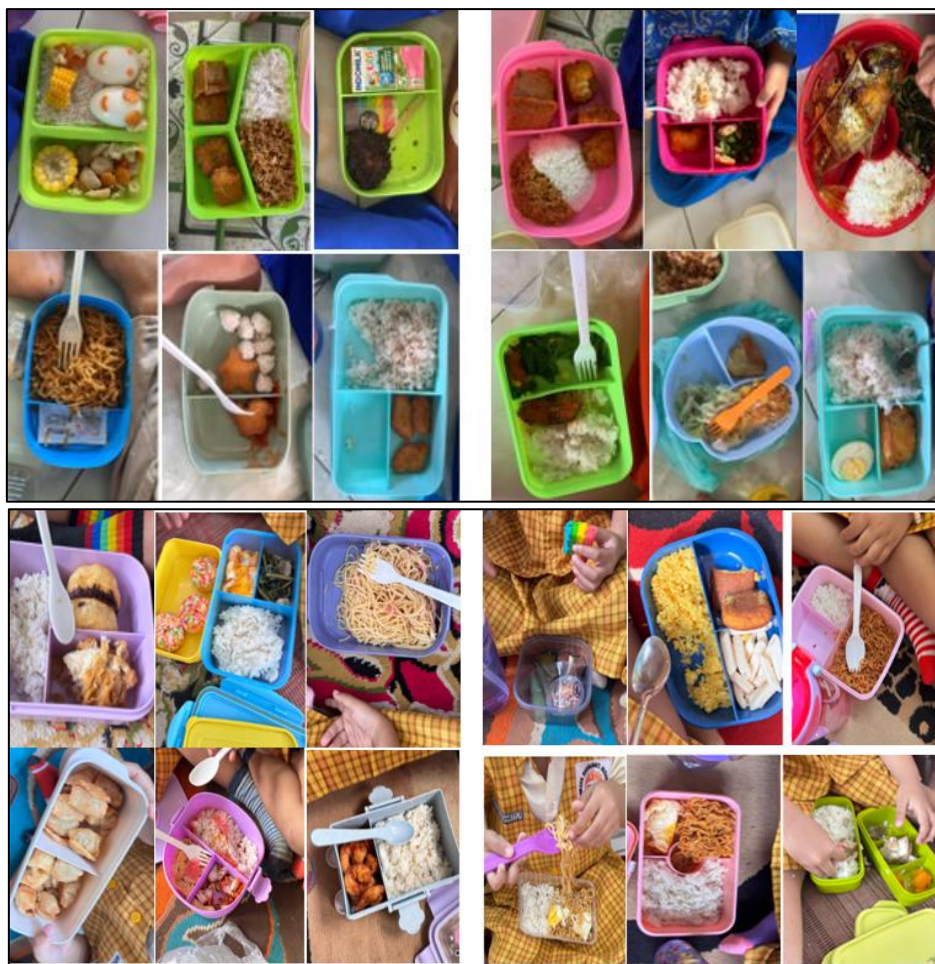


Figure 1. Anggita and Barunawati Early Childhood Lunch Models

Table 4. Early Childhood Provision Model at ECEC Anggita and Barunawati,

Assessment of Early Childhood Children's Provision	ECEC ANGGITA (36 Children)	ECEC BARUNAWATI (47 Children)
Balanced Nutrition	25 (69.44%)	35 (74.46%)
Unbalanced nutrition	11 (30.56%)	12 (25.54%)

Figure 1 and Table 4 present the food provision patterns among children at ECEC Anggita and ECEC Barunawati. In both ECEC centers, most children brought food provisions that met the criteria for balanced nutrition, with a slightly higher proportion observed at ECEC Barunawati. However, unbalanced food provisions were still identified in both settings, indicating that improvements in the quality, diversity, and suitability of children's daily food provisions are still needed. These findings highlight the importance of continuous education and support for parents and teachers in promoting balanced nutrition practices among early childhood children. In addition to nutritional status assessment, child development was also evaluated among children at both partner ECEC institutions, as presented in Figure 2 and Table 5.

Table 5. Assessment of Child Development of ECEC Anggita and Barunawati in Kampung Melayu District

Early Childhood Development	ECEC ANGGITA (36 Children)	ECEC BARUNAWATI (47 Children)
Normal	35 (97.22 %)	46 (97.87%)
Developmental Disorders	1 (2.78%)	1 (2.13%)



Figure 2. Early Childhood Nutrition Status Assessment Activity at ECEC Anggita and Barunawati

Figure 2 illustrates the early childhood assessment activities conducted at ECEC Anggita and ECEC Barunawati, while Table 5 presents the results of the child development assessment. Overall, most children in both ECEC institutions were classified as having normal development, with only a small proportion identified as having developmental disorders. This pattern suggests that the majority of children were developing according to age expectations, while the identified developmental concerns highlight the importance of early detection, referral, and appropriate follow-up support.

Early identification of developmental delays enables timely intervention and contributes to improved developmental outcomes during the critical early childhood period (Ahun et al., 2023). The child development assessment covered four domains: gross motor, fine motor, language, and social-emotional development, which are recognized as essential components of holistic early childhood development (WHO, 2023). Gross motor ability was assessed through activities involving large muscles, such as running, jumping, and throwing a ball, which are important indicators of physical development and are associated with self-regulation and social competence in preschool children (Veldman et al., 2023; Gandotra et al., 2023). Fine motor ability was assessed through hand-eye coordination activities, such as drawing and holding a pencil correctly, reflecting children's readiness for learning and school participation (Strooband et al., 2023). Language was assessed through the child's ability to understand instructions and express ideas verbally, while social-emotional development was assessed through interaction with peers and teachers, sharing behavior, turn-taking, and emotional regulation, all of which are important predictors of later educational and psychosocial outcomes (Gandotra et al., 2023). This activity served not only as a competition but also as a practical reflection of the program's impact on nutrition awareness and child development monitoring. Similar community-based initiatives have demonstrated that empowering health cadres and engaging parents in developmental screening can strengthen early detection systems and improve monitoring of child growth and development at the community level (Hapsari & Yuliani, 2024).

The assessment of children's food provisions and development showed positive initial conditions, but it also revealed areas that need continued attention. Although most children brought balanced food provisions and had normal development, some children still brought unbalanced provisions, and a small number were suspected of having developmental problems. These findings underline the need for routine monitoring, parental counseling, and referral pathways through *posyandu* and ECEC institutions, which are recognized as important strategies for strengthening early childhood nutrition and developmental outcomes (WHO, 2023). The program also reinforces broader efforts to improve nutrition, strengthen child health monitoring, and build sustainable local partnerships in community health interventions (UNICEF, 2024). The intervention has practical implications for future community-based stunting prevention. A model that links local food education, trained cadres, ECEC-based mentoring, and cross-sector coordination can help move stunting programs from short-term activities toward locally owned systems, which have been identified as a key factor in sustainable stunting reduction efforts in Indonesia (UNICEF Indonesia & Bappenas, 2024). For scalability, the model should be supported by standardized modules, routine supervision, sufficient anthropometric equipment, and integration into regional stunting reduction plans to ensure program quality and sustainability.

The findings of this community empowerment activity have important implications for the achievement of the Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 17 (Partnerships for the Goals). The observed improvements in knowledge of local food-based balanced nutrition, child nutritional status assessment, and child development monitoring, together with the increased practical capacity of health cadres and ECEC teachers, strengthen community-level actions to prevent malnutrition and stunting, thereby supporting SDG 2. The integration of routine anthropometric monitoring, early detection of developmental problems, nutrition

education, and referral mechanisms contributes to improving child health and well-being in line with SDG 3. Furthermore, the empowerment of ECEC teachers and health cadres through structured training and practical mentoring strengthens lifelong learning and the provision of quality early childhood education, supporting SDG 4. The formal collaboration established among health centers, local government, health cadres, ECEC institutions, parents, and the community also demonstrates the importance of multisectoral partnerships in addressing the complex determinants of stunting and advancing SDG 17. Thus, the activity provides an applicable community-based model in which local food utilization, capacity building, early childhood education, health monitoring, and cross-sector collaboration are integrated to support sustainable progress toward the SDGs, although long-term monitoring and broader implementation are needed to confirm the sustainability and population-level impact of these contributions (WHO, 2021; UNICEF, 2024; UNICEF Indonesia & Bappenas, 2024).

CONCLUSION

This community service activity achieved its primary objective of strengthening the capacity of health cadres and ECEC teachers in community-level stunting prevention. The pre-test and post-test results showed improvements in knowledge, attitudes, and skills related to local food-based balanced nutrition, child nutritional status assessment, and child development monitoring. The intervention worked because it combined contextual education, hands-on practice, mentoring, and cross-sector commitment, enabling cadres and ECEC teachers to function as local change agents. Although the activity was limited by its short duration, restricted scope, absence of a control group, and potential measurement bias, the findings provide useful initial evidence that local food-based community empowerment can strengthen stunting prevention. This model has significance for future community-based interventions because it offers a scalable approach that can be integrated into regional stunting reduction policies through local capacity building, ECEC involvement, and formal institutional collaboration.

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AUTHOR CONTRIBUTIONS

Demsa Simbolon: Conceptualization, Methodology, Formal Analysis, Investigation, Resources, Data Curation, and Writing-Original Draft; **Dwi Yunita Baska:** Methodology, Formal Analysis, Resources, Data Curation, and Writing-Review & Editing; **Ayu Pravita Sari:** Conceptualization, Investigation, Resources, Data Curation, and Writing-Review & Editing; **Pitrah Tul Jannah:** Conceptualization, Methodology, Formal Analysis, Investigation, Resources, Data Curation, and Writing-Review & Editing; **Helen Albaina:** Conceptualization, Methodology, Formal Analysis, Investigation, Resources, Data Curation, and Writing-Review & Editing; and **Silvia Anggraini:** Formal Analysis, Investigation, Validation and Supervision. All authors have read and approved the final version of this manuscript.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the authors upon reasonable request, subject to ethical approval and institutional regulations.

DECLARATION OF CONFLICTING INTEREST

The authors declare no known financial conflicts of interest or personal relationships that could have influenced the work reported in this manuscript.

DECLARATION OF ETHICS

The authors declare that the writing of this manuscript adheres to ethical standards of research and publication, in accordance with scientific principles, and is free from plagiarism.

DECLARATION OF ASSISTIVE TECHNOLOGIES IN THE WRITING PROCESS

The authors declare that generative artificial intelligence (AI) and other AI-assisted technologies were used in a limited and supportive capacity during the preparation of this manuscript. ChatGPT was used primarily to support brainstorming and the development of ideas, while Grammarly was used to assist with grammar and

stylistic refinement, paraphrasing, and improving the clarity and coherence of the language. All AI-assisted outputs were carefully reviewed, verified, and edited by the authors to ensure their accuracy, completeness, and compliance with applicable ethical and scientific standards. The authors assume full responsibility for the content and final version of the manuscript.

REFERENCES

- Ahun, M.N., Aboud, F., Wamboldt, C., and Yousafzai, A.K. (2023). Implementation of UNICEF and WHO's care for child development package: Lessons from a global review and key informant interviews. *Frontiers in Public Health*, **11**, 1140843. DOI: <https://doi.org/10.3389/fpubh.2023.1140843>.
- Akbar, I. and Huriah, T. (2022). Community-based intervention for the prevention of stunting in children age 6-59 months: A systematic review. *International Journal of Health Sciences*, **6**(S1), 6642–6652. DOI: <https://doi.org/10.53730/ijhs.v6nS1.6418>.
- Aspatia, U. (2020). Pengaruh intervensi makanan tambahan padat energi dan protein berbasis pangan lokal terhadap perbaikan status gizi balita. *Media Kesehatan Masyarakat*, **2**(1), 26-33. DOI: <https://doi.org/10.35508/mkm.v2i1.2027>.
- Bappenas. (2020) *Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2020–2024*. Jakarta: Bappenas. Retrieved from: <https://bappenas.go.id/files/rpjmn/Narasi-RPJMN-2020-2024.pdf> (Accessed: 11 September 2025).
- Beal, T., Tumilowicz, A., Sutrisna, A., Izwardy, D., and Neufeld, L.M. (2018). A review of child stunting determinants in Indonesia. *Maternal & Child Nutrition*, **14**(4), e12617. DOI: <https://doi.org/10.1111/mcn.12617>.
- BKKBN. (2021) *Peraturan Presiden Republik Indonesia Nomor 72 Tahun 2021 tentang Percepatan Penurunan Stunting*. Jakarta: Sekretariat Negara Republik Indonesia.
- Dinas Kesehatan Provinsi Bengkulu. (2023). *Data Prevalensi Stunting di Provinsi Bengkulu*. Retrieved from: <https://bengkuluprov.go.id/angka-stunting-di-provinsi-bengkulu> (Accessed: 11 September 2025).
- Gandotra, A., Kotyuk, E., Bizonics, R., Khan, I., Petánszki, M., Kiss, L., Paulina, L., and Cserjesi, R. (2023). An exploratory study of the relationship between motor skills and indicators of cognitive and socio-emotional development in preschoolers. *European Journal of Developmental Psychology*, **20**(1), 50-65. DOI: <https://doi.org/10.1080/17405629.2022.2028617>.
- Hapsari, W. and Yuliani, D.R. (2024). Pelatihan inovasi kantong development screening one no day untuk deteksi dini perkembangan balita bagi kader posyandu. *PengabdianMu: Jurnal Ilmiah Pengabdian kepada Masyarakat*, **9**(2), 245–252. DOI: <https://doi.org/10.33084/pengabdianmu.v9i2.5942>.
- Jayanti, N.D. and Mayasari, S.I. (2019). Pemberdayaan kader dalam pemantauan pertumbuhan dan perkembangan balita dengan DDST di Desa Mangliawan Kab. Malang. *JAPI: Jurnal Akses Pengabdian Indonesia*, **4**(1), 7-11. DOI: <https://doi.org/10.33366/japi.v4i1.1226>.
- Kemenkes RI. (2022). *Pedoman Pelaksanaan Posyandu dan Pemantauan Pertumbuhan Anak*. Jakarta: Kementerian Kesehatan Republik Indonesia.
- Kemenkes RI. (2023). *Hasil Survei Status Gizi Indonesia (SSGI) Tahun 2022*. Jakarta: Kemenkes RI. Retrieved from: <https://www.kemkes.go.id>. (Accessed: 11 September 2025).
- Kemenkes RI. (2024). *Survei Kesehatan Indonesia (SKI) Tahun 2023*. Jakarta: Kemenkes RI. Retrieved from: <https://www.badankebijakan.kemkes.go.id/hasil-ski-2023/> (Accessed: 11 September 2025).
- Nisbett, N., Gillespie, S., Haddad, L., and Harris, J. (2022). Why worry about the politics of childhood undernutrition? World nutrition and the multisectoral challenge. *Global Food Security*, **33**, 100634. DOI: <https://doi.org/10.1016/j.gfs.2022.100634>.
- Nur, A. (2025). Effectiveness of providing local food-based supplementary food on toddler nutritional status: A review. *Journal of Health Science and Pharmacy*, **2**(2), 245-251. DOI: <https://doi.org/10.36685/jhsp.v2i2.1235>.
- Nuraini, D.L., Ramadanti, D.T., and Syukrina, F. (2025). Effects of Integrated nutrition-specific and nutrition-sensitive interventions on child growth outcomes in low-and middle-income countries: A systematic review. *Proceedings Book of International Conference and Exhibition on The Indonesian Medical Education Research Institute*, **9**, 92-106. DOI: <https://doi.org/10.69951/proceedingsbookoficeonimeri.v9i-.307>.
- Rachmi, C.N., Agho, K.E., Li, M., and Baur, L.A. (2021). Stunting, underweight and overweight in children aged 2.0–4.9 years in Indonesia: Prevalence trends and associated risk factors. *PLOS ONE*, **16**(8), e0254899. DOI: <https://doi.org/10.1371/journal.pone.0254899>.

- Ruel, M.T., Quisumbing, A.R., and Balagamwala, M. (2018). Nutrition-sensitive agriculture: What have we learned so far? *Global Food Security*, **17**, 128-153. DOI: <https://doi.org/10.1016/j.gfs.2018.01.002>.
- Santoso, H., Marbun, M., Wahyuni, D., and Puspitasari, N. (2021). Multi-sectoral coordination in stunting prevention: Lessons from Indonesian districts. *Health Policy and Planning*, **36**(5), 627–635. DOI: <https://doi.org/10.1093/heapol/czab024>.
- Simbolon, D., Pasmah, A.F., Zahara, A., Utami, D.S., Awan, F.A., Sari, I.P., Oktara, M., Lestari, P.A., Maharani, S., and Marseli, T.D. (2023). Intervensi gizi balita malnutrisi melalui pemberian makanan tambahan berbasis pangan lokal dan lomba cooking class di wilayah kerja Puskesmas Lingkar Timur, Bengkulu. *ADM: Jurnal Abdi Dosen dan Mahasiswa*, **1**(3), 271–278. DOI: <https://doi.org/10.61930/jurnaladm.v1i3.392>.
- Skivington, K., Matthews, L., Simpson, S.A., Craig, P., Baird, J., Blazeby, J.M., Boyd, K.A., Craig, N., French, D.P., McIntosh, E., Petticrew, M., Rycroft-Malone, J., White, M., and Moore, L. (2021). A new framework for developing and evaluating complex interventions: Update of Medical Research Council guidance. *BMJ*, **374**, n2061. DOI: <https://doi.org/10.1136/bmj.n2061>.
- Strooband, K.F.B., Howard, S.J., Okely, A.D., Neilsen-Hewett, C., and de Rosnay, M. (2023). Validity and reliability of a fine motor assessment for preschool children. *Early Childhood Education Journal*, **51**(5), 801–810. DOI: <https://doi.org/10.1007/s10643-022-01336-z>.
- UNICEF Indonesia & Bappenas. (2024). *Formative evaluation of the national strategy to accelerate stunting prevention*. UNICEF Indonesia. Retrieved from: <https://www.unicef.org/indonesia/nutrition/reports/formative-evaluation-national-strategy-accelerate-stunting-prevention>.
- UNICEF. (2020). *Improving young children's diets during the complementary feeding period*. United Nations Children's Fund. Retrieved from: <https://www.unicef.org/reports/improving-young-childrens-diets-during-complementary-feeding-period>.
- UNICEF. (2024). *UNICEF and the Sustainable Development Goals*. UNICEF. Retrieved from: <https://www.unicef.org/sdgs>.
- Veldman, S.L.C., Hammersley, M.L., Howard, S.J., Stanley, R.M., Okely, A.D., and Jones, R.A. (2023). Associations of gross motor skills with self-regulation and executive function in preschool-aged children. *Journal of Children's Health and Wellbeing*, **48**(3), 265–275. DOI: <https://doi.org/10.1177/18369391231175524>.
- WHO, UNICEF, & World Bank Group. (2025). *Levels and trends in child malnutrition: Key findings of the 2025 edition of the Joint Child Malnutrition Estimates*. WHO. Retrieved from: <https://www.who.int/publications/b/78252>.
- WHO. (2021). *Community Engagement for Health Improvement: Technical Guidance*. Geneva: World Health Organization.
- WHO. (2023). *Nurturing care practice guide: Strengthening nurturing care through health and nutrition services*. WHO. Retrieved from: <https://www.who.int/teams/maternal-newborn-child-adolescent-health-and-ageing/child-health/nurturing-care>.
- Yosefa, P.S. and Tahun, O.D. (2022). Pengaruh pemberian PMT lokal terhadap peningkatan status gizi pada balita gizi kurang. *Syntax Literate: Jurnal Ilmiah Indonesia*, **7**(6), 6857–6864. Retrieved from: <https://jurnal.syntaxliterate.co.id/index.php/syntax-literate/article/view/7274>.
- Yousafzai, A.K., Rasheed, M.A., Rizvi, A., Armstrong, R., and Bhutta, Z.A. (2014). Effect of integrated responsive stimulation and nutrition interventions in the Lady Health Worker programme in Pakistan on child development, growth, and health outcomes: A cluster-randomised factorial effectiveness trial. *The Lancet*, **384**(9950), 1282–1293. DOI: [https://doi.org/10.1016/S0140-6736\(14\)60455-4](https://doi.org/10.1016/S0140-6736(14)60455-4).