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Local Food Based Supplementary Feeding To Prevent Stunting In Coastal Areas: A Review

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Abstract

Stunting remains a persistent public health challenge in Indonesia, particularly in coastal communities where food insecurity and limited dietary diversity are common. Locally sourced foods, especially fish and moringa based products, have been proposed as culturally relevant and sustainable interventions. This systematic literature review analyzed 18 peer reviewed articles published between 2022 and 2025 that evaluated supplementary feeding interventions using local food ingredients for stunting prevention and treatment in children. Evidence consistently indicates that local food based products such as fish nuggets fortified with moringa leaves, rebon shrimp based meals, and other seafood innovations significantly improve child growth indicators, including height for age and weight for age z scores. Community acceptance was generally high, highlighting the importance of cultural relevance. Key challenges included seasonal variability of raw materials, production costs, and caregiver knowledge gaps. Community empowerment and integration with health policies were essential for sustainability. Overall, locally sourced supplementary feeding is both effective and socially acceptable for reducing stunting in coastal settings. Indonesia's experience demonstrates how nutrition, culture, and policy can converge to create scalable models for child health, underscoring the urgent need to strengthen and replicate these approaches to prevent intergenerational cycles of malnutrition.

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Introduction

Stunting remains one of the most pressing public health challenges globally, particularly in low- and middle-income countries where access to diverse foods and adequate nutrition services is limited (World Health Organization [WHO], 2021). Coastal communities are especially vulnerable due to geographical isolation, economic instability, and seasonal food insecurity, which together contribute to chronic undernutrition and higher stunting prevalence among children under five years of age (Yuliantini, Sukiyono, Yuliarso, & Sulistyo, 2022).

In Indonesia, stunting persists as a major health concern, particularly in coastal regions. Case-control studies in areas such as Central Buton and Nabire have shown that maternal characteristics, family food security, and children's protein intake significantly influence stunting risk (Hasan, 2023; Ibrahim, Khomsan, & Riyadi, 2023). These findings emphasize that beyond biological factors, household-level food availability and socioeconomic conditions strongly determine nutritional outcomes in coastal populations. One promising approach to addressing stunting is supplementary feeding using locally available foods. Conventional interventions that rely on imported or fortified products often face challenges such as high costs, limited sustainability, and lower acceptance by communities. In contrast, programs that utilize local resources not only provide affordable and nutritionally adequate diets but also foster cultural appropriateness and community ownership (Iriani et al., 2024). Strengthening local food systems—through agriculture and fisheries—further enhances resilience and reduces dependency on external aid.

Evidence from both national and international studies highlights that local food-based interventions improve dietary diversity, increase intake of essential nutrients such as protein, iron, and

vitamin A, and enhance program sustainability when combined with nutrition education. For instance, complementary feeding education programs in South Africa demonstrated improvements in child nutritional status, underscoring the importance of linking food provision with caregiver knowledge and behavior change (Makwela, Mushaphi, & Makhado, 2024). Similarly, evaluations of large-scale feeding programs in Bangladesh, Ethiopia, and Vietnam found that equity gaps must be addressed to ensure that the most vulnerable groups benefit from such interventions (Sanghvi, Godha, & Frongillo, 2024).

However, challenges remain. Seasonal availability of certain local foods, limited caregiver knowledge, and inadequate monitoring often reduce the effectiveness of interventions (Yuliantini et al., 2022). Addressing these barriers requires multisectoral collaboration—linking health, agriculture, education, and local governance—to create an enabling environment for sustainable nutrition programs (Iriani et al., 2024). Moreover, integrating maternal empowerment initiatives alongside feeding interventions has shown to amplify positive outcomes by strengthening household decision-making and resource allocation (Hasan, 2023; Ibrahim et al., 2023).

From a global health perspective, stunting prevention aligns with the Sustainable Development Goals (SDGs), particularly Goal 2 (Zero Hunger) and Goal 3 (Good Health and Well-Being). By promoting local food-based strategies, countries can simultaneously advance food security, reduce inequalities, and build community resilience (WHO, 2021). This approach ensures that interventions are not only effective in the short term but also sustainable and adaptable across different coastal settings.

Therefore, the aim of this review is to synthesize recent evidence (2022–2025) on the effectiveness, challenges, and sustainability of supplementary feeding programs using local food sources in coastal areas. Furthermore, it explores opportunities for integrating these interventions into national nutrition policies to accelerate progress in reducing stunting prevalence.

Methods

This study employed a literature review approach by examining national and international journals retrieved from Google Scholar, PubMed, and ScienceDirect. The search used the keywords "local food-based supplementary feeding," "stunting," "complementary feeding," "coastal communities," and "child nutrition," restricted to publications from 2023–2025. Eligible articles were required to be original research using either quantitative or qualitative methods, written in English or Indonesian, published in peer-reviewed journals, and available in open access full-text.

Exclusion criteria included duplicate articles, conference abstracts, non-English/Indonesian publications, and irrelevant reviews. However, one review article was included as it provided an important conceptual framework. In total, 18 articles that met the criteria were reviewed, focusing on local food-based supplementary feeding and stunting prevention in coastal populations.

Results

From the initial search across Google Scholar, PubMed, and ScienceDirect, a total of 45 articles were identified. After applying the inclusion and exclusion criteria—such as publication year (2020–2025), research design, relevance to the topic, and availability of full-text open access—only 18 articles met the eligibility requirements and were included in this review. These selected studies specifically examined the role of local food-based interventions in improving nutritional status and preventing stunting, particularly in coastal communities. The summary of the reviewed articles is presented in the following table.

Table 1. Articles Collected

Author & Year	Intervention	Key Findings
Simanjuntak (2023)	Tilapia fish nuggets as supplementary food	Increased protein intake for toddlers, potential to reduce stunting risk.
Nurmala et al. (2024)	Processed rebon shrimp as PMT	Effective strategy to accelerate stunting reduction.
Shinta et al. (2023)	Mackerel nuggets with tofu & moringa	High protein and iron content; supports child nutrition.
Lukman et al. (2023)	Smoked skipjack tuna as supplementary food	Alternative local innovation with community acceptance.
Sri et al. (2024)	Processed seafood for stunting toddlers	Significant improvement in height and weight.
Anggie et al. (2025)	Catfish (patin) nuggets with moringa leaves	Nutrient-rich, effective in stunting prevention.
Nirmala et al. (2022)	Seafood as local protein source	Supports child growth and development in coastal areas.
Este et al. (2024)	Supplementary feeding in stunted	Increased height significantly.

Author & Year	Intervention	Key Findings
	toddlers	
Mulyadi et al. (2025)	Sea fish & virgin coconut oil	Effective to address stunting and related health issues.
Fransiskus et al. (2024)	Supplementary feeding in Bengkayang	Improved weight and height in stunted toddlers.
Sulistyawati et al. (2022)	Rebon shrimp–based supplementary food	Beneficial for improving height of stunted children.
Haruni et al. (2024)	Mackerel fish nuggets fortified with moringa leaf flour (3% & 7%)	Increased HAZ and WAZ in stunted toddlers; strong evidence of local food fortification.
Solehah et al. (2024)	Nuggets from skipjack tuna, corn, sweet potato, soybean, komak beans, and moringa	Developed energy- and protein-rich formulation; potential to address stunting.
Erianti & Cholifah (2024)	Catfish nuggets with moringa leaves	Accepted by children; demonstrated nutritional potential and social acceptance.
Sari et al. (2024)	Skipjack tuna nuggets with moringa leaves	Focused on acceptance; highlighted importance of community preference.
Yuniati et al. (2024)	Flying fish, millet flour, and moringa leaf nuggets	Tested organoleptic properties and nutrition; suitable for PMT.
Ismail et al. (2024)	Flying fish, foxtail millet flour, and moringa leaf nuggets (6–23 months)	Nutritionally complete; feasible as supplementary feeding for young children.
Christyaningsih et al. (2024)	Community empowerment with moringa-based food diversification	Strengthened community capacity; emphasized sustainability and empowerment.

Overall, the reviewed studies consistently highlight the potential of local food innovations—particularly fish, shrimp, and seaweed-based products—in improving child nutrition and addressing stunting in coastal communities. Interventions using processed seafood (e.g., nuggets, smoked fish, or shrimp-based supplementary food) demonstrated significant effects on weight and height gain, while the addition of nutrient-dense ingredients such as moringa leaves further enhanced protein and micronutrient content. Community-based approaches, including empowerment initiatives and school or household-level feeding programs, showed strong feasibility and acceptance. Despite these promising outcomes, challenges remain in terms of sustainability, cultural food preferences, and ensuring consistent program implementation across different regions.

Discussion

Nutritional Benefits of Local Food-Based Interventions

Findings from this review indicate that local foods based on fish and moringa leaves hold significant potential to improve the nutritional status of coastal children. Simanjuntak (2023) demonstrated that tilapia nuggets can serve as a beneficial protein supplement for stunted toddlers. Haruni et al. (2024) reinforced this evidence by showing that mackerel nuggets fortified with moringa leaf flour improved HAZ and WAZ scores in stunted children. Similarly, Solehah et al. (2024) developed a nugget formulation from skipjack tuna, corn, yellow sweet potato, soybeans, komak beans, and moringa leaves as an energy- and protein-rich supplementary food, highlighting the potential of local ingredient diversification for nutrition interventions. These consistent findings align with global studies, which emphasize that seafood rich in protein and omega-3 contributes to linear growth and child brain health (Iannotti et al., 2021; FAO, 2021).

Community-Based Feeding and Cultural Acceptance

The success of local food interventions depends not only on their nutritional content but also on social and cultural acceptance. Lukman et al. (2023) found that smoked fish as a supplementary food rooted in tradition received positive acceptance within communities. Similarly, Sari et al. (2024) highlighted high levels of community acceptance for skipjack tuna nuggets enriched with moringa leaves. Nurmala et al. (2024), in a systematic review, also emphasized that products made from rebon shrimp are both nutritionally valuable and socially accepted. This resonates with Oniang'o and Mutuku's (2019) perspective that cultural acceptance is a key determinant of the success of nutrition interventions at the community level.

Innovation and Sustainability Challenges

The innovation of local food development continues to progress through various new formulations. Erianti and Cholifah (2024) demonstrated that catfish nuggets with moringa leaves are not only nutrient-rich but also favored by children, showing strong potential for long-term sustainability. Yuniati et al. (2024) and Ismail et al. (2024) explored combinations of flying fish, millet/jewawut flour, and moringa leaves to produce nuggets with complete nutritional content, making them suitable as supplementary feeding (PMT) for children aged 6–23 months. However, challenges remain, including the seasonality of raw materials, production costs, and limited caregiver education (Latifahanun et al., 2024; Fransiskus et al., 2024). Christyaningsih et al. (2024) added an important perspective, emphasizing that sustainability can only be achieved if interventions are integrated with community empowerment, for example through diversification of moringa-based products that can be produced independently by local communities.

Effectiveness of Supplementary Feeding Programs

Quantitative evidence demonstrates the tangible effectiveness of supplementary feeding programs based on local food. Sulistyawati et al. (2022) reported an increase in children's height through the provision of food made from rebon shrimp. Fransiskus et al. (2024) and Latifahanun et al. (2024) found similar results, showing that supplementary feeding programs improved both weight and height in toddlers. International studies support these findings: Ruel et al. (2018) emphasized that integrating local foods into community nutrition programs can reduce the burden of malnutrition, although logistical and cost limitations remain challenges

Unique Contribution to Global Literature

Overall, the reviewed literature highlights three main pillars of local food interventions: nutritional effectiveness, cultural acceptance, and program sustainability. Innovations such as fish and moringa leaf nuggets—whether made from tilapia, mackerel, catfish, skipjack, or tuna—demonstrate that local foods have great potential to serve as effective, acceptable, and sustainable supplementary feeding options. The unique contribution of this review is its emphasis on Indonesia as a laboratory of local food innovations that can serve as a model for other developing countries with coastal characteristics. By combining nutritional evidence, sociocultural aspects, and public policy support, this review expands the global understanding of context-specific and sustainable community-based stunting interventions.

Conclusion

This review highlights that locally sourced foods—particularly fish- and moringa-based products—hold strong potential to improve child nutrition in coastal communities. Beyond their proven nutritional value, these interventions succeed when they align with cultural practices and are supported by community-driven innovation and sustainable systems. Collectively, the evidence underscores that local food–based supplementary feeding can be both an effective and contextually relevant solution to stunting.

The unique contribution of this study is to position Indonesia's diverse coastal communities as a model for integrating nutrition science, cultural acceptance, and local empowerment into public health strategies. By bridging evidence from nutrition, policy, and practice, this review shows that innovation in local food interventions can inform both national and global approaches to child nutrition.

Addressing stunting through culturally embedded and sustainable programs is not only feasible but urgent. Without bold action to strengthen community-based and policy-supported food interventions, the window of opportunity to improve child growth and break intergenerational cycles of malnutrition will continue to close.

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