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MAPPING STUNTING REDUCTION EFFORTS IN INDONESIA: A SCOPING REVIEW OF EVIDENCE PUBLISHED FROM 2020 TO 2025

Refani Alycia Kusuma[1*], Dian Putri Mumpuni[2], Helmi Prinanda[2,3]

[1]Nutrition Departement, Faculty of Medicine, Univeristas Negeri Semarang, Semarang, Indonesia
[2]Edukazi Indonesia Bergizi, Indonesia
[3]Varians Statistik Kesehatan, Tangerang, Indonesia

*Corresponding Author: refani.alycia15@gmail.com

Abstract

Background: Indonesia reduced its national stunting prevalence from 21.5% in 2023 to 19.8% in 2024 through accelerated multisectoral interventions. However, evidence regarding the characteristics, implementation approaches, and outcomes of these interventions remains fragmented. **Objective:** This scoping review mapped evidence on stunting reduction efforts in Indonesia published between 2020 and 2025, focusing on intervention and policy characteristics, target populations, implementation approaches, reported outcomes, and evidence gaps. **Methods:** A scoping review was conducted following the Joanna Briggs Institute methodology and reported according to PRISMA-ScR. Scopus and PubMed/MEDLINE were searched for studies published between January 2020 and December 2025. Eligible studies included direct intervention and program evaluations as well as policy, implementation, and contextual evidence informing stunting reduction efforts in Indonesia. Findings were synthesized using narrative evidence mapping. **Results:** Thirty-three studies were included. Nutrition supplementation and complementary feeding were the most frequently reported interventions, followed by nutrition education, community empowerment, health cadre strengthening, governance, and multisectoral collaboration. Most interventions improved maternal knowledge, child feeding practices, health worker capacity, community participation, and child growth indicators. Successful implementation consistently depended on implementation capacity, interprofessional collaboration, community engagement, and supportive local governance. Limited evidence was identified regarding implementation fidelity, cost-effectiveness, scalability, and long-term sustainability. **Conclusion:** Indonesia's stunting reduction efforts have evolved toward integrated, multisectoral strategies addressing both immediate and undrlying determinants of child growth. Strengthening implementation research and context-specific, evidence-informed approaches will be essential to sustain equitable reductions in childhood stunting.

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Keywords: Stunting; Nutrition interventions; Multisectoral collaboration; Evidence Mapping; Child nutrition.

Introduction

Stunting remains one of the most persistent public health and human development challenges worldwide, affecting children's physical growth, neurocognitive development, educational attainment, and long-term economic productivity.[1] Despite substantial global progress in reducing chronic undernutrition over the past decade, millions of children under five years of age continue to experience impaired linear growth, particularly in low- and middle-income countries.[2] Beyond its immediate health consequences, stunting increases susceptibility to infectious diseases, reduces educational achievement, and contributes to the intergenerational cycle of poverty and malnutrition.[3,4] Indonesia has made substantial progress in reducing childhood stunting in recent years. According to the *Survei Status Gizi Indonesia* (SSGI), national stunting prevalence declined from 21.5% in 2023 to 19.8% in 2024, representing the first national estimate below 20%.[5,6] Nevertheless, the burden remains considerably higher than the national target and continues to exhibit marked disparities across provinces, districts, and socioeconomic groups. Moreover, millions of Indonesian children continue to experience impaired linear growth during the first 1,000 days of life, highlighting that stunting remains a major barrier to achieving equitable human development and the vision of Golden Indonesia 2045.[7]

Recognizing the multifactorial nature of stunting, the Government of Indonesia has implemented a national acceleration agenda emphasizing the convergence of nutrition-specific and nutrition-sensitive interventions through multisectoral collaboration across the health, education, agriculture, water and sanitation, social protection, and local governance sectors.[5,8] This policy approach has promoted integrated action across sectors rather than relying on nutrition-specific interventions alone. Various initiatives have been introduced, including maternal and child nutrition programs, breastfeeding promotion, complementary feeding, micronutrient supplementation, community-based nutrition services through Integrated Child Health Posts (*Posyandu*), adolescent nutrition programs, food security initiatives, digital health innovations, WASH-related strategies, and strengthened monitoring

and referral systems. While these efforts have contributed to measurable improvements in national indicators, implementation remains heterogeneous across regions due to differences in local capacity, governance, financing, and contextual challenges.[8]

Alongside these national initiatives, a growing body of research has evaluated diverse approaches to stunting reduction in Indonesia. Published study have examined community-based nutrition education, maternal empowerment, food supplementation, digital nutrition interventions, school-based programs, WASH-related and environmental evidence, health system strengthening, policy implementation, and multisectoral collaboration.[9] The available evidence remains fragmented across disciplines, intervention types, target populations, and implementation settings. Most existing studies focus on individual programs or specific geographic areas, making it difficult for researchers and policymakers to obtain a comprehensive understanding of the range of strategies implemented, their characteristics, implementation approaches, and reported outcomes.

To date, no comprehensive scoping review has systematically mapped the breadth of evidence on stunting reduction efforts implemented in Indonesia during the recent national acceleration period. Existing reviews have primarily synthesized the effectiveness of specific nutrition interventions or examined determinants and risk factors of stunting rather than providing an overarching map of intervention strategies, program implementation, policy initiatives, multisectoral actions, implementation barriers, facilitators, and remaining evidence gaps. However, existing reviews have not comprehensively integrated intervention characteristics with implementation approaches, policy initiatives, multisectoral actions, implementation barriers and facilitators, and remaining evidence gaps within an Indonesia-specific evidence map. Given the rapidly expanding literature and the evolving policy landscape, a comprehensive evidence mapping is essential to support evidence-informed decision-making, identify research priorities, and strengthen future program design.

Therefore, this scoping review aims to systematically map the available evidence on stunting reduction efforts implemented in Indonesia between 2020 and 2025, with particular attention to intervention characteristics, target populations, implementation approaches, reported outcomes, implementation barriers and facilitators, and evidence gaps. By

identifying the current landscape of evidence as well as remaining research gaps, this review is expected to provide a comprehensive reference for researchers, practitioners, and policymakers seeking to accelerate stunting reduction and improve child nutrition outcomes in Indonesia.

Methods

This scoping review was conducted to systematically map the published evidence on stunting reduction efforts in Indonesia from 2020 to 2025. The review followed the Joanna Briggs Institute (JBI) methodology for scoping reviews and was reported in accordance with the Preferred Reporting Items for Systematic Reviews extension for Scoping Reviews (PRISMA-ScR).[10,11] The study selection process is presented using a PRISMA-ScR flow diagram (Figure 1).

A comprehensive literature search was conducted on 10th July 2026 using two electronic databases: Scopus and PubMed/MEDLINE. Scopus and PubMed/MEDLINE were selected as the primary databases because they provide broad coverage of peer-reviewed biomedical, health, nutrition, and multidisciplinary literature relevant to stunting reduction. Google Scholar and SINTA were not systematically searched because differences in indexing and search functionality may reduce the reproducibility and consistency of the search process. The potential omission of Indonesian-language and locally indexed studies was considered as a limitation of the review.

The search strategy was developed using the Population–Concept–Context (PCC) framework and combined keywords related to stunting, interventions, programs, policies, implementation strategies, and Indonesia. The search terms included combinations of "stunting", "stunted growth", "childhood stunting", "intervention", "program", "policy", "strategy", "stunting reduction", "stunting prevention", "Indonesia", and "Indonesian" using Boolean operators (AND/OR). Reference lists of eligible articles were also manually screened to identify additional relevant studies.

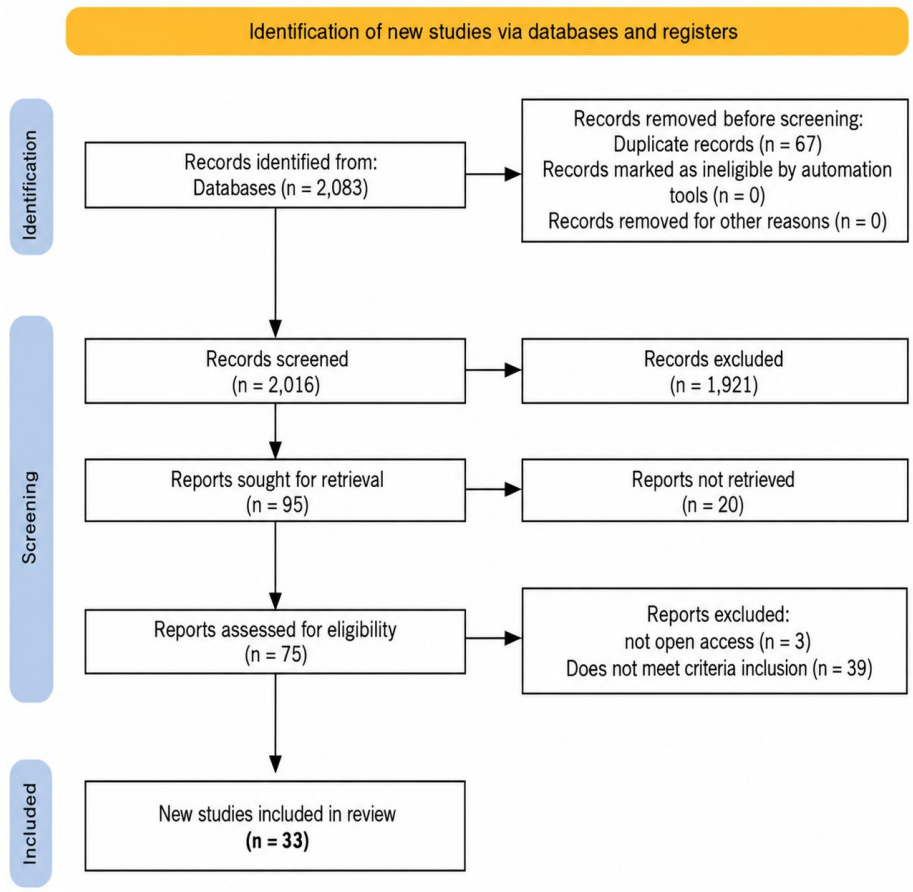


Figure 1. PRISMA-ScR flow diagram of study identification, screening, eligibility assessment, and inclusion for the scoping review of stunting reduction efforts in Indonesia, 2020–2025, guided by the Population–Concept–Context (PCC) framework.

The review applied the Population–Concept–Context (PCC) framework recommended by the Joanna Briggs Institute. The population included Indonesian populations targeted by or relevant to stunting reduction efforts, including women of reproductive age, pregnant women, lactating mothers, infants, children under five years, adolescents, families, communities, health workers, and policymakers. The concept focused on stunting reduction efforts, including nutrition-specific and nutrition-sensitive interventions, community-based strategies, health system strengthening, policy initiatives, implementation strategies, and multisectoral approaches. The context was limited to studies addressing stunting reduction in Indonesia, with publication dates restricted to January 2020 through December 2025.

Studies published between January 2020 and December 2025 were eligible if they

directly evaluated, described, or generated empirical evidence on a stunting reduction intervention, program, policy, prevention strategy, or implementation approach in Indonesia. Studies providing contextual or determinant-related evidence were eligible only when their findings had an explicit and actionable relevance to stunting reduction, such as informing intervention targeting, program design, policy prioritization, resource allocation, or implementation planning. Primary quantitative, qualitative, mixed-methods, implementation, and program evaluation studies published in English were included. Studies reporting only stunting prevalence, determinants, or risk factors without a direct link to an intervention, program, policy, prevention strategy, or actionable implementation recommendation were excluded. Reports without accessible full text were excluded because sufficient information was required for data extraction and eligibility assessment. Review articles, conference abstracts, editorials, protocols, and grey literature were also excluded.

The 2020–2025 period referred to the publication year rather than the period in which an intervention was implemented or data were collected. Therefore, studies published within the eligible publication window were retained when they provided direct evidence on a stunting reduction intervention, program, policy, or implementation strategy, even if they analyzed historical program data or earlier implementation periods. The intervention or data-collection period was extracted separately during data charting to distinguish the publication window from the period represented by the evidence. This distinction was applied consistently during study selection and data extraction.

All retrieved records were exported to Mendeley Reference Manager for duplicate removal and subsequently imported into Rayyan for title, abstract, and full-text screening. Two reviewers independently screened the records, and disagreements were resolved through discussion until consensus was reached. Data were extracted from the included studies using a standardized charting approach, including first author, publication year, study location, study design, target population, intervention or program characteristics, implementation approach, reported outcomes, and key findings. For studies reporting implementation or contextual evidence, additional information on implementation barriers, facilitators, policy context, and reported evidence gaps was extracted when available.

Given the heterogeneity of study designs, intervention types, implementation settings, and outcome measures, a meta-analysis was not appropriate. Findings were therefore synthesized narratively using an evidence-mapping approach to describe intervention categories, target populations, implementation approaches, reported outcomes, implementation barriers and facilitators, and evidence gaps. Consistent with the objective of a scoping review and JBI guidance, no formal critical appraisal or risk-of-bias assessment was undertaken, as the primary aim was to map the breadth, characteristics, and implementation-related evidence rather than estimate intervention effectiveness.

Results and Discussion

1. Characteristics and Geographic Distribution of Included Studies

A comprehensive search of Scopus and PubMed/MEDLINE identified 2,083 records related to stunting reduction in Indonesia. After removal of 67 duplicates, 2,016 records underwent title and abstract screening. Ninety-five reports were sought for retrieval, of which 75 were assessed for eligibility after excluding 20 reports that could not be retrieved. Following full-text assessment, 42 reports were excluded, including 3 that were not open access and 39 that did not meet the predefined inclusion criteria (Figure 1). The included studies comprised direct evaluations of nutrition and community-based interventions, program implementation and health-system strategies, and policy or multisectoral approaches relevant to stunting prevention and reduction. Studies focusing solely on stunting prevalence, determinants, or risk factors without an explicit link to an intervention, program, policy, prevention strategy, or actionable implementation recommendation were excluded.

The included studies varied substantially in geographical coverage, study design, target population, and intervention or policy focus (Table 1). Most studies were conducted in provinces with a high burden of stunting, including East Java, East Nusa Tenggara, West Java, South Sulawesi, and Yogyakarta, while several analyzed nationwide datasets. Cross-sectional studies predominated, although qualitative, mixed-methods, quasi-experimental, randomized controlled trials, ecological studies, and program evaluations were also identified. This methodological diversity reflects the range of evidence used to examine both intervention delivery and the contextual factors relevant to stunting reduction.[12–20] The diversity of study

designs is consistent with the broader growth of implementation-oriented research, which seeks to translate evidence-based nutrition interventions into effective and sustainable public health practice.[21,22]

The methodological diversity was accompanied by considerable variation in intervention targets and implementation settings. The interventions targeted pregnant women, mothers and caregivers, children under five, adolescents, *Posyandu* cadres, community leaders, and policymakers. Nutrition-specific interventions, including supplementary feeding, breastfeeding promotion, complementary feeding, and maternal nutrition education, remained the most frequently reported approaches. Increasing attention was also directed toward nutrition-sensitive strategies, including WASH, social protection, community empowerment, village governance, digital health, and multisectoral collaboration.[13,14,17–19,23–29] This pattern is consistent with WHO and UNICEF recommendations that sustainable stunting reduction requires integrated action addressing both immediate and underlying determinants of child growth.[8,30,31]

Across the included studies, reported outcomes included improvements in maternal knowledge, child feeding practices, community participation, health worker capacity, nutritional status, and child growth.[14,17–19,24,25,32–34] However, reported effectiveness was influenced by implementation quality, community engagement, health-system capacity, multisectoral coordination, and local governance.[35] These findings indicate that expanding intervention coverage alone may be insufficient unless interventions are supported by the systems and community structures required for consistent delivery and follow-up.

The evidence therefore indicates a broadening of Indonesia's stunting reduction efforts from predominantly nutrition-specific approaches toward more integrated strategies involving communities, primary healthcare, social protection, governance, and multisectoral collaboration. Important gaps remain in evidence on implementation fidelity, long-term effectiveness, scalability, cost-effectiveness, and sustainability across diverse regional settings.

Table 1. Characteristics of the 33 Included Studies by Study Design, Population, Intervention/Program, and Main Findings

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
1	Andriani et al. (2025)[36]	Projecting the impact of a national strategy to accelerate stunting prevention in East Nusa Tenggara, Indonesia, using the Lives Saved Tool	East Nusa Tenggara	Modeling study	Children under five years	National Strategy to Accelerate Stunting Prevention (Stranas Stunting), including breastfeeding promotion, vitamin A supplementation, and multiple micronutrient supplementation (MMS)	Breastfeeding promotion was projected to contribute the largest reduction in stunting cases, followed by vitamin A and MMS. Scaling up priority nutrition interventions under the national strategy could substantially increase the number of stunting cases averted and support progress toward national and SDG targets.
2	Bahar et al. (2025)[14]	Strengthening the Role of Community Health Workers in High Stunting Prevalence Areas of Kendari City, Southeast Sulawesi Province, Indonesia: A Qualitative Study	Southeast Sulawesi (Kendari City)	Qualitative study (FGDs, in-depth interviews, observations, content analysis)	*Posyandu* cadres, healthcare workers, mothers of stunted children, and local government representatives (n=16)	Strengthening the role of *Posyandu* cadres in community-based stunting prevention through growth monitoring, home visits, nutrition education, counseling, referral, and community outreach	Experienced *Posyandu* cadres played a pivotal role in increasing community trust, improving maternal engagement, reducing stigma, facilitating growth monitoring, and supporting early detection of stunting. However, strengthening cadre competencies in counseling, anthropometric measurement, and program management remains essential.
3	Azis et al. (2025)[37]	Parenting Behaviour and Stunting Prevention in South Sulawesi Province, Indonesia	South Sulawesi (Makassar City and	Cross-sectional study	260 families with children under five	Assessment of family parenting behaviour for stunting prevention, including parenting knowledge, nutrition	Parenting behaviour was significantly associated with parenting knowledge, nutrition knowledge, environmental sanitation knowledge, parenting attitudes, parenting motivation,

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
			Jeneponto Regency)			knowledge, environmental sanitation knowledge, parenting attitudes, motivation, family planning, and local culture	family planning, and cultural factors ($p<0.05$). Culture was identified as the strongest predictor of appropriate parenting behaviour, followed by environmental sanitation knowledge, family planning, and parenting attitudes. The study recommends culturally tailored, family-based interventions involving community and religious leaders to strengthen stunting prevention
4	Pasaribu et al. (2025)[38]	Empowering Mothers in Utilizing Local Food Based on Mixed Fish to Prevent Stunting: A Reflection Study in Participatory Action Research	North Sumatra (Deli Serdang Regency)	Participatory action research	50 mothers of children aged 0–5 years, supported by 10 trained PKK members and health cadres	Maternal empowerment through Participatory Action Research, nutrition education, local mixed-fish food utilization, cadre training, and community-based behaviour change	The program significantly improved maternal knowledge and attitudes toward child nutrition. Training community health cadres and PKK mothers as change agents promoted sustainable behaviour change and strengthened community participation in stunting prevention through locally available food resources.
5	Prayitno et al. (2025)[27]	Exploring the Role of Food Security in Stunting Prevention Efforts in the Bondowoso Community, Indonesia	East Java (Bondowoso Regency)	Cross-sectional study	113 mothers of stunted children aged 0–59 months from seven villages in Wonosari District	Assessment of food security pillars (food availability, food accessibility, and food utilization) in relation to household stunting prevention practices	Food security significantly influenced stunting prevention efforts. Food availability was the strongest predictor of prevention behaviours, followed by food accessibility, while food utilization showed limited direct effects. The study highlights

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
							strengthening household food security as a key strategy for reducing stunting in rural communities.
6	Puteri & Fitria (2025)[23]	Access to Sanitation and Its Impact on Stunting in Toddlers in East Nusa Tenggara, Indonesia	East Nusa Tenggara (Province-wide)	Secondary cross-sectional study	4,224 children aged 0–59 months	WASH-related strategies and contextual evidence.	Inadequate sanitation access significantly increased the risk of stunting (adjusted OR = 1.56). Residence was an important confounding factor, with children living in rural areas having a substantially higher risk of stunting. The study recommends expanding sanitation , particularly in rural communities, as part of comprehensive stunting prevention efforts.
7	Sandra et al. (2025)[39]	Establish the Policy Target to Reduce Stunting Among Indonesian Toddlers with Single Mothers	Nationwide (Indonesia)	Secondary cross-sectional study	5,387 toddlers living with single mothers	Policy-targeting evidence for vulnerable single-mother households based on socioeconomic and maternal characteristics.	The study identified rural residence, young maternal age, low maternal education, unemployment, low household wealth, lack of antenatal care (ANC), older toddler age, and female sex as priority targets for stunting reduction policies. It recommends integrated, multisectoral, and area-based interventions focusing on vulnerable single-mother households.
8	Fatkuriyah et al. (2025)[40]	Risk Factors of Stunting among	East Java (Jember	Cross-sectional study	163 mothers and children	Contextual evidence for community-based	Maternal short stature, low paternal education, and low household income

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
		Children in Rural Area of Jember, Indonesia	Regency, Sukosari Village)		aged 12–59 months living in a rural area	prevention targeting; nutrition education and family support recommended for vulnerable rural household	were significant predictors of stunting. Maternal height was the strongest determinant (OR=8.495). The study recommends strengthening nutrition education, promoting 12-year compulsory education, improving family economic support, and prioritizing adequate nutrition for girls and women across the life course to prevent intergenerational stunting.
9	Mauludyani et al. (2025)[12]	Factors Associated with Stunting Prevalence in Indonesia: A Multilevel Analysis of Island Disparities	Nationwide (514 districts across eight major islands in Indonesia)	Ecological study	District-level population across 514 districts and eight major islands	Regional policy evidence identifying poverty, food security, clean water, health workforce, and women's education as priorities for region-specific strategies.	Poverty, high household food expenditure, limited access to clean water, low health worker coverage, and regional economic disparities were significantly associated with higher stunting prevalence. The study recommends tailoring stunting reduction programs to regional characteristics rather than applying uniform national strategies.
10	Musviro et al. (2025)[41]	Smart Class Innovation Using Tes Duga to Accelerate Stunting Prevention in Agricultural Areas	East Java (Lumajang Regency)	Pre-experimental one-group pretest–posttest study	107 parents of children under five years living in agricultural communities	Smart Class Program using the Tes Duga (Guessing Stunting with Snakes and Ladders) educational game, combined with focus group discussions and complementary feeding	The Smart Class intervention significantly improved parental knowledge and attitudes regarding stunting prevention ($p < 0.001$). Mean knowledge scores increased from 73.36 before the intervention to 87.01 after the intervention, demonstrating that interactive game-based nutrition

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
						demonstrations based on local food resources	education effectively strengthened parental capacity for stunting prevention in agricultural communities.
11	Aisyah et al. (2025)[42]	Strategy for Accelerating Stunting Reduction Program in Tasikmalaya City, Indonesia Using Analytic Hierarchy Process (AHP)	West Java (Tasikmalaya City)	Mixed-methods study	Fourteen stakeholders involved in stunting policy and program implementation, including representatives from the Health Office, Food Security Office, BAPPEDA, Social Services, BPS, PERSAGI, and community nutrition experts	Policy prioritization for accelerating stunting reduction using the Analytic Hierarchy Process (AHP), focusing on macronutrient interventions, micronutrient supplementation, nutrition education, and food security strategies	Macronutrient intake intervention was identified as the highest-priority strategy for accelerating stunting reduction, followed by food insecurity-free environmental interventions. Budgetary readiness, community readiness, institutional sustainability, and infrastructure were identified as the main determinants influencing program prioritization. The study recommends strengthening locally sourced supplementary feeding, multisectoral collaboration, and sustainable policy implementation.
12	Sutrisna et al. (2025)[18]	Moringa Leaves-Added Food, Baby Massage, and Tui Na Massage to Reduce Stunting Rate on Young	Aceh (North Aceh District, Simpang Keramat)	Quasi-experimental study	50stunted children aged 0–2 years (25 intervention; 25 control)	Integrated intervention consisting of a balanced diet supplemented with Moringa oleifera leaves, baby massage, and Tui Na massage for 2.5 months	The integrated intervention significantly improved children's growth. The intervention group experienced a mean weight gain of 0.48 kg and a mean height increase of 2.84 cm, with significant differences in both weight ($p < 0.001$) and height (p

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
		Children in Indonesia					= 0.003) compared with the control group. The study concluded that combining locally available nutrient-rich foods with sensory stimulation effectively improved the nutritional status of stunted children
13	Andrestian et al. (2025)[43]	Analysis of Nutrition Intervention Policies in the Prevalence of Stunting in Indonesia	South Kalimantan	Mixed-methods study	Thirteen districts/cities in South Kalimantan; Health Office representatives and regional planning documents (RPJMD)	Analysis of district nutrition intervention policies, including specific nutrition intervention programs, policy actors Regional Government Organizations (OPDs), and budget allocation for stunting reduction	Most districts had implemented nutrition intervention programs aligned with national policy standards. However, no significant association was found between program alignment or budget allocation and district-level stunting prevalence. Qualitative findings emphasized that cross-sectoral convergence, governance, and program implementation were more influential than program quantity or budget alone
14	Karuniawati et al. (2025)[15]	Is Adolescent Health a Priority Program? A Qualitative Study on the Stunting Prevention Program in Gunungkidul, Yogyakarta, Indonesia	Special Region of Yogyakarta (Gunungkidul Regency)	Qualitative study with a phenomenological approach (in-depth interviews and focus group discussions)	Health Office officials, PKPR (Adolescent Health Care Services) officers, members of the district stunting task force, and	Evaluation of adolescent-focused stunting prevention programs, including the Weekly Iron Folic Acid (WIFA) supplementation program, PKPR (Adolescent Health Care Services), adolescent	The study found that adolescent health had not yet become a priority within local stunting prevention efforts. Although WIFA distribution and PKPR activities were implemented, program effectiveness was constrained by limited funding, insufficient human resources, weak monitoring and evaluation, and low

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
					Family Planning Office representatives (n = 12)	empowerment, health education, counselling, and reproductive health promotion	adolescent compliance with iron supplementation. The authors emphasized strengthening cross-sector collaboration, parental involvement, and adolescent empowerment to improve program sustainability
15	Prayitno et al. (2025)[44]	Community-powered Environmental Pathways to Reduce Stunting: Food Security, Social Capital, and Open Innovation in Semi-Urban Indonesia	East Java (Bumiaji District, Batu City)	Mixed-methods study	120 households with children under five and 15 key informants (caregivers, *Posyandu* cadres, community leaders)	Community-based stunting prevention integrating food security, WASH, social capital, *Posyandu*, PKK, and open innovation through peer groups, co-creation with health workers, stakeholder engagement, and local knowledge integration	Food security significantly improved toddler feeding, sanitation, and preventive health behaviours, while social capital strengthened these effects. Community-led open innovation through *Posyandu*, PKK, peer support, and cross-sector collaboration accelerated behaviour change and supported sustainable stunting prevention. The study recommends institutionalising community co-design and cross-sector governance to strengthen local stunting prevention programs.
16	Widiasih et al. (2025)[34]	Evaluating the Knowledge, Roles, and Skills of Health Cadres in Stunting Prevention: A Mixed-Method Study in Indonesia	Bangka Belitung Islands Province	Embedded mixed-methods study (quantitative survey, qualitative interviews,	193 health cadres from 10 stunting locus villages; 20 cadres participated in interviews and	Evaluation of community-based health cadre capacity in implementing stunting prevention programs. The study assessed cadres' knowledge, practical	More than half of cadres demonstrated low knowledge regarding stunting prevention, and many performed anthropometric measurements inaccurately. Despite actively supporting growth monitoring, nutrition counselling,

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
				and observational assessment)	anthropometric observations	roles, anthropometric measurement skills, and implementation experiences in *Posyandu*-based stunting prevention, including growth monitoring, nutrition education, supplementary feeding support, home visits, and collaboration with *Puskesmas* and local government.	supplementary feeding, and home visits, cadres experienced challenges related to inadequate training, non-standardized equipment, and limited resources. The study recommends certification-based training, standardized anthropometric tools, and web-based learning platforms to strengthen program implementation.
17	Damanik et al. (2025)[28]	Evaluating the Effectiveness of Social Protection in Reducing Stunting in Indonesia	National (33 provinces in Indonesia; SSGI 2022 excluding East Nusa Tenggara)	Cross-sectional study using secondary data with binary logistic regression analysis	323,887 children aged 3–60 months from the Indonesian Nutritional Status Survey (SSGI) 2022	Evaluation of national social protection programs including Program Keluarga Harapan (PKH), Bantuan Langsung Tunai (BLT), Bantuan Pangan Non-Tunai (BPNT), and Stunting Priority Areas (DPS) to assess their association with childhood stunting.	BLT was significantly associated with a higher probability of stunting, whereas PKH, BPNT, and DPS showed no significant association with stunting reduction. Improved sanitation, clean water access, clean cooking energy, higher socioeconomic status, and higher birth weight were consistently associated with lower stunting risk. The study concludes that social protection alone is insufficient and should be integrated with nutrition-specific, nutrition-sensitive, health, WASH, and behaviour change interventions.

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
18	Sjarif et al. (2025)[45]	Effectiveness of a Tiered Referral System and Early Nutritional Intervention to Prevent and Recover Stunting in Under-Five Indonesian Children	West Sumatra, South Sumatra, Central Java, East Java, East Nusa Tenggara, Central Kalimantan, Central Sulawesi, and Southeast Sulawesi (14 regencies)	One-group pre–post experimental study	3,363 children aged <5 years from 14 regencies; included healthy children receiving preventive intervention and children with weight faltering, underweight, wasting, low birth weight, or stunting requiring referral	Aksi Cegah Stunting (ACS): caregiver nutrition education; daily local animal-source protein supplementation (egg and/or milk); routine anthropometric monitoring at Posyandu; early detection and referral to Puskesmas; short-term nutritional intervention at Puskesmas; tiered referral to regional hospitals; and FSMP/ONS for catch-up growth among stunted children.	Among 1,841 children receiving milk and/or egg supplementation, 1,320 (71.7%) maintained normal nutritional status and prevented weight faltering over 6 months. Early detection and management at Puskesmas successfully prevented stunting in 536/709 (75.6%) referred children. Among 381 children receiving regular hospital follow-up, 166 (43.6%) achieved recovery from stunting within approximately 3.4 months. Higher Posyandu visit frequency was significantly associated with greater stunting reduction (OR 6.8, 95% CI 3.0–15.4).
19	Pardamean et al. (2024)[19]	Monitoring and evaluation of childhood stunting reduction program based on fish supplement product in North Sumatera, Indonesia	North Sumatra (Serdang Bedagai Regency)	Prospective program evaluation	219 children under five years with HAZ < −2 enrolled from 17 public health centers (*Puskesmas*)	Government stunting reduction program consisting of fish-based local supplementation, National Supplementary Feeding Program (nutritious biscuits), or a combination of both, accompanied by routine anthropometric	After six months, 37% of children recovered from stunting, mean HAZ increased by 0.97, mean WHZ increased by 1.00, and fish-based supplementation produced the greatest improvement in nutritional status. The study concludes that locally produced fish supplements are an effective strategy for reducing

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						monitoring using the StuntingDB digital monitoring system.	childhood stunting and recommends continuation of the program.
20	Munawaroh, Fajri, & Ajija (2024)[13]	The Effects of Social Assistance on Stunting Prevalence Rates in Indonesia	National (34 provinces, Indonesia)	Quantitative ecological study using dynamic panel regression (Generalized Method of Moments/GMM) with secondary panel data (2015–2021)	Provincial panel data from 34 Indonesian provinces (2015–2021)	Evaluation of government social assistance , primarily the Family Hope Program (PKH) and Non-Cash Food Assistance (BPNT), together with environmental and socioeconomic indicators (sanitation, education, nutrition, drinking water, internet access)	Social assistance significantly reduced stunting prevalence. Better sanitation, higher educational attainment, adequate protein intake, and improved drinking water access were also associated with lower stunting, whereas undernutrition and excessive calorie consumption were associated with higher stunting. The study recommends optimizing social assistance together with integrated nutrition and environmental interventions.
21	Tanjung et al. (2024)[46]	Comparative Analysis of Nutritional Advice and a Combined Approach for Addressing Impending Stunting in Infants: A Clinical Trial	South Sulawesi	Nonrandomized clinical trial, 3-month follow-up	Infants aged 6–12 months with weight faltering (weight increment <P15); 170 eligible infants, with 105 receiving NA + ONS and 65 receiving NA only	Nutritional Advice (NA) alone for infants with WI P5–<P15, and NA + Oral Nutritional Supplementation (ONS) for infants with WI <P5; intervention was tailored to nutritional requirements and monitored monthly	Both interventions improved growth, but NA + ONS produced greater weight and length gains. After 3 months, weight gain was 264.1 g vs 137.4 g in NA-only ($p<0.001$). The findings support initiating nutritional intervention below P15 and adding ONS for infants below P5.

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
22	Noviansyah et al. (2022)[47]	Strategy for Accelerating Stunting Prevention through Religious Approach to Generate Qualified Generation	Lampung Province (Pringsewu District)	Qualitative case study (in-depth interviews, focus group discussions, observation, and document review)	62 stakeholders, including policymakers, Islamic religious counselors, health promotion officers, nutritionists, community leaders, religious leaders, health cadres, prospective brides and grooms, mothers of toddlers, and members of Islamic study assemblies	Implementation analysis of a religious-based strategy for stunting prevention, integrating advocacy, community empowerment, and social support. The proposed communication channels included premarital counseling, Islamic study assemblies (Majelis Taklim), Friday sermons, and community religious counseling, with collaboration between the Health Office and the Ministry of Religious Affairs.	The study found that community empowerment for stunting prevention had not been optimally implemented because religious counselors received limited training on stunting. Existing national and regional policies supported stunting prevention, but specific guidance for religious approaches was lacking. The authors proposed integrating stunting prevention messages into premarital counseling, Friday sermons, and Islamic community activities as a national communication strategy.
23	Indra & Khoirunurrofik (2022)[26]	Understanding the Role of Village Fund and Administrative Capacity in Stunting Reduction:	National (473 districts/cities across Indonesia)	Quantitative ecological study using district-level panel data	473 districts/cities (946 observations) using	Evaluation of Village Fund (Dana Desa) program and village administrative capacity (education of village heads and number	Village fund allocation significantly reduced stunting prevalence, particularly in regions outside Java. A greater number of village officials was associated with lower stunting

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
		Empirical Evidence from Indonesia		with fixed-effects regression (2014 & 2018)	aggregated data from Riskesdas, PODES, Ministry of Finance, and BPS	of village officials) in supporting national stunting reduction through community empowerment and health promotion.	prevalence, whereas higher educational attainment of village heads was not significantly associated with improved stunting outcomes. The findings highlight the importance of strengthening village governance capacity alongside adequate financing.
24	Wenang et al. (2022)[33]	Strengthening Community Roles to Reduce Stunting in COVID-19 Pandemic in Indonesia Rural Areas: Capacity Building Program for Cadres and Local Government	Special Region of Yogyakarta (Kulon Progo Regency; Temon, Kalibawang, and Dekso Subdistricts)	Pre–post intervention study	180 participants, including health cadres (*Posyandu*/'Aisyiyah cadres), village heads, community leaders, nursery/early childhood teachers, and academicians	Capacity-building program delivered through three interactive online webinars during the COVID-19 pandemic. The program focused on strengthening community roles in nutrition services, integrated management of malnutrition, communication strategies for stunting prevention, cadre commitment, psychosocial support, GIS utilization, breastfeeding, child nutrition, and multisectoral collaboration to ensure continuity of nutrition services.	Participants demonstrated significant improvements in knowledge following Webinar I and Webinar III (p=0.001), although Webinar II showed no significant change (p=0.251). The program highlighted that strengthening cadres' capacity and promoting multisectoral collaboration among local government, health professionals, community leaders, UNICEF, and academic institutions are essential to sustain stunting prevention efforts during public health emergencies.

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
25	Juliasih et al. (2022)[48]	Stakeholder's Knowledge About Stunting as an Effort to Accelerate Desa Emas in Mojokerto Regency	East Java (Mojokerto Regency)	Cross-sectional quantitative study with pretest–posttest educational intervention	32 stakeholders, including Regional Apparatus Organization (OPD) representatives, village heads from stunting locus villages, heads of public health centers (*Puskesmas*), and Health Office staff involved in stunting reduction	Stakeholder education program (Desa EMAS acceleration) consisting of pre-test, educational sessions delivered by three speakers, discussion/Q&A, and post-test to improve knowledge regarding stunting prevention and multisectoral policy implementation.	Stakeholders' knowledge significantly improved after the educational intervention (mean score increased from 60.6 to 83.3; p = 0.000). The proportion of participants with good knowledge increased from 12.5% to 68.7%, indicating that education effectively strengthened stakeholder understanding to support stunting reduction policies and the Desa EMAS program.
26	Siswati et al. (2022)[17]	Impact of an Integrative Nutrition Package through Home Visit on Maternal and Children Outcome: Finding from Locus Stunting in	Special Region of Yogyakarta (Bantul Regency)	Controlled experimental study	60 stunted children under five years (30 intervention, 30 control) and their mothers from two stunting locus villages	Integrative Nutrition Package (INP) delivered through weekly home visits by trained *Posyandu* cadres for four weeks. The package included maternal education, behaviour change communication,	The intervention significantly improved maternal knowledge and practices related to child growth monitoring, development monitoring, and feeding practices. Children in the intervention group showed greater improvements in body weight, body height, and developmental scores compared with the control group. The

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
		Yogyakarta, Indonesia				counselling on child growth and development monitoring (CGM/CDM), infant and young child feeding (IYCF), complementary feeding, and monitoring of child growth and development.	study recommends implementing the INP home-visit model in high-stunting areas.
27	Gani et al. (2021)[20]	The Effect of Convergent Action on Reducing Stunting Prevalence in Under-Five Children in Banggai District, Central Sulawesi, Indonesia	Central Sulawesi (Banggai District)	Program evaluation study (before–after evaluation of a one-year intervention)	532 children under five years from 10 priority villages with high stunting prevalence	Evaluation of the National Stunting Convergence Program, integrating nutrition-specific and nutrition-sensitive interventions through multisectoral collaboration. The program included the First 1,000 Days of Life strategy, Preconception Integrated Service Posts, maternal and child health services, nutrition education, micronutrient supplementation, sanitation improvement, and coordinated actions involving the health sector, local government,	After one year of implementation, stunting prevalence decreased from 41.09% to 38.91% (2.18 percentage-point reduction). The largest improvement occurred among children aged 0–11 months, with significant improvements in HAZ among infants aged 6–11 months. The findings demonstrate that convergent multisectoral interventions targeting the First 1,000 Days of Life can contribute to measurable reductions in childhood stunting.

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
						universities, and other stakeholders	
28	Nadimin et al. (2021)[16]	Local Snacks and Virtual Nutrition Counseling Services Increasing Growth of Stunting Children	South Sulawesi	Randomized controlled trial	48 mothers and their stunted children aged 12–59 months (25 intervention; 23 control)	Community-based intervention combining local supplementary food (Tibus snacks substituted with snakehead fish flour) and virtual nutrition counseling via WhatsApp for one month. The intervention group received daily Tibus snacks plus virtual counseling, while the control group received Tibus snacks only. Counseling focused on child nutrition, complementary feeding, and child care practices.	Maternal nutrition knowledge increased significantly in the intervention group (63.78 to 73.70 points; p=0.010). Children receiving Tibus snacks plus virtual counseling experienced significantly greater weight gain (0.37 vs. 0.07 kg; p=0.021). Height increased significantly in both groups, with a larger (although non-significant) increase in the intervention group (1.82 vs. 1.53 cm). The study concluded that combining local supplementary foods with virtual nutrition counseling can improve growth among stunted children.
29	Dolifah et al. (2021)[24]	Providing Education for a Mother in Stunting Prevention: A Collaborative Study through Action Research	West Java (Sumedang District)	Action research	100 mothers of toddlers participating in the Bina Keluarga Balita (BKB) program within the Kampung	Community education intervention using the I-CARE model (Identification, Consolidation, Action, Review, Evaluation) integrated into the government's BKB–	The intervention substantially improved mothers' knowledge regarding stunting, its causes, prevention strategies, and impacts. Community participation in BKB activities increased markedly, with BKB membership expanding from 68 to 127 families and active

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
					Keluarga Berencana (Kampung KB) initiative	Kampung KB program. The intervention included maternal education on stunting prevention, parenting, exclusive breastfeeding, complementary feeding, nutrition, cadre capacity building, development of educational modules, poster campaigns, and strengthening BKB management.	participation increasing from 32 to 125 families. The study concluded that the I-CARE model strengthened community engagement and maternal understanding of stunting prevention through the Kampung KB program.
30	Rah et al. (2020)[29]	Improved Sanitation is Associated with Reduced Child Stunting Amongst Indonesian Children Under 3 Years of Age	Papua (Jayawijaya), Central Java (Klaten), and East Nusa Tenggara (Sikka)	Cross-sectional analysis of MYCNSIA end-line survey	1,450 children aged 6–35 months	Evaluation of the Maternal and Young Child Nutrition Security Initiative in Asia (MYCNSIA), a UNICEF–EU program (2011–2015) that strengthened essential nutrition interventions by improving the enabling environment, health worker and community worker capacity, nutrition information systems, and integration of nutrition	Children living in households with improved sanitation had 29% lower odds of stunting than those with unimproved sanitation. Stunting prevalence in the program areas declined from approximately 30% in 2011 to 24% in 2014, suggesting that integrating WASH with essential nutrition interventions may further accelerate stunting reduction. No significant association was found between improved drinking water and stunting or anaemia.

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
						services with WASH and social protection. The study specifically assessed the contribution of improved household sanitation to child stunting.	
31	Fitriani et al. (2020)[32]	Implementing PRECEDE–PROCEED Model toward the Mothers' Perception on the Importance of Feeding of Home-Made Complementary Food to Wasting and Stunting Toddlers	Aceh (West Aceh Regency)	One-group pretest–posttest intervention study	63 mothers of children under two years of age with wasting or stunting	Community-based nutrition education using the PRECEDE–PROCEED Model to improve mothers' knowledge, attitudes, practices, family support, health worker support, and cultural support regarding preparation and provision of home-made complementary foods (MP-ASI). The intervention was implemented over three months with regular supervision	The intervention significantly improved maternal knowledge (p=0.003), attitudes (p=0.01), feeding practices (p=0.005), family support (p=0.004), health worker support (p=0.004), and cultural support (p=0.0001). The findings indicate that the PRECEDE–PROCEED Model effectively strengthened behavioural and social determinants supporting appropriate complementary feeding for stunting prevention.
32	Martha et al. (2020)[49]	The Empowerment of Cadres and Medicasters in the Early Detection and	West Java (Bogor City)	Quasi-experimental study	31 *Posyandu* cadres and traditional birth attendants	Community empowerment program involving training on early detection and prevention	Training significantly improved participants' knowledge (30.68% increase; p = 0.0005). Following the intervention, cadres and medicasters

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
		Prevention of Stunting			(medicasters) from three villages in North Bogor	of stunting through lectures, discussions, practical demonstrations, and educational videos. Following the training, participants implemented a Follow-Up Plan (FUP) consisting of community education and outreach for pregnant women, mothers, and families, supported by WhatsApp groups for monitoring and mentoring.	conducted community education reaching approximately 124 community members through *Posyandu* activities, home visits, religious gatherings, schools, and community meetings. The program demonstrated that empowering community health volunteers and traditional birth attendants can strengthen community-based stunting prevention.
33	Herawati et al. (2020)[25]	Effect of Eel Biscuit Supplementation on Height of Children with Stunting Aged 36–60 Months: A Pilot Study	West Java (Priangan Region)	Pilot intervention study with pretest–posttest control group design	56 stunted children aged 36–60 months (25 intervention; 27 control completed the study)	Nutritional supplementation using eel biscuits (10 biscuits/day for three months). The intervention group received eel-enriched biscuits, while the control group received biscuits from the Indonesian Government Supplementary Feeding Program. Daily consumption was monitored by community	After three months, children receiving eel biscuits showed a significantly greater improvement in HAZ (ΔHAZ = 0.93 SD) than the control group (ΔHAZ = 0.60 SD). The intervention significantly increased linear growth, suggesting that nutrient-rich animal-source supplementation can contribute to stunting recovery among preschool children.

No	Author (Year)	Title	Province	Study Design	Population	Intervention/Program	Main Findings
						health cadres, with weekly home visits and food record collection	

2. Nutrition-Specific Interventions and First 1,000 Days of Life

Figure 2 and Table 2 illustrate the distribution of evidence across nine major categories of stunting reduction efforts. Nutrition supplementation and complementary feeding represented the largest body of evidence, supported by studies of fish-based supplementation, eel biscuits, locally produced complementary foods, integrated nutrition packages, and national supplementary feeding programs.[16–19,25] Nutrition education and behavior change communication formed another major category, including maternal education, home visits, interactive learning, and virtual counseling.[16,24,32,41] Community empowerment and health cadre strengthening were similarly represented through cadre training, mentoring, *Posyandu* strengthening, and community capacity building.[33,34,49]



Figure 2. Evidence mapping of stunting reduction efforts in Indonesia, 2020–2025, showing the distribution of included studies across intervention categories, target populations, implementation approaches, reported outcomes, facilitators, barriers, and evidence gaps.

The predominance of nutrition supplementation and complementary feeding reflects Indonesia's continued prioritization of the first 1,000 days of life as the critical period for preventing linear growth faltering. Most studies evaluated supplementary feeding, breastfeeding promotion, complementary feeding, and maternal nutrition education, which

consistently reported improvements in maternal knowledge, feeding practices, and child growth indicators.[16–19,25] These findings are consistent with the WHO Guideline for Complementary Feeding and Sidiartha, who emphasized that appropriate nutritional management during infancy remains fundamental for preventing disease-related malnutrition and supporting optimal growth.[50,51] A recent Indonesian clinical trial demonstrated that combining individualized nutritional advice with comprehensive nutritional management for infants at risk of stunting produced greater improvements in growth outcomes than nutritional advice alone, highlighting the importance of early, personalized interventions during the first 1,000 days of life.[46] Nutritional management is recommended to be individualized according to children's nutritional status and underlying clinical conditions, as untreated disease-related malnutrition may compromise linear growth and reduce the effectiveness of nutrition interventions.[51]

Several studies also highlighted the increasing adoption of food-based approaches using locally available food resources. This trend reflects growing recognition that sustainable nutrition should not only improve dietary quality but also consider cultural acceptability, affordability, and local food availability.[16,18,19,38] Recent studies emphasized that traditional Indonesian foods possess considerable potential to support stunting prevention because they are nutritionally adequate, culturally familiar, and more likely to be accepted by communities.[52] Such approaches may improve program sustainability while strengthening household food security and promoting greater community participation.[52–54]

Table 2. Evidence Mapping of Stunting Reduction Efforts in Indonesia by Intervention Category

Intervention Category	Target Population	Implementation Approach	Reported Outcomes	Number of Studies (n)
Nutrition supplementation and complementary feeding	Stunted children, children under five, mothers/caregivers	Supplementary feeding using local foods, fortified foods, complementary feeding, home-based nutrition package	Improved child growth (height, weight, HAZ), improved dietary intake, better child development	**7**
Nutrition education and	Mothers, caregivers, families	Individual counseling, group	Increased maternal knowledge,	**5**

Intervention Category	Target Population	Implementation Approach	Reported Outcomes	Number of Studies (n)
behavior change communication		education, behavior change communication, home visits, digital counseling	improved infant and young child feeding practices, improved caregiving behavior	
Community empowerment and health cadre strengthening	Health cadres, community volunteers, village communities	Cadre training, mentoring, community empowerment, *Posyandu* strengthening, capacity building	Improved cadre competency, enhanced growth monitoring, increased community participation	**5**
Governance, multisectoral collaboration, and policy implementation	Local governments, stakeholders, policymakers	National strategy implementation, multisectoral coordination, convergence planning, district governance	Improved policy coordination, stronger governance, enhanced implementation capacity	**6**
Social protection and village financing	Low-income households, vulnerable families, village governments	Village Fund (Dana Desa), PKH, BPNT, integrated social assistance	Improved access to nutrition services, strengthened household support, reduced socioeconomic barriers	**3**
WASH and environmental evidence	Households, rural communities	Water, sanitation, hygiene improvement, sanitation infrastructure, integrated WASH–nutrition approach	Improved sanitation practices and reduced environmental risk factors associated with stunting	**2**
Religious and community-based engagement	Religious leaders, community leaders, prospective couples, community members	Religious counseling, premarital education, community engagement, faith-based communication	Increased community awareness, strengthened multisectoral collaboration, improved stakeholder engagement	**2**
Adolescent and preconception interventions	Adolescents and stakeholders involved in	Weekly iron supplementation, adolescent health	Improved adolescent nutrition knowledge, strengthened	**1**

Intervention Category	Target Population	Implementation Approach	Reported Outcomes	Number of Studies (n)
	adolescent health services	services, school-based education	preconception health services	
Digital health and virtual nutrition services	Mothers and caregivers	WhatsApp-based nutrition counseling, online education, virtual support	Increased maternal knowledge, improved child feeding practices, greater accessibility of nutrition education	**2**

Note: Studies may contribute to more than one intervention category when interventions included multiple components; therefore, category counts may not sum to the total number of included studies. Because several studies evaluated multidimensional interventions, individual studies could contribute to more than one intervention category; therefore, the sum of category-specific study counts exceeds or may differ from the total number of included studies.

The findings also support the importance of improving complementary feeding quality during the transition from exclusive breastfeeding to family foods. In addition to diversified complementary foods, recent evidence suggested that appropriate milk consumption contributes substantially to nutritional adequacy among children aged 12–24 months. Previous studies reported that milk consumption was linked to increased intake of energy, protein, calcium, and several essential micronutrients, and may support better dietary adequacy during the complementary feeding period.[55] These findings complement the current evidence by suggesting that nutrition supplementation should focus not only on increasing food quantity but also on improving dietary quality through balanced and age-appropriate complementary feeding practices.[56,57]

3. Community Empowerment and Health Cadre Strengthening

Beyond nutrition-specific interventions, the evidence map demonstrates an increasing emphasis on community empowerment, health cadre strengthening, social protection, village governance, WASH, and multisectoral collaboration. This transition reflects Indonesia's efforts to address the broader determinants of stunting beyond inadequate dietary intake alone. Several studies highlighted that strengthening community participation through *Posyandu* cadres, village governments, and primary healthcare services might improve program implementation and service accessibility.[58,59] Posyandu (*Pos Pelayanan Terpadu*) serves as an important community-based platform for delivering maternal and child health and nutrition

services. Within stunting reduction efforts, Posyandu facilitates child growth monitoring, nutrition counselling, supplementary feeding support, early identification of growth faltering, and referral to primary healthcare facilities. Its position at the community level enables continuous interaction between caregivers, community health cadres, and Puskesmas and may therefore strengthen intervention reach and continuity of care.[58] These findings reinforce the important contribution of Indonesian healthcare workers, particularly nutritionists, nurses, midwives, and *Posyandu* cadres, in strengthening growth monitoring, nutrition counseling, and early detection of stunting. Basrowi et al. indicated that frontline healthcare workers remain central to the successful implementation of national stunting reduction programs, while Sentika et al. argued that interprofessional collaboration within primary healthcare may improve coordination, referral systems, and continuity of care.[60,61] These findings support global recommendations advocating integrated primary healthcare systems as the foundation for delivering effective maternal and child nutrition interventions.

4. Nutrition-Sensitive and Multisectoral Approaches

The evidence also highlights the growing role of social protection, village governance, and multisectoral collaboration as nutrition-sensitive approaches to addressing the broader determinants of child growth. Several included studies indicated that social protection programs, village funding, food security initiatives, and cross-sectoral coordination may improve access to nutrition-related services and strengthen community-based stunting prevention efforts.[13,26,28] These approaches, however, should be considered within the broader socioeconomic context of households, as their potential benefits may depend on families' capacity to access, utilize, and translate available resources into improved nutrition and caregiving practices.

Evidence from the Indonesian Nutritional Status Survey further indicates that maternal education, household socioeconomic conditions, and other individual- and household-level factors remain important determinants of stunting among children under two years of age.[62] Likewise, Mitra et al. found that sociodemographic factors were indirectly associated with stunting through parenting patterns, with feeding practices, hygiene, environmental sanitation, and health-service use representing important pathways.[62] These findings suggest

that social protection and economic support may be more effective when complemented by nutrition education, caregiver support, and family-centered interventions that strengthen the capacity of households to adopt appropriate feeding, hygiene, and care practices.

Environmental and food-system determinants should likewise be addressed alongside nutrition-specific interventions. Evidence from Indonesia indicates that household food security, access to nutritious foods, sanitation, and hygiene are relevant components of stunting prevention, particularly in communities facing socioeconomic and environmental constraints.[26,28] These findings support the integration of WASH, food security, social protection, and nutrition services within locally adapted multisectoral strategies. Nevertheless, the relatively limited number of studies evaluating the implementation and long-term effects of such integrated approaches indicates that the evidence remains uneven across sectors. Future research should therefore examine how multisectoral interventions can be effectively coordinated, implemented, and sustained across diverse Indonesian settings, with greater attention to implementation fidelity, scalability, and long-term child growth outcomes.

5. Emerging Adolescent and Digital Nutrition Interventions

Evidence on adolescent- and preconception-focused approaches was limited within the included literature. Karuniawati et al. examined adolescent-focused stunting prevention in Gunungkidul, including the Weekly Iron Folic Acid (WIFA) supplementation program, adolescent health services, health education, counselling, and reproductive health promotion.[15] The study found that adolescent health had not yet become a priority within local stunting prevention efforts, with implementation constrained by limited funding, insufficient human resources, weak monitoring and evaluation, and low adherence to iron supplementation.[15] These findings suggest that adolescent nutrition represents an important but relatively underdeveloped component of the broader stunting prevention continuum. Rather than demonstrating direct effects on childhood stunting, the available evidence primarily supports the potential relevance of improving adolescent health and nutritional status before pregnancy as part of a longer-term intergenerational prevention strategy. Further longitudinal research is needed to determine whether adolescent-focused

interventions can improve maternal nutritional status, pregnancy outcomes, and subsequent child growth.

Digital nutrition interventions were also limited, with only two of the 33 included studies evaluating digital or virtual components.[16,34] One randomized controlled study found that virtual nutrition counselling combined with locally produced supplementary food improved maternal nutrition knowledge and was associated with greater weight gain among stunted children, although the effect on linear growth was not significantly different between groups.[16] This finding suggests that digital counselling may serve as a complementary delivery mechanism for community-based nutrition interventions rather than as a stand-alone strategy.

Evidence from studies outside the included intervention literature further indicates potential opportunities for digital nutrition education and online engagement. Web-based nutrition education and digital platforms have been proposed as approaches for expanding access to nutrition information, while analysis of *Google search* trends in Indonesia suggests increasing public interest in information related to stunting interventions.[63,64] Although digital nutrition interventions remain limited, increasing public interest in online information related to stunting prevention suggests substantial opportunities for expanding digital behavior change communication and tele-nutrition services.[65] Future research should therefore evaluate the reach, acceptability, digital literacy requirements, integration with primary healthcare and community nutrition services, and sustained behavioral and nutritional outcomes of digital interventions, particularly among populations with limited access to conventional services.[63,64]

Table 3. Implementation Barriers, Facilitators, and Evidence Gaps

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
1	Andriani et al. (2025)	National policy implementation	Uneven intervention coverage across districts; limited implementation of nutrition-sensitive interventions; inadequate data for several interventions (e.g., complementary feeding and WASH); reliance on modeling assumptions; insufficient field data; limited evaluation of cost-effectiveness and implementation at scale.	National Strategy to Accelerate Stunting Prevention (Stranas Stunting); Presidential Regulation No. 72/2021; multisectoral collaboration; breastfeeding promotion; vitamin A supplementation; multiple micronutrient supplementation (MMS); use of list for evidence-informed planning and policy prioritization.	Evaluate nutrition-sensitive interventions (particularly WASH and complementary feeding), cost-effectiveness analyses, real-world program implementation across provinces, and long-term impacts of integrated multisectoral strategies beyond modeling projections
2	Bahar et al. (2025)	Community health workforce strengthening	Limited cadre competencies, social stigma toward stunting, low maternal nutrition literacy, geographical barriers, and insufficient digital capacity among health cadres.	Community trust in experienced *Posyandu* cadres, strong collaboration between cadres and primary healthcare providers, home visits, continuous training, and effective communication supported program implementation	Evaluate standardized cadre training, digital reporting systems, and the long-term impact of community health worker strengthening on stunting outcomes.
3	Azis et al. (2025)	Family-based stunting prevention	Limited parenting knowledge, inadequate environmental sanitation knowledge, suboptimal family planning, and cultural beliefs that discourage appropriate childcare practices.	Positive parenting attitudes, improved sanitation knowledge, strategic family planning, and involvement of community and religious leaders through culturally appropriate approaches.	Evidence is limited to cross-sectional findings; intervention studies are needed to evaluate the effectiveness of culturally tailored family-based parenting on stunting outcomes.
4	Pasaribu et al. (2025	Local food empowerment	Limited maternal nutrition knowledge, misconceptions regarding the	Participatory Action Research, empowerment of PKK mothers and	Evaluate the long-term effects of maternal empowerment on

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
			affordability of nutritious foods, insufficient skills in preparing nutritious meals, and limited previous nutrition training among community health cadres constrained effective stunting prevention	health cadres as community change agents, nutrition education, practical cooking demonstrations using locally available mixed fish, interpersonal communication, and continuous community reflection strengthened program implementation and sustainability	children's nutritional status, assess program scalability across different sociocultural settings, and explore the integration of digital technologies to strengthen community nutrition education.
5	Prayitno et al. (2025)	Household food security	High household poverty, limited dietary diversity, inadequate food access, unstable food availability during lean seasons, suboptimal food utilization, inadequate sanitation and hygiene practices, and maternal nutrition knowledge limitations reduced the effectiveness of stunting prevention.	Stable food availability, improved economic access to nutritious food, diversified local food production, nutrition education, *Posyandu*-based caregiver training, improved WASH practices, community participation, and multisectoral food security strategies supported better stunting prevention behaviors.	Longitudinal studies are needed to establish causal relationships between food security and stunting prevention. Future research should include objective dietary assessments (e.g., 24-hour dietary recalls), direct observation of WASH practices, cultural feeding norms, behavioral mediators, and larger, more representative populations to improve external validity.
6	Puteri & Fitria (2025)	Water, Sanitation, and Hygiene (WASH)	Inadequate household sanitation facilities, open defecation practices, poor sanitation infrastructure in rural areas, repeated exposure to fecal pathogens, and disparities between	Expansion of sanitation infrastructure, implementation of WASH , improved toilet ownership and safe fecal disposal systems, government support for rural sanitation, and multisectoral collaboration were identified as	Incorporate direct determinants of stunting, including dietary intake, infectious diseases, breastfeeding practices, maternal factors, and socioeconomic conditions, while

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
			rural and urban communities limited effective stunting prevention	important strategies to reduce stunting risk.	using more comprehensive analytical models to better explain causal pathways
7	Sandra et al. (2025)	Targeted social protection	Poverty, low maternal education, unemployment, inadequate antenatal care utilization, limited access to health services in rural areas, and the socioeconomic burden faced by single mothers hindered effective stunting prevention.	Integrated multisectoral policies, strengthened maternal and child health services, improved ANC coverage, social protection, economic empowerment of single mothers, and coordinated community-based support were recommended to improve stunting prevention among high-risk households.	Evaluate the effectiveness of targeted policies for single-mother households using longitudinal or implementation study designs and examine additional determinants such as maternal nutritional status, cultural practices, and caregiving behaviors.
8	Fatkuriyah et al. (2025)	Rural community prevention	High prevalence of maternal short stature, low paternal education, low household income, limited access to nutritious foods, and socioeconomic constraints in rural households hinder effective stunting prevention.	Community nutrition education led by nurses, promotion of 12-year compulsory education, economic support for disadvantaged rural families, provision of affordable protein-rich local foods, nutrition monitoring through *Posyandu*, and government that strengthen family food security were proposed to reduce stunting risk	Include larger and more diverse populations beyond a single rural village, compare rural and urban settings, and investigate additional dietary factors such as animal-source food intake, milk consumption, and overall dietary patterns to better understand determinants of stunting.
9	Mauludyani et al. (2025)	Regional policy planning	Persistent poverty, limited access to clean water, high household food expenditure, shortages of health workers, and regional economic disparities hinder the implementation	Region-specific policy design, strengthening the health workforce, improving household purchasing power, expanding access to clean water, and allocating resources	Evaluate the effectiveness of region-specific interventions using longitudinal or implementation study designs and incorporate individual- and

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
			of effective stunting reduction across Indonesia	according to local needs were identified as key strategies for reducing stunting.	household-level determinants that were not available in the ecological dataset
10	Musviro et al. (2025)	Game-based nutrition education	Low parental nutrition knowledge, low educational attainment in agricultural communities, and limited access to engaging health education constrained effective stunting prevention. Some implementation challenges included limited learning space and varying participant engagement.	Interactive game-based education (Tes Duga), Smart Class sessions, focus group discussions involving parents, health workers, cadres, and village government, practical demonstrations of complementary feeding using local foods, and an agronursing approach created an engaging learning environment and significantly improved parental knowledge and attitudes.	Employ controlled study designs, evaluate long-term behavioral and nutritional outcomes, and assess the scalability of the Smart Class model across different geographic, cultural, and agricultural settings.
11	Aisyah et al. (2025)	Policy prioritization	Limited budget allocation, inadequate infrastructure, weak institutional coordination, inconsistent program sustainability, and insufficient multisectoral integration hindered effective implementation of stunting reduction .	Strong political commitment, adequate budgetary support, multisectoral collaboration through government agencies, optimization of *Posyandu*, provision of locally sourced supplementary foods (e.g., eggs, milk, and local foods), community readiness, and structured program prioritization using the Analytic Hierarchy Process facilitated more effective implementation of stunting reduction strategies.	Evaluate the real-world effectiveness of prioritized strategies using implementation or longitudinal study designs, assess program scalability in different districts, and examine the long-term impact of integrated multisectoral interventions on stunting prevalence

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
12	Sutrisna et al. (2025)	Integrated nutrition intervention	High stunting prevalence, inadequate dietary diversity, limited nutritional intake during the first 1,000 days of life, and insufficient use of locally available nutrient-rich foods contributed to poor child growth. Conventional nutrition alone were considered insufficient to address multifactorial causes of stunting.	The combination of Moringa leaf-based complementary foods, balanced diet counseling, baby massage, Tui Na massage, active involvement of community health centers (*Puskesmas*), village health workers, and family participation successfully improved child growth. Utilization of locally available Moringa strengthened program feasibility and sustainability in rural communities	Further multicentre randomized controlled trials with larger samples are needed to determine the independent contribution of each intervention component, evaluate long-term effects on linear growth, and assess the scalability and cost-effectiveness of integrated nutrition and stimulation across different Indonesian settings.
13	Andrestian et al. (2025)	Nutrition policy implementation	Weak cross-sector coordination, inconsistent program alignment with national standards, limited public awareness, inadequate human resources in some districts, geographical barriers affecting access to health services, insufficient convergence among government sectors, and variations in program implementation despite available budgets.	National policy frameworks (RPJMN, RAN-PG, Presidential Regulation No. 72/2021), multisectoral convergence, involvement of Regional Government Organizations (OPDs), integration of planning through RPJMD, supplementary feeding (PMT), iron supplementation (TTD), and strong local government commitment supported program implementation.	Evaluate both specific and nutrition-sensitive interventions simultaneously, assess program quality and implementation fidelity rather than program quantity, and investigate how governance, multisector collaboration, and policy execution contribute to reductions in stunting across different regions.
14	Karuniawati et al. (2025)	Adolescent health	Limited funding, inadequate human resources, weak monitoring and evaluation, low adherence to weekly iron–folic acid supplementation, insufficient parental support,	The implementation of PKPR services, Weekly Iron Folic Acid (WIFA) supplementation, adolescent health education, peer counseling, healthy school canteens, parental engagement,	Future implementation research should evaluate the long-term effectiveness of adolescent empowerment , strategies to improve adherence to iron

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
			fragmented cross-sector coordination, and adolescent health not yet being prioritised within local stunting .	routine monitoring, and stronger collaboration between the health and education sectors were identified as key facilitators for strengthening adolescent-focused stunting prevention.	supplementation, and scalable cross-sector models integrating schools, families, and health services in stunting prevention.
15	Prayitno et al. (2025)	Environmental governance	Underfunded nutrition , weak food distribution systems, inadequate WASH investment, fragmented governance, persistent socioeconomic inequalities, limited collaboration between the health, agriculture, and environmental sectors, and weak institutional integration of community innovation.	Strong food security, active *Posyandu* and PKK groups, social capital (trust, community networks, and collective norms), community co-creation with health workers, stakeholder engagement, local knowledge (home gardens and traditional foods), digital communication platforms, and cross-sector collaboration enhanced sustainable behavior change and strengthened stunting prevention.	Evaluate the long-term effectiveness of open innovation approaches using longitudinal and implementation study designs, examine scalability across different rural and semi-urban settings, and strengthen evidence on integrating food security, WASH, social capital, and environmental governance within national stunting reduction .
16	Widiasih et al. (2025)	Health cadre strengthening	Insufficient cadre knowledge, inaccurate anthropometric measurement techniques, irregular and non-standardized training, damaged or poorly calibrated equipment, limited funding for supplementary feeding , inadequate skills in healthy food preparation, and	Strong collaboration among *Posyandu, Puskesmas*, nutritionists, local government, and community volunteers supported program implementation. Cadres actively conducted growth monitoring, nutrition education, home visits, supplementary feeding, cooking demonstrations, and referral of high-	Evaluate certification-based cadre training, standardized anthropometric measurement systems, web-based learning platforms, long-term competency retention, and the impact of improved cadre capacity on program

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
			reduced program activities during the COVID-19 pandemic.	risk children. Continued community engagement during the COVID-19 pandemic further strengthened service continuity.	effectiveness and child nutritional outcomes.
17	Damanik et al(2025)	Implementation of social protection programs for stunting reduction	Low benefit value relative to living costs; inaccurate beneficiary targeting; inefficient data management; lack of transparency; inconsistent food distribution; long distance to food distribution points; inadequate nutritional quality of BPNT food packages; weak integration between social protection and nutrition ; insufficient behavior change interventions; inadequate cross-sector coordination; limited incentives for community health cadres; cross-sectional data unable to assess implementation quality, benefit continuity, or conditionality compliance.	National-scale social protection (PKH, BPNT, BLT, DPS); integration with health, nutrition, WASH, and Behavior Change Communication (BCC); improved sanitation and clean water infrastructure; stronger cross-sector collaboration; strengthened monitoring systems; improved targeting; restructuring incentives for community health workers; integration of nutrition education with cash assistance.	More longitudinal and experimental studies are needed to establish causal effects of social protection on stunting. Future research should evaluate program quality, benefit adequacy, conditionality compliance, implementation fidelity, intra-household food allocation, maternal caregiving pathways, access to health services, subnational disparities, and mechanisms through which social protection influences child nutrition.
18	Sjarif et al. (2025)	Health-system implementation, referral, and community-based nutrition intervention	Low compliance with referral and follow-up; 45.4% of referred children did not attend Puskesmas and 25.1% of hospital attendees were lost to follow-up. Financial constraints, transportation limitations, distance to	A clearly defined Posyandu–Puskesmas–regional hospital referral pathway; training of cadres and healthcare professionals; multidisciplinary local ACS teams; routine anthropometric monitoring;	No control group limited causal inference. Compliance was suboptimal, and social determinants influencing participation—such as local government support—were not

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
			health facilities, and other logistical/physical barriers may have limited participation.	standardized measurement equipment; Ministry of Health logistical support; regular multidisciplinary coordination and supervision.	comprehensively assessed. The study also did not provide controlled evidence on the independent effects of individual intervention components within the integrated protocol.
19	Pardamean et al. (2024)	Nutrition supplementation and program implementation	Limited follow-up capacity, reliance on routine monitoring, and variation in response to supplementation.	Locally produced fish supplementation, routine anthropometric monitoring, Puskesmas involvement, and digital StuntingDB monitoring.	Limited controlled evidence and need for longer-term evaluation of program sustainability and scalability.
20	Munawaroh, Fajri, & Ajija (2024)	Social protection	Social assistance is not always utilized according to children's nutritional needs. Access to the internet and improved drinking water did not consistently translate into lower stunting, suggesting limited utilization of health information and persistent environmental challenges. The study also notes limitations in sanitation measurement and contextual variation across provinces	Government social assistance (PKH and BPNT) significantly reduced stunting prevalence. Program effectiveness was strengthened when combined with improved sanitation, higher parental education, adequate protein intake, and integration of health, nutrition, and environmental . Community education on nutrition and calorie consumption was also identified as an important supporting strategy.	The ecological design cannot establish causal relationships at the household level. The mechanisms through which social assistance improves child nutrition were not directly examined. Future studies should evaluate household utilization of social assistance, investigate how internet use influences nutrition behavior, and assess strategies to improve sanitation effectiveness and program implementation.
21	Tanjung et al. (2024)	Nutrition intervention delivery /	Parental non-compliance with recommended nutritional advice was identified as a cause of recurrent WF;	Intervention was delivered through 30 primary health facilities with trained medical doctors and nutritionists;	Short 3-month follow-up limits conclusions regarding long-term growth and sustained prevention

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
		adherence / community-based implementation	frequent illness such as respiratory infection and diarrhea also hindered maintenance of adequate weight gain. Limited availability of qualified health professionals (pediatricians, physicians, midwives, nutritionists, nurses) was identified as a challenge for managing WF in disadvantaged communities.	regular follow-up and weekly telephone monitoring of ONS consumption supported implementation. ONS was reported to be well tolerated and accepted by parents, while nutritional advice was adapted to socioeconomic conditions and locally available/affordable foods.	of stunting. The study was nonrandomized because infants with severe WF required immediate ONS; intervention-group crossover occurred, and individual laboratory testing was not performed. Longer follow-up (e.g., 18–24 months), broader populations, comparison of interventions, and investigation of mechanisms were recommended.
22	Noviansyah et al. (2022)	Religious community engagement	Limited community knowledge regarding stunting, inadequate training of Islamic religious counselors, absence of standardized stunting education materials within religious counseling, weak integration between the health and religious sectors, insufficient community empowerment activities, and the lack of specific policies supporting religious-based communication for stunting prevention.	Strong collaboration between the Health Office, Ministry of Religious Affairs, community leaders, and religious leaders. Existing platforms such as premarital counseling, Islamic study assemblies, Friday sermons, and community religious counseling provided effective channels for delivering behavior change messages. Existing national and local stunting policies also created an enabling environment for multisectoral collaboration.	Evaluate the effectiveness of religious-based communication strategies on maternal knowledge, health behaviors, and child nutritional outcomes using implementation or intervention study designs. Research is also needed to assess scalability, sustainability, and adaptation of this approach across different religious and cultural settings in Indonesia.

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
23	Indra & Khoirunurrofik (2022)	Village governance	Uneven village fund allocation across regions, limited prioritization of health spending at village level, village leaders' preference for infrastructure rather than nutrition , weak commitment of some village heads to stunting prevention, limited administrative capacity, and the absence of village-level stunting data for monitoring program performance. Potential governance and accountability issues were also recognized as challenges affecting effective utilization of village funds.	The Village Fund program provided substantial financial resources for community empowerment and health promotion. Adequate numbers of village officials, collaboration between village governments and health services, integrated coordination with nutrition personnel and primary healthcare facilities, and stronger village administrative capacity facilitated more effective implementation of stunting reduction efforts, particularly in non-Java regions.	Evaluate village fund utilization using village-level data, investigate how village funds are specifically allocated to nutrition interventions, examine leadership quality and governance mechanisms influencing program effectiveness, and assess causal pathways linking village financing, implementation processes, and child nutritional outcomes.
24	Wenang et al. (2022)	Community capacity building	Disruptions of *Posyandu* services due to COVID-19, limited opportunities for face-to-face cadre training, declining cadre participation, variations in participants' baseline knowledge, and differences in educational backgrounds that may have influenced learning outcomes. Webinar II did not significantly improve knowledge, suggesting that participant characteristics and prior experience affected program effectiveness.	Interactive online webinars, active engagement of *Posyandu* and 'Aisyiyah cadres, involvement of village governments, community leaders, nursery teachers, UNICEF, universities, and district health authorities. Political commitment from local government, multisectoral collaboration, interactive discussion sessions, and continuous education strengthened participants' knowledge and supported continuity of nutrition services during the pandemic.	Assess the long-term effectiveness of online capacity-building , determine whether improved cadre knowledge translates into sustained improvements in community nutrition practices and reductions in stunting, and evaluate the scalability of digital training models in different regions and emergency settings.

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
25	Juliasih et al. (2022)	Stakeholder capacity building	Initial stakeholder knowledge regarding stunting was inadequate, particularly concerning the first 1,000 days of life (1000 HPK) and major risk factors for stunting. Stunting prevention was not yet uniformly understood across government sectors, limiting coordinated policy implementation	Structured education significantly improved stakeholder knowledge. Supportive local policies (Mojokerto Regent Regulation No. 66/2021), multisectoral involvement of OPDs, village governments, *Puskesmas*, and Health Office personnel, as well as building a shared perception and commitment among policymakers, facilitated implementation of the Desa EMAS program.	The study evaluated knowledge improvement only. It did not assess whether increased stakeholder knowledge translated into policy implementation, intersectoral coordination, behavioral change, or reductions in stunting prevalence. The authors also recommend future studies examining stakeholder attitudes and behaviors related to stunting prevention
26	Siswati et al. (2022)	Home-visit–based integrated nutrition intervention	The need for sustained cadre knowledge and commitment, mothers' consistency in practising recommended child care behaviors, household food availability and purchasing power, and the relatively short eight-week follow-up period, which was insufficient to evaluate long-term impacts. Generalisability was also limited because all participants were from one ethnic population (Javanese)	Trained *Posyandu* cadres conducting regular home visits, individualized counseling, behavior change communication, provision of complementary feeding, supervision to ensure intervention quality, strong interaction between cadres and mothers, and multisectoral collaboration supporting the home-visit program. These factors enhanced maternal knowledge, caregiving practices, and child nutritional outcomes.	Evaluate the long-term effectiveness and cost-effectiveness of integrative nutrition packages, determine the optimal combination of intervention components, assess sustainability beyond the intervention period, and examine implementation in more diverse populations and settings.

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
27	Gani et al. (2021)	Multisectoral convergence strategy for stunting reduction	The program faced challenges related to the initially high prevalence of stunting, geographical dispersion of villages, and the need to coordinate nutrition-specific and nutrition-sensitive interventions across multiple sectors and administrative levels. Sustaining program integration and ensuring equitable implementation across diverse settings remained important implementation challenges.	Strong political commitment from the local government, implementation of the National Stunting Convergence Strategy, establishment of the First 1,000 Days Task Team, multisectoral collaboration involving the health sector, local government, universities, and private partners, together with innovative approaches such as the Preconception Integrated Service Post, strengthened program implementation and contributed to reductions in stunting prevalence among children under one year of age.	Evaluate the long-term sustainability of convergence , assess implementation fidelity across different districts, examine cost-effectiveness, and identify which combinations of nutrition-specific and nutrition-sensitive interventions produce the greatest reductions in stunting at scale.
28	Nadimin et al. (2021)	Food supplementation and virtual counseling	Inadequate baseline maternal nutrition knowledge, insufficient dietary intake among stunted children, limited energy contribution from supplementary foods alone, and the multifactorial causes of stunting that cannot be addressed by food supplementation without behavioral change. The short intervention period (one month) also limited assessment of sustained growth effects	The use of locally available nutrient-rich Tibus snacks, daily supplementary feeding, structured whatsapp-based nutrition counseling, regular delivery of nutrition education messages, active participation of mothers, and involvement of nutritionists as counselors. The integration of food supplementation with behavior-change communication enhanced maternal knowledge and supported improvements in child growth.	Evaluate the long-term effectiveness and sustainability of virtual nutrition counseling, assess adherence and cost-effectiveness at larger scale, and determine whether integrating digital counseling with local supplementary feeding can produce sustained improvements in HAZ and reductions in stunting prevalence through longer randomized trials.

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
29	Dolifah et al. (2021)	Maternal education	Limited maternal knowledge regarding stunting, absence of specific stunting education, inadequate institutional capacity of BKB, insufficient numbers of BKB groups and cadres, weak organizational management, lack of structured educational materials and documentation, low cadre confidence in delivering nutrition education, and low community participation in BKB activities before the intervention.	The I-CARE action research model, collaboration among universities, local government, public health centers, and BKB cadres, development of standardized educational modules, cadre capacity building, community seminars, poster campaigns, establishment of additional BKB groups, and continuous monitoring and evaluation. These strategies substantially improved maternal knowledge and community participation in the government program.	Evaluate the long-term sustainability of the I-CARE model, its effectiveness in reducing stunting prevalence and improving child nutritional outcomes, scalability across different regions, and comparative effectiveness against other community-based education models.
30	Rah et al. (2020)	Integrated WASH and nutrition	Inadequate household sanitation coverage, widespread open defecation, persistent environmental contamination, and continued reliance on nutrition-specific interventions without sufficient integration of WASH. In addition, the observational study design limited causal inference regarding program effectiveness.	The MYCNSIA program strengthened the enabling policy environment, improved health worker and community worker capacity, enhanced nutrition information systems, expanded essential nutrition interventions, and promoted integration of sanitation with nutrition services. Improved household sanitation was consistently associated with lower odds of child stunting, supporting multisectoral implementation approaches.	Evaluate the effectiveness of integrated WASH–nutrition using randomized or longitudinal designs, assess community-level sanitation coverage, identify optimal implementation models for integrating WASH into national stunting , and determine how WASH interventions can maximize reductions in child stunting within the first 1,000 days of life.

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
31	Fitriani et al. (2020)	Complementary feeding behavior change	Program implementation was initially hindered by limited maternal knowledge and skills regarding home-made complementary feeding, inadequate family support, inconsistent support from health workers, and cultural beliefs that influenced infant feeding practices. These behavioral and social factors reduced the adoption of appropriate complementary feeding practices before the intervention.	The PRECEDE–PROCEED Model provided a structured framework for behavior change by strengthening maternal knowledge, attitudes, and feeding practices while simultaneously enhancing family involvement, health worker support, and positive cultural reinforcement. Regular supervision throughout the intervention further supported program implementation.	Evaluate whether improvements in maternal behavior are sustained over time and determine whether PRECEDE–PROCEED-based education leads to measurable improvements in child growth, complementary feeding quality, and reductions in wasting and stunting using controlled or longitudinal study designs.
32	Martha et al. (2020)	Community empowerment	Limited baseline knowledge of cadres and especially traditional birth attendants, low educational attainment among participants, misconceptions regarding stunting within the community, and the limited involvement of community actors beyond the health sector before the intervention. Coordination between formal health workers and traditional birth attendants also remained a challenge.	Interactive training methods (lectures, discussions, demonstrations, and educational films), continuous mentoring, implementation of a structured Follow-Up Plan (FUP), establishment of *Whatsapp* groups for supervision and communication, collaboration with primary healthcare centers (*Puskesmas*), and the use of religious and community-based approaches to motivate cadres and traditional birth attendants to conduct outreach activities.	Evaluate the long-term sustainability of cadre and traditional birth attendant empowerment , assess their impact on child growth and stunting prevalence, compare different training models, and examine strategies for integrating community volunteers more effectively into national stunting prevention .
33	Herawati et al. (2020)	Food-based supplementation	Relatively low parental educational attainment, the possibility of poor	The use of a nutrient-dense local food product (eel biscuits), daily supervision	Larger randomized controlled trials with longer intervention

No	Author (Year)	Domain	Barriers	Facilitators	Evidence Gap
			compliance with daily biscuit consumption, participant dropout during follow-up, and the short intervention period of only three months, which may have limited the magnitude of growth improvement.	by community health cadres, weekly household monitoring, caregiver training on food recording, and comparison with the existing government supplementary feeding program. High adherence in the intervention group further strengthened program implementation.	periods (>6 months) are needed to evaluate long-term effectiveness, sustainability, cost-effectiveness, functional outcomes, and scalability of eel biscuit supplementation within national supplementary feeding .

6. Implementation Barriers, Facilitators, and Evidence Gaps

Table 3 summarizes the implementation barriers, facilitators, and evidence gaps identified across the included studies, demonstrating that the success of stunting reduction depends not only on intervention design but also on the capacity of health systems, community engagement, and multisectoral coordination. Despite variations in intervention type, several recurring implementation challenges emerged, including limited health workforce capacity, inadequate maternal knowledge, socioeconomic inequalities, poor sanitation, weak intersectoral collaboration, and inconsistencies in program implementation across regions. These findings indicate that implementation barriers are multidimensional and extend beyond the health sector, requiring coordinated efforts across education, agriculture, water and sanitation, and social protection. Similar implementation challenges have been reported in low- and middle-income countries, where fragmented governance, resource constraints, and contextual differences frequently reduce the effectiveness of evidence-based nutrition interventions.[66,67]

A prominent facilitator identified across the included studies was strong community participation supported by trained *Posyandu* cadres, village governments, healthcare professionals, and multisectoral partnerships. Home visits, nutrition counseling, cadre training, and village-level coordination were consistently associated with improved program acceptance, service accessibility, and community engagement. These findings are consistent with recent implementation research suggesting that community health workers may improve maternal and child nutrition outcomes when supported by continuous training, supervision, and local leadership.[68] Effective implementation also requires stronger interprofessional collaboration across primary healthcare services.[69,70] Recent expert consensus recommends integrating physicians, nutritionists, nurses, midwives, sanitarians, and community health workers within a coordinated model of stunting management to improve continuity of care at the *Puskesmas* level.[61] Strengthening collaboration among these professionals is therefore essential to enhance implementation fidelity and ensure continuity of nutrition services across different levels of care.

The evidence further highlights the increasing importance of governance and

multisectoral collaboration in accelerating stunting reduction. Several studies emphasized that effective implementation was facilitated by policy commitment, adequate financing through village funds and social protection , and coordination among health offices, local governments, educational institutions, and community organizations. These findings support the UNICEF Conceptual Framework on Child Malnutrition and recent global evidence emphasizing that sustainable improvements in child nutrition require coordinated actions across health, food systems, education, sanitation, and social protection. Integrating nutrition-specific and nutrition-sensitive interventions through effective governance remains fundamental for addressing the multiple determinants of childhood stunting.[71,72]

Although many interventions reported positive short-term outcomes, important evidence gaps remain. Although numerous intervention studies were identified, few evaluated implementation fidelity, cost-effectiveness, scalability, or long-term sustainability. This limitation has also been recognized by Soffiudin et al. highlighted that community-based stunting reduction programs require stronger implementation evaluation to determine whether successful local initiatives can be effectively scaled across different socioeconomic settings.[53] In addition, relatively few studies examined digital nutrition services, adolescent nutrition, or hybrid implementation strategies. Similar gaps have been identified in recent implementation science literature, emphasizing the need for stronger evidence on how effective interventions can be adapted, implemented, and sustained across diverse contexts.[73]

The evidence synthesized in this review indicates that achieving sustained reductions in childhood stunting requires strengthening implementation capacity alongside expanding intervention coverage. Future research should prioritize longitudinal implementation studies, hybrid effectiveness–implementation designs, economic evaluations, and digital health innovations while reinforcing multisectoral collaboration and community participation. Generating robust implementation evidence will support Indonesia in translating successful local interventions into scalable national programs capable of sustaining progress toward the national stunting reduction target and achieving equitable improvements in child nutrition outcomes.

Collectively, the evidence indicates that Indonesia has progressively expanded its

stunting reduction strategy from predominantly nutrition-specific interventions toward integrated nutrition-sensitive approaches involving health systems, social protection, community empowerment, and multisectoral governance. Nevertheless, evidence evaluating implementation fidelity, cost-effectiveness, scalability, and long-term sustainability remains limited. Strengthening implementation research across these domains will be essential to optimize national stunting reduction and support evidence-informed policymaking.

7. Strengths and Limitations

This review has several strengths. First, it provides an Indonesia-specific evidence map that integrates nutrition-specific interventions with nutrition-sensitive strategies, community-based approaches, health-system implementation, social protection, governance, and multisectoral collaboration. Second, the review incorporated diverse evidence types, including quantitative, qualitative, mixed-methods, implementation, and program evaluation studies, allowing a broader understanding of how stunting reduction strategies are implemented across different settings. Third, the use of the PCC framework and PRISMA-ScR reporting strengthened transparency in study selection and evidence mapping. In addition, the explicit synthesis of implementation barriers, facilitators, and evidence gaps provides practical information for future program design and implementation research.

Several limitations should also be considered. First, the literature search was conducted primarily in Scopus and PubMed/MEDLINE; therefore, relevant evidence indexed in other databases or scholarly platforms, including Indonesian-specific sources, may have been missed. Although reference lists of eligible studies were manually screened to identify additional evidence, the absence of a structured search of databases such as SINTA and Google Scholar may have limited the retrieval of locally published studies. Second, eligibility was restricted to publications from January 2020 to December 2025. Because eligibility was based on publication year rather than intervention or data-collection period, some included studies analyzed interventions or datasets from earlier periods. This may limit the extent to which the mapped evidence reflects implementation conditions during the entire 2020–2025 period. Third, grey literature, conference abstracts, protocols, editorials, and reports without accessible full text were excluded. This may have reduced the completeness of evidence on

government-led, community-based, and ongoing stunting reduction programs, particularly evidence that has not yet been formally published in peer-reviewed journals. Fourth, the restriction to English-language publications may have introduced language bias and resulted in the exclusion of potentially relevant evidence published in Indonesian. Finally, substantial heterogeneity in study designs, populations, intervention characteristics, outcome measures, and implementation contexts limited direct comparison across studies and precluded quantitative synthesis. In addition, because this was a scoping review focused on mapping the breadth and characteristics of the evidence, formal methodological quality appraisal was not undertaken; therefore, the findings should not be interpreted as comparative estimates of intervention effectiveness. These limitations should be considered when interpreting the breadth, completeness, and applicability of the mapped evidence.

Conclusion

This scoping review mapped a transition in Indonesia's stunting reduction evidence from predominantly nutrition-specific interventions toward more integrated, multisectoral approaches addressing both the immediate and underlying determinants of child growth. The evidence indicated that sustainable stunting reduction extended beyond nutritional supplementation to include community empowerment, health system strengthening, social protection, WASH, local food utilization, digital innovation, and multisectoral governance. However, the effectiveness and sustainability of these interventions remained strongly influenced by implementation capacity, interprofessional collaboration, local governance, and socioeconomic contexts. Persistent evidence gaps in implementation fidelity, cost-effectiveness, scalability, and long-term sustainability underscored the need for more rigorous implementation research to strengthen policy and practice. Future research should prioritize implementation-focused evaluations to support the development of integrated, evidence-informed, and context-specific strategies capable of sustaining equitable reductions in childhood stunting and advancing Indonesia's long-term human capital development goals.

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Conflict of Interest

There are no conflict interest of this publication.

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