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Socioeconomic and Environmental Determinants of Community Stunting Prevention Behaviors: A Systematic Literature Review

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Abstract

Stunting represents a critical public health challenge in developing countries affecting over a quarter of children globally and resulting from complex interactions between socioeconomic, environmental, and behavioral factors that require comprehensive understanding for effective intervention strategies. This study aimed to identify, analyze, and synthesize the determinants of stunting prevention behaviors in developing countries through systematic literature review to provide evidence-based recommendations for targeted intervention strategies. A systematic literature review following PRISMA 2020 guidelines was conducted using PubMed, Scopus, Science Direct, and Google Scholar databases. Search terms included "stunting," "malnutrition," "determinant factors," "prevention," "community behavior," and "developing countries." Inclusion criteria encompassed articles published 2019-2024 focusing on children aged 0-59 months in developing countries. Quality assessment utilized Newcastle-Ottawa Scale and Cochrane Risk of Bias Tool, resulting in 20 high-quality studies from 309 initially identified articles. Maternal education emerged as the most consistent determinant, with low educational levels significantly correlated with suboptimal parenting practices. Economic status demonstrated complex relationships where poverty limited nutritious food access and affected family resource allocation priorities. Health promotion models proved effective for behavioral change, with self-efficacy and social support as significant factors. Environmental and sanitation factors played crucial roles through infection prevention and optimal nutrient absorption mechanisms. Multisectoral collaborative approaches emerged as most effective strategies requiring stakeholder trust and integrated coordination mechanisms. Comprehensive stunting prevention requires holistic intervention programs integrating maternal education, economic empowerment, and improved healthcare access. Strategic recommendations include participatory health education approaches, community-involved sanitation infrastructure development, and multisectoral collaboration models with neutral coordination platforms and shared performance indicators for sustainable program implementation.

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Introduction

Stunting was a chronic condition that described the stunted growth of children due to malnutrition over a long period of time (Nenobais & Katmini, 2021). This problem had become a serious public health challenge in many developing countries, including the Southeast Asian region which accounted for more than a quarter of the number of children who were stunted worldwide (Azriani et al., 2024). The impact of stunting was not only limited to impaired children's physical growth, but also affected the rate of death, illness, and economic productivity of a country in the future. The prevalence of stunting in developing countries showed significant variation between urban and rural areas, reflecting complex underlying factors that influenced child growth and development across different geographical and socioeconomic contexts.

Data from Bangladesh showed that 36.2% of children were stunted, with the highest prevalence occurring in the age group of 18-23 months reaching 48% (Das & Gulshan, 2020). Similar conditions were also found in Indonesia, where there was a difference in the prevalence of stunting between urban and rural areas which reflected inequality in access to nutrition, health services, and other socio-economic factors (Siramaneerat et al., 2024). Even in more vulnerable populations such as street children in Northwestern Ethiopia, the prevalence of stunting reached 46.4%, demonstrating the complexity of the problems faced by marginalized groups of people (Mulu et al., 2022). These statistics highlighted the widespread nature of stunting across different developing regions and emphasized the urgent need for comprehensive intervention strategies tailored to specific population characteristics and environmental conditions.

An in-depth analysis of the determinants of stunting revealed that this problem could not be viewed partially, but rather as the result of a complex interaction of various interrelated factors. These factors could be categorized into three main levels, namely direct factors which included characteristics of parents and children, food intake, and health conditions; indirect factors that included feeding practices and access to health services; as well as basic factors consisting of environmental conditions, household health, and socioeconomic status (Azriani et al., 2024). This multilevel framework provided a comprehensive understanding of how various elements interacted to influence child nutritional outcomes, demonstrating that effective interventions required addressing multiple domains simultaneously rather than focusing on isolated factors.

Research in various developing countries showed that socioeconomic factors had a very dominant role in determining children's nutritional status. Children from families with the lowest economic level had a 2.9 times higher risk of stunting compared to families with more economic means (Das & Gulshan, 2020). The education level of parents, especially mothers, also showed a strong correlation with the incidence of stunting, where mothers with low education or no school education had a 1.22 times greater risk of having stunted children. In addition, the mother's suboptimal nutritional status increased the risk of stunting in children by up to 1.76 times. These findings underscored the intergenerational nature of malnutrition and highlighted the critical importance of investing in maternal education and nutrition as foundational elements of stunting prevention programs.

Child characteristics also contributed significantly to the incidence of stunting, with various demographic and biological factors playing crucial roles in determining growth outcomes. The child's age, birth weight, and weaning age showed a close relationship with the child's growth status, indicating that early life experiences and developmental milestones were critical determinants of long-term nutritional health. Research in Indonesia revealed that in urban areas, there were seven factors that affected stunting, including the age of the child, the age of weaning, the birth weight, the age of the father and mother, the place of birth, and the nutritional status of the mother (Siramaneerat et al., 2024). Meanwhile, in rural areas, the influencing factors were more limited to the age of the child and birth weight, showing differences in the pattern of stunting determinants based on geographical characteristics. This geographical variation suggested that intervention strategies needed to be adapted to local contexts and resource availability.

Community behavior in stunting prevention was a key factor that determined the success of efforts to overcome this nutritional problem. The application of the Health Belief Model theory showed that the perception of vulnerability, severity, barriers, cues to act, perceived benefits, and self-efficacy had a simultaneous effect on stunting prevention efforts through nutrient fulfillment behavior with a significance value of 0.000 and an influence of 12.8% (Nenobais & Katmini, 2021). This indicated that effective interventions should not only focus on medical and nutritional aspects, but must also consider the psychological and behavioral aspects of the community. Understanding these behavioral determinants was essential for developing culturally appropriate and sustainable prevention programs that could effectively engage communities in long-term stunting reduction efforts, ultimately contributing to improved child health outcomes and reduced healthcare burdens in developing nations.

The complexity of the determinants of stunting in developing countries demands a comprehensive and integrated approach in its prevention efforts. Differences in characteristics between urban and rural areas, variations in risk factors between population groups, and interactions between biological, social, economic, and behavioral factors require intervention strategies tailored to the local context. A deep understanding of these determinants is an important foundation for designing effective and sustainable stunting prevention programs. Based on this description, the research problem that arises is the lack of a comprehensive synthesis of the determinants of stunting prevention on community behavior in developing countries that can be used as a reference for the development of targeted intervention strategies. Therefore, this study aims to identify, analyze, and synthesize the determinants of stunting prevention on community behavior in developing countries through a systematic literature review, so as to provide evidence-based recommendations for the formulation of more effective stunting prevention policies and programs.

Methods

This study utilized a systematic literature review approach with reference to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure the transparency and quality of the review process. The PRISMA method was chosen because it provided a structured and comprehensive framework for identifying, selecting, and analyzing scientific literature relevant to the research topic, following the updated 2020 guidelines that helped systematic reviewers transparently report why the review was done, what the authors did, and what they found (Page et al., 2021). The literature search strategy was carried out systematically using four main electronic databases, namely PubMed, Scopus, Science Direct, and Google Scholar, with the selection based on the extensive coverage of public health and nutrition literature and ease of access to the latest articles. The search keywords used were a combination of relevant terms including "stunting", "malnutrition", "growth failure", "determinant factors", "prevention", "community behavior", "developing countries", "Southeast Asia", "risk factors", and "nutritional status", utilizing Boolean operators "AND" and "OR" to optimize search results and ensure the relevance of articles found.

The inclusion criteria established in this study encompassed articles published in the 2019-2024 timeframe to ensure information novelty, research conducted in developing countries with focus on Southeast Asia, Africa, and Latin America, study populations of children aged 0-59 months, articles in English or Indonesian, and observational, experimental, or systematic review studies discussing stunting determinants and preventive behaviors. Exclusion criteria comprised editorial articles, letters to editors, conference abstracts, research conducted in developed countries, inaccessible articles, and research with low methodological quality based on critical assessment. The article selection process was conducted in three stages according to the PRISMA flow, beginning with identification of 309 potential articles through database search, followed by title and abstract screening conducted independently by two researchers resulting in 102 articles meeting initial criteria, and concluding with feasibility evaluation through full-text reading that yielded 20 articles as the main data source.

The quality of articles was assessed using the Newcastle-Ottawa Scale for observational studies and the Cochrane Risk of Bias Tool for experimental studies, with the assessment conducted independently by two researchers and agreement evaluated using the kappa coefficient (Hassan et al., 2024). Articles with low-quality scores were excluded from the analysis to ensure validity of study findings. All articles meeting quality criteria were extracted using standardized data extraction forms, including information about study characteristics, population, methodology, identified determinant factors, and key research outcomes. Data analysis was conducted narratively with a thematic approach to identify key patterns and themes emerging from the reviewed literature, with determinants categorized based on predetermined conceptual frameworks including direct, indirect, and basic factors. The synthesis of findings was carried out by comparing results between studies, identifying consistency and inconsistency of findings, and analyzing factors affecting differences in research results, ensuring adherence to contemporary systematic review reporting standards (Wells et al., 2021). The entire research process was systematically

documented using the PRISMA flowchart showing article numbers at each selection stage, exclusion reasons, and final selection results, with research limitations identified and discussed to provide appropriate context for result interpretation, ensuring high validity and reliability for stunting prevention policy recommendations in developing countries.

Results

The flow chart of PRISMA Figure 1 illustrates the systematic and transparent literature selection process in this study. The identification stage began with a comprehensive search through four electronic databases that yielded 309 potential articles. The initial screening process successfully eliminated 102 duplicate articles, leaving 207 articles for the next stage. At the screening stage by title and abstract, as many as 95 articles were excluded because they did not meet the criteria for the relevance of the topic, target population, or established research design. Furthermore, 112 articles underwent a feasibility evaluation through a full-text reading, of which 56 articles were not fully accessible or had inadequate methodological quality. Quality evaluation using standard instruments resulted in the exclusion of an additional 36 articles for various methodological reasons, leaving 20 high-quality articles that met all inclusion criteria. This gradual selection process reflects compliance with international standards in a systematic review and ensures that the articles analyzed have optimal validity and reliability to answer research questions regarding the determinants of stunting prevention on the behavior of people in developing countries.

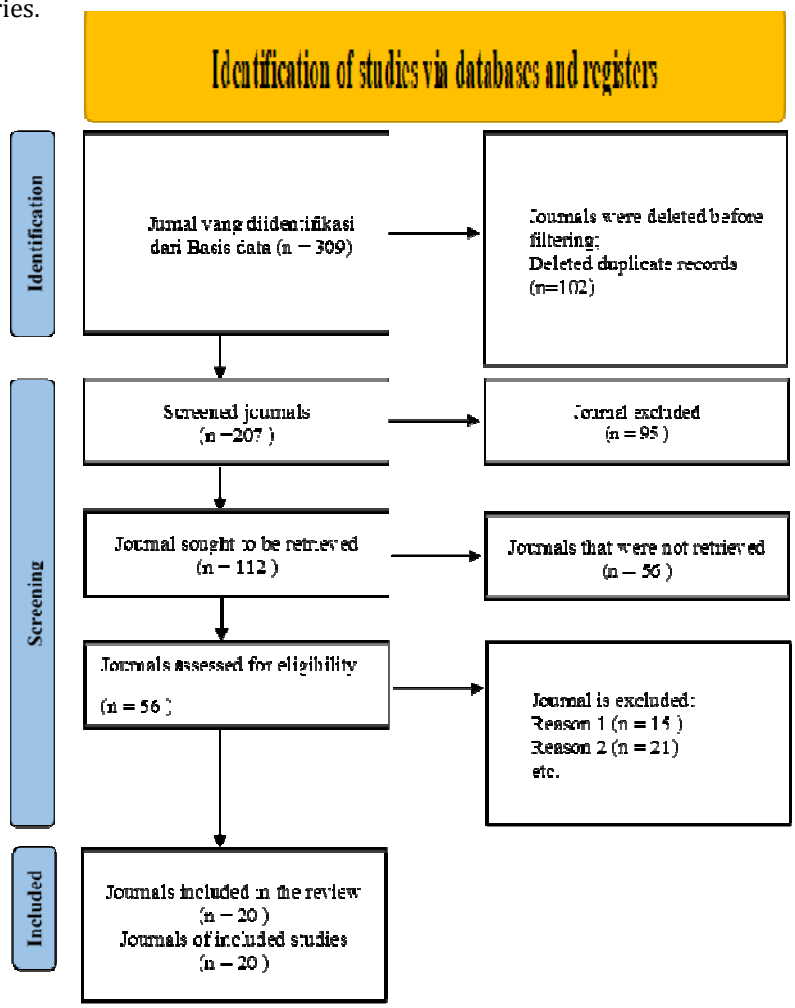

Figure 1. PRISMA Flowchart

The following table presents a comprehensive synthesis of the 20 studies selected through the PRISMA systematic selection process. Each study was analyzed based on the characteristics of the methodology, key findings, identified determinant factors, and its relevance to the research focus on community behavior in stunting prevention. This synthesis reveals the diversity of methodological

approaches used, ranging from cross-sectional observational studies, systematic reviews, to randomized controlled trials that provide varying levels of evidence. Key findings from each study show consistency in identifying key factors such as maternal education, socioeconomic status, feeding practices, and access to health services as the main determinants of stunting. Determinant factors related to community behavior include aspects of health promotion, self-efficacy, social support, and stakeholder collaboration that are the focus of preventive interventions. The relevance of each study to the title of the study was assessed based on its contribution to understanding the relationship between determinants and stunting prevention behaviors, particularly in the context of developing countries that have unique challenges in the implementation of public health programs.

Table 1. Synthesis of Key Characteristics and Findings of Studies on Determinants of Stunting Prevention in Developing Countries

No	Author & Year	Heading	Methodology	Key Findings	Determinants of Stunting Prevention on Community Behavior	Relevance to Research Title
1	(Castro-Bedriñana et al., 2021)	Predictive model of stunting in the Central Andean region of Peru based on socioeconomic and agri-food determinants	Cross-sectional, logistic regression	Maternal education, colostrum consumption, birth weight	Maternal education, breastfeeding practices, family agro-production	Demonstrate the importance of socio-agroeconomic indicators in developing countries
2	(Tapkigen et al., 2024)	Stunting in Developing Countries	Global descriptive review	Stunting begins from the intrauterine period	Maternal nutrition, climate change, conflict, poor funding	Emphasizing interdisciplinarity in understanding stunting in developing countries
3	(Ain et al., 2022)	Stunting Prevention Based On Health Promotion Model From Perspective Philosophy Of Science: A Literature Review	SLR with PICOS & JBI	Mother's education → good parenting behavior	Health promotion model, maternal education	Relevant because of its focus on community behavior and educational interventions
4	(Nurdin et al., 2023)	Prevalence and Determinants of Stunting	Cross-sectional, secondary database	Factors: maternal age, birth weight, infections, low	Exclusive breastfeeding, water quality, growth and	Demonstrate a direct relationship between

No	Author & Year	Heading	Methodology	Key Findings	Determinants of Stunting Prevention on Community Behavior	Relevance to Research Title
		Risk Factors among Children Under Five Years Old: An Analysis of the Indonesian Secondary Database		education	development monitoring	behavioral and environmental factors
5	(Bhutta et al., 2025)	What works for reducing stunting in low-income and middle-income countries? Cumulative learnings from the Global Stunting Exemplars Project	Mixed methods	Effective cross-sectoral interventions	Sanitation, maternal education, maternal and child nutrition	Strong evidence of the effectiveness of multisectoral interventions in developing countries
6	(Bhutta et al., 2020)	How countries can reduce child stunting at scale: Lessons from exemplar countries	Mixed-methods & country studies	Interventions within and outside the health sector	Education, fertility, nutrition, sanitation	Provide a roadmap for relevant interventions
7	(Akter & Nishu, 2025)	Malnutrition among under-5 children and its determinants in the southwestern coastal region of Bangladesh: A community-based study	Cross-sectional	Young mothers, employment status, experience of child death	Mother's education, work, child's age	Explain sociodemographic determinants in coastal areas
8	(Soviyati et al., 2023)	Effect of applying the	Cross-sectional &	Significant self-efficacy and	Perception of vulnerability,	Strengthening behavioral

No	Author & Year	Heading	Methodology	Key Findings	Determinants of Stunting Prevention on Community Behavior	Relevance to Research Title
		health promotion model in stunting prevention and behavior control in Indonesia	path analysis	social support	sanitation, self-efficacy, parenting	approaches in prevention
9	(Ferdaus et al., 2024)	Exploring the Determinants of Malnutrition among Under-Five Children in the Coastal Area of Bangladesh	Cross-sectional	42% stunted, influenced by economic status & illness	Maternal education, family income, sanitation	Demonstrates the complexity of the coastal context
10	(Siregar et al., 2024)	Determinants of Stunting Among Children Under Five Years in Indonesia: Evidence from the 2021-2022 Demographic and Health Survey	Literature review & secondary analysis	Factors: mother's age, breast milk, birth weight, sanitation	Socioeconomic, environmental, maternal-child nutrition	Relevant as a summary of Indonesia's current condition
11	(Bakri et al., 2025)	Determinants of Stunting Severity Among Under-Fives: Comparison of Agricultural and Nonagricultural Households in South Lampung Regency, Indonesia	Ordinal logistic regression	Children in non-agricultural households are healthier	Breast milk, age during pregnancy, pregnancy distance	Clarify the difference in risk based on livelihood

No	Author & Year	Heading	Methodology	Key Findings	Determinants of Stunting Prevention on Community Behavior	Relevance to Research Title
12	(Tamanna et al., 2025)	Identifying determinants of malnutrition in under-five children in Bangladesh: insights from the BDHS-2022 cross-sectional study	Cross-sectional with the Boruta + RF algorithm	18–22 important features depending on the type of malnutrition	Parental education, wealth index, toilet facilities	Demonstrate predictive ability for targeted interventions
13	(Kustanto et al., 2025)	The Prevalence of Stunting in Indonesia: An Examination of the Health, Socioeconomic Status, and Environmental Determinants	Ecological analysis data panel	Sanitation, diarrhea, significant dependency ratio	Antenatal care, nutrition, hygiene	Highly suitable for evidence-based national policies
14	(Gusnedi et al., 2023)	Risk factors associated with childhood stunting in Indonesia: A systematic review and meta-analysis	SLR & meta-analysis	Dominant factors: low birth weight, parental education	Infections, poor sanitation, improper water	Supporting household & community-based prevention
15	(Tahangnacca et al., 2020)	Model of stunting determinants: A systematic review	SLR	Factors: mother's age, education, water, sanitation, location	Mother's education, child's age, economic status	Forming the basis for mapping determinant factors
16	(Astuti et al., 2025)	Modeling environmental interactions and collaborative interventions	Qualitative, FGD	The important role of social capital	Stakeholder collaboration, social trust	Ideal for community-based intervention strategies

No	Author & Year	Heading	Methodology	Key Findings	Determinants of Stunting Prevention on Community Behavior	Relevance to Research Title
		for childhood stunting: A case from Indonesia				
17	(Saleh et al., 2021)	Role of Maternal in Preventing Stunting: a Systematic Review	SLR	The role of mothers in the 3 golden phases is crucial	Maternal and child nutrition, breast milk, family support	Emphasizing the role of mothers as key actors in prevention
18	(Rahut et al., 2024)	Geospatial and environmental determinants of stunting, wasting, and underweight: Empirical evidence from rural South and Southeast Asia	Poisson regression, DHS	Significant household climate and fuel factors	Climate change, water, fuel, education	The context of developing countries is very strong in agrarian areas
19	(Kim et al., 2020)	Behavior change interventions delivered through interpersonal communication, agricultural activities, community mobilization, and mass media increase complementary feeding practices and reduce child stunting in Ethiopia	RCT cluster + path analysis	Reducing stunting with a multimodal approach	Interpersonal, media, agriculture	Relevant to the communication approach to behavior change
20	(Conway et	Drivers of	Mixed	Factors:	Maternal	Highly relevant

No	Author & Year	Heading	Methodology	Key Findings	Determinants of Stunting Prevention on Community Behavior	Relevance to Research Title
	al., 2020)	stunting reduction in Nepal: A country case study	methods	education, sanitation, decentralizatio n of services	nutrition, open defecation, education	success studies as a comparison of good practice

Discussion

Socio-Economic and Education Factors as the Main Determinants of Stunting Prevention

A comprehensive analysis of the literature reviewed shows that socioeconomic factors are fundamental determinants in stunting prevention in developing countries. Maternal education emerged as the most consistent variable influencing stunting prevention behaviors, as shown in various cross-geographic studies (Castro-Bedriñana et al., 2021; Ain et al., 2022; Nurdin et al., 2023). Low maternal education levels are significantly correlated with suboptimal parenting practices, limited nutritional understanding, and delays in accessing health services. These findings indicate that investment in women's education not only provides individual benefits, but also has a generational impact through improving the quality of childcare and health. A family's economic status shows a complex relationship with stunting prevention behaviors, where poverty not only limits access to nutritious food, but also affects family priorities in resource allocation (Akter & Nishu, 2025; Ferdaus et al., 2024). Research in Bangladesh shows that low-income families tend to prioritize short-term economic needs over long-term health investments for their children. This condition is exacerbated by limited access to quality health information and prevention services. Furthermore, an analysis of the wealth index shows that economic disparities not only affect financial ability to meet nutritional needs, but also shape patterns of behavior and attitudes towards children's health (Tamanna et al., 2025).

The interaction between educational and economic factors creates a complex cycle in stunting prevention, where families with low levels of education and economics face multi-layered challenges in adopting effective preventive behaviors. Longitudinal research shows that interventions that focus on only one socioeconomic aspect have limited effectiveness, while holistic approaches that integrate improved education, economic empowerment, and access to health services show more sustainable outcomes (Bhutta et al., 2025). These findings affirm the importance of policies that adopt a multisectoral approach in addressing the root causes of stunting, taking into account the complexity of socioeconomic factors that interact with each other in shaping people's behavior towards stunting prevention. The dimension of the linkage between economic aspects and stunting prevention behavior shows a more complex mechanism than just the availability of funds to buy nutritious food. Families with economic limitations tend to experience psychological distress that affects decision-making patterns related to children's health, where the priority of urgent needs often trumps long-term health investments. This phenomenon creates a vicious cycle where children from poor families not only face the risk of malnutrition due to food insecurity, but also miss out on the opportunity to get the optimal stimulation and care necessary for growth and development. Unstable economic conditions also affect the emotional stability of families, which in turn impacts the quality of parent-child interaction and consistency in implementing parenting practices that support stunting prevention.

The Role of Health Education and Promotion in Behavior Change

Health education and health promotion have proven to be effective instruments in changing people's behavior related to stunting prevention, as evidenced through various theoretical models and practical implementation. The Health Promotion Model applied in the context of stunting prevention shows that sustainable behavior change requires an approach that involves not only information transfer, but also attitude formation, self-efficacy improvement, and the creation of a supportive environment (Ain et al., 2022; Soviyati et al., 2023). Research in Indonesia shows that self-efficacy and social support are factors that significantly influence the adoption of stunting prevention behaviors by mothers, indicating that educational interventions should be designed to increase mothers' confidence and ability to implement optimal parenting practices. The implementation of nutrition and health education programs shows significant variations in effectiveness depending on the methodological approach and the socio-cultural context in which the program is implemented. Research in various developing countries reveals

that educational programs that use a participatory approach and involve local community leaders have higher acceptance and sustainability rates compared to conventional top-down approaches (Kim et al., 2020; Conway et al., 2020). Interpersonal communication factors and the use of local media have proven to be important catalysts in the process of behavior change, where health messages conveyed through communication channels that are trusted by the community have a deeper impact on changes in parenting practices.

Long-term evaluation of health promotion programs shows that the sustainability of behavior change is strongly influenced by the availability of a sustainable support system and the program's integration with routine health services. Meta-analysis research indicates that educational programs that are integrated with basic health services have a greater effect and last longer than stand-alone programs (Gusnedi et al., 2023). This emphasizes the importance of program design that not only focuses on knowledge transfer, but also creates an ecosystem that supports the application of that knowledge in daily practice, including the availability of resources, access to health services, and ongoing social support to maintain optimal stunting prevention behaviors. The effectiveness of health education programs is highly dependent on a deep understanding of the cultural context and belief systems of the target community, where health messages that are contrary to traditional values tend to experience strong resistance. Research shows that programs that successfully integrate modern medical knowledge with local wisdom and involve indigenous or religious leaders as agents of change have a much higher acceptance rate. This approach requires a significant investment of time in understanding the socio-cultural dynamics of the community and developing communication strategies that are sensitive to local nuances. The process of cultural adaptation in educational programs includes not only the use of local languages, but also modifications to the delivery methods, implementation times, and types of media used to be in harmony with the lifestyle patterns and preferences of the local community.

Environmental and Sanitation Factors in Stunting Prevention

Environmental and sanitary factors play a crucial role in stunting prevention through complex mechanisms involving infection prevention, optimal nutrient absorption, and the creation of living conditions that support child growth. Analysis of various studies shows that access to clean water and proper sanitation facilities has a strong correlation with a reduction in stunting prevalence, not only through the prevention of diarrhea and gastrointestinal infections, but also through improved efficiency of nutrient absorption (Kustanto et al., 2025; Tahangnacca et al., 2020). Research in Indonesia shows that the availability of proper toilet facilities and open defecation practices have a significant relationship with a child's growth status, indicating that sanitation interventions are an integral component of comprehensive stunting prevention strategies. The quality of the household environment, including ventilation, occupancy density, and waste management, has been shown to affect children's health through various interacting pathways. Cross-country research shows that children living in poorly sanitized environments have a significantly higher risk of stunting, even after controlling for socioeconomic factors and nutritional intake (Rahut et al., 2024; Conway et al., 2020). This condition shows that stunting prevention cannot be seen only from a nutritional perspective, but requires a holistic approach that includes improving the condition of the living environment. Furthermore, research shows that investment in sanitation infrastructure at the community level has a multiplier effect that can benefit the entire child population in the community.

The relationship between climate change and environmental factors adds to the complexity of stunting prevention challenges in developing countries, where extreme weather, drought, and flooding can disrupt access to clean water and increase the risk of environmental contamination. Geospatial research in Asia shows that climate variability interacts with socioeconomic factors in influencing stunting prevalence, with a greater impact on already vulnerable communities (Rahut et al., 2024). These findings underscore the importance of adaptation and mitigation strategies that integrate aspects of child health into sustainable development planning. Effective environmental interventions require cross-sectoral collaboration and approaches that take into account not only the technical aspects of sanitation, but also community behavior, local policies, and institutional capacity to maintain sustainable sanitation infrastructure. The interaction between sanitary conditions and the nutritional status of the child shows a complex biological mechanism through the pathway of environmental enteropathy, where chronic exposure to pathogens due to poor sanitation causes inflammation of the small intestine that interferes with nutrient absorption. This condition creates a paradox where children who get sufficient food intake in quantity can still experience malnutrition due to impaired absorption of nutrients caused by unhealthy environmental conditions. The long-term impact of environmental enteropathy is not only limited to physical growth, but also affects the cognitive development and immune system of the child. Research shows that children who are exposed to poor sanitation early in life have a higher risk of developmental

impairment even after sanitary conditions are improved, indicating a critical window in which sanitation interventions should be undertaken to prevent permanent damage.

The implementation of effective sanitation programs requires an approach that integrates technical, social, and economic aspects simultaneously to achieve long-term sustainability. The success of sanitation programs is not only measured by the development of physical infrastructure, but also by changes in people's behavior in using and maintaining sanitation facilities that have been built. Research shows that sanitation programs that involve the community in the planning, implementation, and maintenance processes have a higher level of sustainability than top-down programs. The ownership factor and the community's sense of responsibility for sanitation facilities are key in ensuring the long-term functioning of the infrastructure that has been built. In addition, the integration of sanitation programs with other health and nutrition programs creates synergies that strengthen the overall impact on children's health, where improved sanitation combined with nutrition education and improved access to health services produces a greater effect in stunting prevention.

Collaborative Models and Multisectoral Interventions in Stunting Prevention

Collaborative approaches and multisectoral interventions have proven to be the most effective strategies in stunting prevention, given the complexity of determinant factors involving different sectors and levels of society. Research shows that collaborative models involving the health, education, agriculture, and local government sectors are able to create synergies that produce greater impact than stand-alone sectoral interventions (Astuti et al., 2025; Bhutta et al., 2020). Social capital and trust between stakeholders are important foundations in the successful implementation of collaborative programs, where a high level of trust facilitates effective coordination and sustainability of programs. Research in Indonesia revealed that communities with strong social capital show higher levels of participation in stunting prevention programs and have better results in the long run. The implementation of multisectoral interventions shows significant variation in success depending on institutional capacity, political commitment, and availability of resources at the local level. Case studies in Nepal show that the decentralization of health services and the empowerment of local governments play a key role in the success of sustainable stunting prevention programs (Conway et al., 2020). Local leadership factors and community leader involvement are proving to be important catalysts in community resource mobilization and changes in social norms that support optimal parenting practices. Research in Ethiopia shows that programs that integrate communication, media, and agricultural components with a multimodal approach have managed to achieve significant stunting reductions through comprehensive behavioral change (Kim et al., 2020).

Long-term evaluations of multisectoral programs identify several key factors that determine the sustainability and scalability of interventions, including clear coordination mechanisms, integrated monitoring and evaluation systems, and sustainable financing strategies. Research shows that programs that are successful in the long run are those that are able to integrate stunting interventions into routine service systems and create financing mechanisms that are not completely dependent on external assistance (Bhutta et al., 2025). The role of the private sector and civil society organizations has also shown significant contributions in providing innovation, additional resources, and wider reach. These findings confirm that effective stunting prevention requires systemic transformation that involves policy change, institutional capacity building, and the creation of an ecosystem that supports sustainable collaboration between various stakeholders to achieve the common goal of improving the nutritional status and health of children in developing countries. The complexity of coordination in multisectoral interventions requires clear governance mechanisms and accountability systems that can accommodate the interests of a wide range of stakeholders. The main challenge in the implementation of collaborative programs lies in differences in organizational culture, priorities, and reporting systems between sectors that can hinder effective coordination. The success of the collaborative model relies heavily on having a neutral coordination platform and having the authority to integrate various programs and resources from different sectors. The development of shared performance indicators that can be used by all sectors is key in ensuring that all parties move towards the same goals and can measure each other's contribution to the achievement of the final result. Furthermore, an incentive system that encourages collaboration between sectors needs to be designed taking into account the motivations and capacities of each stakeholder.

Lessons learned from the implementation of multisectoral programs show that investment in institutional capacity building at the local level is a fundamental prerequisite for program sustainability. This capacity includes not only technical capabilities in designing and implementing interventions, but also managerial capabilities in managing intersectoral cooperation and community resource mobilization. The development of integrated information systems allows various sectors to share data and information in real-time, thus facilitating more responsive and evidence-based decision-making. The long-term success of multisectoral programs also requires a financial sustainability strategy that is not entirely

dependent on external funding, including through the development of innovative financing mechanisms involving the private sector and communities. Innovation aspects in a multisectoral approach, such as the use of digital technology for monitoring and evaluation, show great potential in improving the efficiency and effectiveness of programs, while addressing the geographical and logistical challenges often faced in program implementation in developing countries.

Research Limitations

This systematic literature review acknowledges several methodological and contextual limitations that may influence the interpretation of findings. First, the heterogeneity of study designs, measurement instruments, and outcome definitions across the included studies limits the ability to conduct comprehensive meta-analyses and may affect the generalizability of results. The predominant focus on studies from specific developing countries, particularly in South and Southeast Asia, may restrict the applicability of findings to other geographical contexts with different socioeconomic, cultural, and environmental characteristics. Additionally, the temporal scope of the review may not capture the most recent interventions and policy developments in stunting prevention, potentially overlooking emerging evidence and innovative approaches. The quality of primary studies varies considerably, with some relying on cross-sectional designs that limit causal inference regarding the relationships between determinants and stunting prevention behaviors. Furthermore, publication bias toward studies reporting significant positive outcomes may skew the evidence base, while the complex interplay between multiple determinants makes it challenging to isolate individual factor effects. The review's reliance on English-language publications may exclude relevant studies published in other languages, potentially missing culturally specific insights. Finally, the varying definitions and operationalization of stunting prevention behaviors across studies may affect the consistency and comparability of findings across different contexts and populations.

Conclusion

This systematic literature review of 20 high-quality studies reveals the complex interplay of socioeconomic and environmental determinants influencing community stunting prevention behaviors in developing countries. Maternal education emerges as the most consistent determinant, with low educational levels significantly correlated with suboptimal parenting practices and delayed healthcare access. Economic status demonstrates a complex relationship where poverty not only limits access to nutritious food but affects family resource allocation priorities, creating difficult-to-break cycles. Health promotion models prove effective in behavioral change, with self-efficacy and social support as significant factors influencing mothers' adoption of prevention behaviors. Environmental and sanitation factors play crucial roles through complex mechanisms involving infection prevention, optimal nutrient absorption, and creating supportive living conditions for child growth. Multisectoral collaborative approaches emerge as the most effective strategies, requiring social capital, stakeholder trust, and integrated coordination mechanisms for sustainable program implementation.

Based on these comprehensive findings, strategic recommendations must prioritize holistic intervention programs that simultaneously integrate maternal education, economic empowerment, and improved healthcare access, recognizing the multilayered challenges created by educational-economic factor interactions. Health education programs should adopt participatory approaches involving local community leaders and trusted communication channels while integrating modern medical knowledge with local wisdom to enhance acceptance and sustainability. Investment in sanitation infrastructure and environmental improvements must involve communities in planning, implementation, and maintenance to ensure long-term sustainability. Effective multisectoral collaboration models require neutral coordination platforms with clear authority, accountability systems accommodating diverse stakeholder interests, and shared performance indicators ensuring unified goal achievement. Fundamental institutional capacity building at local levels, including technical intervention design capabilities and managerial skills for intersectoral cooperation, combined with innovative financing mechanisms involving private sector and community participation, represents essential prerequisites for sustainable stunting prevention program success in developing countries.

Patents

This section is not mandatory but may be added if there are patents resulting from the work reported in this manuscript.

Author Contributions

For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used “Conceptualization, X.X. and Y.Y.; methodology, X.X.; software, X.X.; validation, X.X., Y.Y. and Z.Z.; formal analysis, X.X.; investigation, X.X.; resources, X.X.; data curation, X.X.; writing—original draft preparation, X.X.; writing—review and editing, X.X.; visualization, X.X.; supervision, X.X.; project administration, X.X.; funding acquisition, Y.Y. All authors

have read and agreed to the published version of the manuscript." Authorship must be limited to those who have contributed substantially to the work reported.

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Conflicts of Interest

Declare conflicts of interest or state "The authors declare no conflict of interest." Authors must identify and declare any personal circumstances or interest that may be perceived as inappropriately influencing the representation or interpretation of reported research results. Any role of the funders in the design of the study; in the collection, analyses or interpretation of data; in the writing of the manuscript; or in the decision to publish the results must be declared in this section. If there is no role, please state "The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results".

Appendix A

The appendix is an optional section that can contain details and data supplemental to the main text—for example, explanations of experimental details that would disrupt the flow of the main text but nonetheless remain crucial to understanding and reproducing the research shown; figures of replicates for experiments of which representative data is shown in the main text can be added here if brief, or as Supplementary data. Mathematical proofs of results not central to the paper can be added as an appendix.

Appendix B

All appendix sections must be cited in the main text. In the appendices, Figures, Tables, etc. should be labeled starting with "A"—e.g., Figure A1, Figure A2, etc.

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