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EFFECTIVENESS OF COMMUNITY-BASED NUTRITION EDUCATION IN REDUCING STUNTING IN RURAL AREAS: A SYSTEMATIC REVIEW

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Abstract

Community-based nutrition education is a key strategy for addressing stunting in geographically isolated regions, yet synthesized evidence on its effectiveness in these specific high-constraint environments remains limited. This systematic review evaluates the impact of community-based nutrition education on stunting and child nutrition outcomes in remote and rural areas. We searched six major databases (ProQuest, ScienceDirect, Scopus, SAGE, SpringerLink, Taylor & Francis) for randomized controlled trials and quasi-experimental studies published between 2014 and 2024. Following PRISMA guidelines, twelve studies (N=53,570) from Asia, Africa, and Latin America were included for qualitative synthesis. Interventions combining nutrition counseling, cooking demonstrations, and home visits significantly improved complementary feeding practices, dietary diversity, and hygiene behaviors. While all studies reported improvements in caregiving, significant reductions in stunting prevalence (ranging from 4.9% to 35%) were primarily observed in multi-year programs that integrated educational components with targeted nutritional supplementation and growth monitoring. In isolation, education improved dietary diversity but had modest, statistically insignificant effects on linear growth. Community-based nutrition education is most effective in reducing stunting when implemented as a multifaceted, long-term intervention linked to social support and supplementation. Policy design for remote areas must prioritize culturally adapted, resource-integrated models to achieve measurable anthropometric gains.

Keywords: Child Nutrition Disorders, Community Health Services, Growth Disorders, Health Education, Rural Population.

Abstrak

Edukasi gizi berbasis komunitas merupakan strategi kunci dalam mengatasi stunting di wilayah yang secara geografis terpencil, namun bukti yang telah disintesis mengenai efektivitasnya dalam lingkungan dengan keterbatasan tinggi tersebut masih terbatas. Tinjauan sistematis ini mengevaluasi dampak edukasi gizi berbasis komunitas terhadap stunting dan luaran gizi anak di daerah terpencil dan pedesaan. Kami menelusuri enam basis data utama (ProQuest, ScienceDirect, Scopus, SAGE, SpringerLink, Taylor & Francis) untuk studi uji coba terkontrol secara acak dan studi kuasi-eksperimental yang dipublikasikan antara tahun 2014 hingga 2024. Sesuai pedoman PRISMA, dua belas studi (N=53.570) dari Asia, Afrika, dan Amerika Latin dimasukkan untuk sintesis kualitatif. Intervensi yang menggabungkan konseling gizi, demonstrasi memasak, dan kunjungan rumah secara signifikan meningkatkan praktik pemberian makanan pendamping ASI, keberagaman diet, serta perilaku kebersihan. Meskipun seluruh studi melaporkan adanya perbaikan dalam pola pengasuhan, penurunan signifikan dalam prevalensi stunting (berkisar antara 4,9% hingga 35%) terutama ditemukan pada program multi-tahun yang mengintegrasikan komponen edukasi dengan suplementasi gizi terarah serta pemantauan pertumbuhan. Jika dilakukan secara terpisah, edukasi hanya meningkatkan keberagaman diet namun memberikan efek yang kecil dan tidak signifikan secara statistik terhadap pertumbuhan linier anak. Edukasi gizi berbasis komunitas paling efektif dalam menurunkan stunting apabila dilaksanakan sebagai intervensi multifaset jangka panjang yang terhubung dengan dukungan sosial dan suplementasi. Perancangan kebijakan untuk daerah terpencil perlu memprioritaskan model yang disesuaikan secara budaya dan terintegrasi dengan sumber daya agar dapat mencapai peningkatan antropometri yang terukur.

***Kata kunci**: Gangguan Gizi pada Anak, Layanan Kesehatan Masyarakat, Gangguan Pertumbuhan, Pendidikan Kesehatan, Masyarakat Pedesaan*

Introduction

Adolescence Stunting serves as a critical measure of chronic malnutrition, adversely impacting the physical and cognitive development of children and carrying long-term consequences for health and productivity. In 2022, approximately 148 million children under five years of age (22.3%) were classified as stunted globally. Although this reflects a decrease from 1990, stunting continues to be disproportionately prevalent in low- and middle-income countries (Ponum et al., 2020; WHO, 2024). Indonesia's stunting prevalence is 21.6%, exceeding the national target of 14% set for 2024.

Significant disparities continue to exist, especially in underdeveloped and remote areas such as Papua, where the prevalence is 34.6% (Kemenkes, 2023). Stunting, as defined by low height-for-age according to WHO standards, signifies chronic malnutrition and underscores the critical necessity for evidence-based, multisectoral, and context-sensitive interventions to meet the Sustainable Development Goals (SDGs) (Wirawan et al., 2023). The impacts include impaired physical growth and cognitive development, increasing the long-term risk of non-communicable diseases in adulthood, such as diabetes and cardiovascular conditions (Marume et al., 2023; Siswati et al., 2022; Tang et al., 2022).

Recent evidence suggests that stunting during the 6–11 month period markedly reduces the probability of complete recovery. Children with severe stunting have approximately an 80% likelihood of achieving catch-up growth, whereas those with moderate stunting exhibit only a 60% likelihood (Nemerimana et al., 2023). The findings underscore the significance of targeted nutrition and health interventions in the initial 1,000 days of life (Imtiaz et al., 2024). Only 27.8% of countries are anticipated to achieve the stunting reduction targets set for 2025, despite worldwide initiatives (Tadesse et al., 2023). This situation highlights the critical necessity for coordinated, evidence-based strategies that encompass enhanced health policies, robust food systems, and increased access to primary health services.

Numerous strategies have been implemented worldwide to mitigate stunting, encompassing integrated national policies and community-based interventions (Ashraf et al., 2024; Avula et al., 2024). Community-based nutrition education, which includes supplementation, counselling, home visits, and cooking demonstrations, has emerged as a prevalent model for enhancing nutritional knowledge, attitudes, and practices (Perry et al., 2023; Yao et al., 2022). This strategy promotes local engagement and tackles the social, economic, and environmental factors contributing to stunting, enhancing its sustainability and relevance to specific contexts (Haile & Legisso, 2024). The effectiveness of this approach in remote or rural areas is subject to ongoing debate, primarily due to geographic and healthcare access challenges (Tontisirin & Bhattacharjee, 2025). In China, the integration of health counselling with the Ying Yang Bao program led to a significant reduction in stunting, decreasing from 26.3% to 10.8% through enhancements in feeding practices and access to care (Yao et al., 2022). In contrast, research conducted in Ethiopia indicated a minimal effect on stunting and the Composite Index of Anthropometric Failure (CIAF), despite observed decreases in wasting and underweight (Bidira et al., 2022).

Significant obstacles in remote or rural regions consist of challenging terrain, inadequate infrastructure, limited parental education, and food insecurity (Beggs et al., 2024). These regions demonstrate a consistently elevated prevalence of stunting, attributable to inadequate healthcare, education, nutrition, and suboptimal environmental conditions (Sahiledengle et al., 2022; Widyaningsih et al., 2022). Socio-economic factors, especially low maternal education and inadequate sanitation, significantly affect child nutrition (Kuse & Debeko, 2023). Community-based nutrition education is an essential and sustainable approach that improves local literacy and facilitates behavior change. Analyzing the spatial patterns and determinants of stunting is essential for formulating context-specific interventions (Kuse & Debeko, 2023; Widyaningsih et al., 2022).

While numerous systematic reviews have addressed nutrition education in rural settings, few have distinctively isolated the unique challenges of geographically isolated regions. Consequently, the specific efficacy of educational interventions in these high-constraint environments remains under-synthesized. This systematic review aims to bridge this gap by evaluating the effectiveness of community-based nutrition education specifically in remote areas, providing evidence to support the development of scalable, context-specific strategies for the most hard-to-reach populations.

Methods

Study Design

This study adhered to the established protocol for evidence synthesis in medical and health research. The selection, development, and preparation process for this systematic review adhered to the PRISMA 2020 guidelines, recognized as an international standard for reporting systematic reviews and meta-analyses. This review was registered with the

International Prospective Registry of Systematic Reviews (PROSPERO) on December 7, 2024, under registration number CRD42025623734 to ensure transparency and methodological integrity. This step illustrates the author's dedication to replicable and reliable research methodologies aimed at producing high-quality scientific evidence.

Table 1. Search strategy in selected databases

Database	Search Strategy	Filter	Records
ProQues	("Nutrition Education" OR "Nutritional Counselling") AND ("Community-Based" OR "Participatory Approach") AND ("Stunting" OR "Chronic Malnutrition") AND ("Remote Area" OR "Rural Area")	Year: 2014-2024 Article Language: English	142
ScienceDirect	("Nutrition Education" OR "Nutritional Counselling") AND ("Community-Based" OR "Participatory Approach") AND ("Stunting" OR "Chronic Malnutrition") AND ("Remote Area" OR "Rural Area")	Year: 2014-2024 Research articles	57
Scopus	("Nutrition Education" OR "Nutritional Counselling") AND ("Community-Based" OR "Participatory Approach") AND ("Stunting" OR "Chronic Malnutrition") AND ("Remote Area" OR "Rural Area")	Year: 2014-2024 Article Language: English	5
SAGE Journals	("Nutrition Education" OR "Nutritional Counselling") AND ("Community-Based" OR "Participatory Approach") AND ("Stunting" OR "Chronic Malnutrition") AND ("Remote Area" OR "Rural Area")	Year: 2014-2024 Research articles Language: English	5
SpringerLink	("Nutrition Education" OR "Nutritional Counselling") AND ("Community-Based" OR "Participatory Approach") AND ("Stunting" OR "Chronic Malnutrition") AND ("Remote Area" OR "Rural Area")	Year: 2014-2024 Research articles Language: English	17
Taylor & Francis	[[All: "nutrition education"] OR [All: "nutritional counselling"]] AND [[All: "community-based"] OR [All: "participatory approach"]] AND [[All: "stunting"] OR [All: "chronic malnutrition"]] AND [[All: "remote area"] OR [All: "rural area"]] AND [Article Type: Article] AND [Publication Date: (01/01/2014 TO 12/31/2024)]	Year: 2014-2024 Article Language: English	3

Search Methods

Articles published in English were retrieved from six electronic databases: ProQuest, ScienceDirect, Scopus, SAGE Journals, SpringerLink, and Taylor & Francis, covering the period from January 2014 to December 31, 2024. Alongside database searches, we conducted a manual review of the reference lists of identified articles to enhance the breadth and comprehensiveness of the literature coverage. A 10-year timeframe (2014–2024) was selected to incorporate recent studies that illustrate the latest advancements in stunting prevention and control initiatives, especially those associated with the execution of global policies like the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). This limitation is anticipated to lead to the synthesis of pertinent, contextual evidence that supports the development of innovative, data-driven health policies.

The search strategy was structured using the PICO framework to ensure a systematic and focused retrieval of literature. The population (P) consists of children aged 0 to 5 years residing in remote or rural areas characterized by a high prevalence of stunting. The intervention (I) involves community-based nutrition education engaging community leaders, health workers, and caregivers. The comparison (C) involves individual nutritional interventions by healthcare professionals or the absence of intervention. The primary outcome (O) is the reduced prevalence of stunting.

To maintain consistency across databases, we integrated controlled vocabulary through DeCS (Health Sciences Descriptors) and MeSH (Medical Subject Headings). Search terms were combined using the Boolean operators "AND" and "OR" as follows:

("Nutrition Education" OR "Nutritional Counselling") AND ("Community-Based" OR "Participatory Approach") AND ("Stunting" OR "Chronic Malnutrition") AND ("Remote Area" OR "Rural Area").

The study design encompasses Randomized Controlled Trials (RCT) and quasi-experimental designs published between 2014 and 2024. While the search string was intentionally kept focused on primary educational and community-based descriptors to ensure high precision in identifying direct interventions, we acknowledge a potential retrieval bias regarding broader behavioral change frameworks (e.g., SBCC or IYCF). To mitigate this, manual hand-searching of reference lists from the included studies was performed to ensure conceptual saturation. All identified articles were organized and managed using the Covidence Systematic Review Tool to ensure transparency in the screening and data extraction process. (refer to Table 1).

Following the deduplication process, two researchers conducted independent reviews of the titles and abstracts of the articles to evaluate eligibility according to established inclusion and exclusion criteria. Disagreements are addressed through discussion, and if required, a third researcher is involved as the final arbiter. Articles that advance to this stage undergo a comprehensive evaluation through full-text reading. Exclusion reasons are systematically documented to maintain transparency and accountability in the selection process, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Inclusion and exclusion criteria

The inclusion criteria are as follows: (1) Studies focusing on children aged 0–5 years residing in rural areas or regions with restricted access to healthcare services; (2) Implementation of community-based nutrition education, which includes training for community health workers, mothers, or community leaders, while respecting local values and culture; (3) Studies that report the effects of interventions on stunting prevalence, enhancements in height-for-age Z-score (HAZ) or length-for-age Z-score (LAZ), and alterations in community nutrition knowledge. Experimental studies, including randomized controlled trials (RCTs) or quasi-experimental designs, and studies conducted in developing countries, especially in areas with a high prevalence of stunting.

Exclusion criteria are as follows: (1) Studies not conducted in remote or rural areas or not involving children aged 0–5 years; (2) Articles categorized as cohort studies, cross-sectional studies, systematic reviews/meta-analyses, opinions, editorials, or comments lacking empirical data; (3) Studies focusing solely on medical approaches without incorporating community-based nutrition education; (4) Interventions executed independently within healthcare facilities without community engagement; and (5) Studies that fail to report outcomes related to children's nutritional status or alterations in dietary behavior.

Data Extraction

Two reviewers conducted an independent screening of titles and abstracts to evaluate study eligibility based on established inclusion and exclusion criteria. Studies that met the criteria were subjected to full-text evaluation. Disagreements were addressed through consensus or, when required, by consulting a third reviewer. Data were extracted in duplicate to improve reliability and minimize bias. The data were systematically organized according to author, publication year, article title, study location, setting, research design, target population, sample size, and key findings (refer to Table 2).

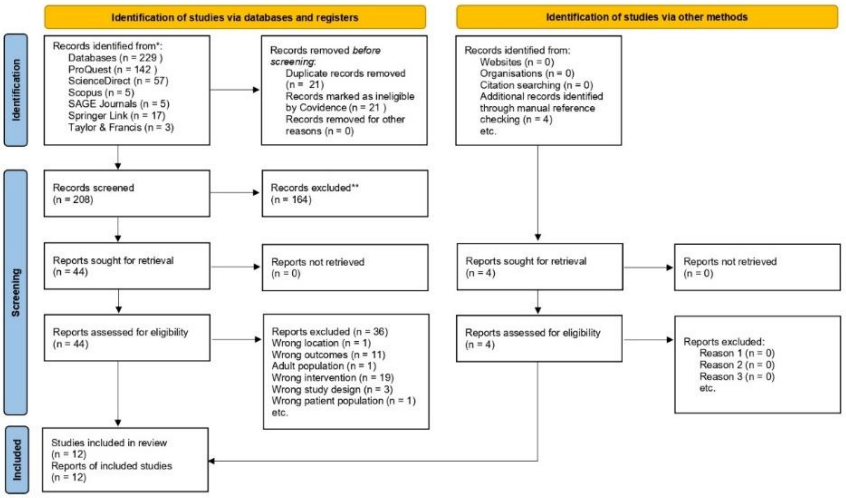
Quality Appraisal

The risk of bias for each included study was assessed independently by two reviewers utilizing the Joanna Briggs Institute (JBI) critical appraisal checklists, which were adapted to the specific study designs of Randomized Controlled Trials (RCTs) and Quasi-Experimental Studies. Discrepancies among reviewers were addressed through discussion to reach a consensus. If consensus was not achieved, a third reviewer was engaged for consultation. Studies were categorized into three groups according to the frequency of “yes” responses to the checklist items. Low risk of bias: RCTs with 10-13 “Yes” responses or quasi-experimental studies with 7-9 “Yes” responses; moderate risk of bias: RCTs with 7-9 “Yes” responses or quasi-experimental studies with 5-6 “Yes” responses; high risk of bias: RCTs with 0-6 “Yes” responses or quasi-experimental studies with 0-4 “Yes” responses (refer to Table 3).

This quality appraisal fundamentally guided the interpretation of results, where low-bias studies carried greater weight in concluding intervention effectiveness. Conversely, findings from moderate-to-high risk studies were interpreted with caution to account for methodological heterogeneity, ensuring that policy recommendations are derived from the most rigorous evidence.

Synthesis Methods

This review utilized a narrative synthesis approach due to the significant variability in study designs, population characteristics, intervention strategies, and outcome measures, rather than conducting a meta-analysis. This method facilitated a thorough assessment of current evidence, emphasizing trends, patterns, and knowledge gaps in community-based nutrition education interventions aimed at preventing stunting. The limited availability of robust quantitative data in several studies supports the appropriateness of this qualitative synthesis in providing a nuanced and contextually grounded interpretation of findings. Due to the significant heterogeneity across the included studies regarding intervention design, duration (ranging from 6 to 18 months), and outcome measurement tools, a quantitative meta-analysis was deemed inappropriate. Therefore, a narrative synthesis was conducted to systematically explore the findings, grouped by intervention characteristics and outcome efficacy, following the SWiM (Synthesis Without Meta-analysis) reporting guidelines.



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Figure 1. PRISMA systematic review flow diagram

Results

A total The selection process for this systematic review was conducted rigorously following the PRISMA 2020 flow diagram, identifying 229 records from databases and 4 additional sources. After stringent screening for duplicates and eligibility criteria across 44 full-text articles, 12 studies were ultimately selected for qualitative analysis. These studies, published between 2014 and 2024, involved a total of 53,570 participants, including parents and children under five in regions with limited healthcare access. Geographically, the scope was extensive: eight studies were conducted in Asia (Nepal, Pakistan, India, China, Laos, Indonesia), three in Africa (Ethiopia, Kenya), and one in Guatemala. The methodology comprised six cluster-randomized controlled trials (cluster-RCTs) and six quasi-experimental studies, with the majority (ten studies) demonstrating a low risk of bias.

Based on the review results, significant variations in intervention components were identified. To address the review objectives systematically, the interventions were categorized into two primary groups: (1) Standalone Nutrition Education Interventions focusing on behavioral change, and (2) Multicomponent Intervention Packages combining education with supplementation, healthcare services, or WASH (Water, Sanitation, and Hygiene) infrastructure.

Impact of Standalone Nutrition Education (Behavioral Change Only)

Interventions focusing solely on education demonstrated strong efficacy in short-term nutritional indicators but were often limited in terms of linear growth outcomes. Yadav et al. (2014) reported that a 12-month education program featuring monthly interactive discussions reduced the prevalence of underweight by 17.7% and wasting by 5% in the intervention group, whereas the control group experienced nutritional deterioration. Similar findings were reported by Bidira et al. (2022), where a 9-month intervention on healthy eating reduced wasting by 5.5% and underweight by 5.7%.

Regarding dietary diversity, Waswa et al. (2015) noted that a one-year participatory program including cooking demonstrations significantly increased the intake of Vitamin A-rich foods, green leafy vegetables, and protein sources. Furthermore, Pavithra et al. (2019) showed that a two-year health education program improved maternal knowledge regarding feeding frequency from 12% to 91%. However, despite these behavioral improvements, the impact on physical growth (stunting) remained a challenge. Research by Sato et al. (2024) emphasized that although dietary diversity scores increased from 3.36 to 4.22, this improvement yielded no statistically significant impact on stunting prevalence. Similarly, Beatty et al. (2024) recorded that a 3.5-year community intervention resulted in only a statistically insignificant 0.3% reduction in stunting.

Impact of Multicomponent Intervention Packages (Integrated Packages)

Stronger and more significant results regarding stunting reduction (HAZ/LAZ) were found in programs that integrated education with physical support and integrated health services. Based on the analyzed data, three primary integration patterns emerged:

- Education + Supplementation & Growth Monitoring: Liang et al. (2018) found that a growth monitoring program combined with education reduced stunting prevalence by 12.3% and drastically increased early initiation of breastfeeding (from 15.4% to 51.9%). Soofi et al. (2022) reported a highly significant reduction in stunting (from 62.2% to 48.8%) through collaboration with Lady Health Workers, combining counseling with the provision of supplementary foods such as Plumpy' Nut and Corn-Soy Blend (CSB). Kang et al. (2017) supported these findings, noting an 8.1% reduction in stunting through a similar comprehensive package over a one-year period.

- Education + WASH: Nair et al. (2017) demonstrated that integrating nutrition education with hygiene practices (WASH) from pregnancy to 18 months postpartum significantly improved handwashing behavior (OR 5.23) and contributed directly to reduced child mortality. Zhang et al. (2016) added that education accompanied by counseling reduced anemia prevalence from 71.1% to 47.8%, alongside increased consumption of iron-rich foods.

- Education + Peer Group Support: Perry et al. (2023) recorded the most drastic stunting reduction in this review, from 74.5% to 39.5%. This success was achieved through the Care Groups model led by peers, which synergistically combined growth monitoring, nutritional counseling, and continuous education over a period of less than three years.

Table 2. Study characteristics of the studies included in the systematic review

No	Author, year	Article tittle	Location	Setting	Study design	Target population	Sample size	Key findings	Risk of bias
1	Sato et al., 2024	Enhancing child dietary diversity through cooking demonstration and nutritional education in rural Lao PDR	Laos	Rural	Quasi-Experimental	Children And Mothers	415	Nutrition education, cooking demonstrations and healthy food consumption enhance child IDDS; however, they did not significantly impact stunting.	Low 8/9
2	Yadav et al., 2014	Community Based nutrition education for promoting nutritional status of children under three years of age in rural areas of Mahottari District of Nepal	Nepal	Rural	Quasi-Experimental	Children and Mothers	1323	Nutrition education There was a reduction in underweight and wasting among children, an improvement in breastfeeding practices and vitamin A intake; however, stunting was not reduced.	Low 9/9
3	Nair et al., 2017	Effect of participatory women's groups and counselling through home visits on children's linear growth in rural eastern India (CARING trial): a cluster-randomised controlled trial	Eastern India	Rural	Cluster-Randomised Controlled Trial	Pregnant Women and Their Children	5781	Counseling in rural eastern India enhanced dietary diversity, hand hygiene, and infant survival; however, it did not have a significant impact on child growth in the context of prevalent malnutrition.	Low 11/13
4	Soofi et al., 2022	Effectiveness of nutritional supplementation during the first 1000-days of life to reduce child undernutrition: A cluster randomized controlled trial in Pakistan	Pakistan	Rural	Cluster-Randomised Controlled Trial	Pregnant Women and Their Children	2030	Nutritional supplementation within the first 1000 days significantly decreases the prevalence of stunting and underweight, particularly when combined with integrated nutrition education and health monitoring. Success is contingent upon adherence, the quality of supplements, and their effective integration into local health systems.	Low 11/13

5	Zhang et al., 2016	Effectiveness of complementary food supplements and dietary counselling on anaemia and stunting in children aged 6–23 months in poor areas of Qinghai Province, China: a controlled interventional study	China	Rural	Controlled interventional study	Children and Mothers	8451	Community-based complementary food supplementation, accompanied by nutrition counseling, enhances feeding practices and decreases anemia; however, additional longitudinal studies are required to assess the long-term impacts on stunting.	Low 9/9
6	Pavithra et al., 2019	Effectiveness of a community-based intervention on nutrition education of mothers of malnourished children in a rural coastal area of South India	South India	Rural	Quasi-Experimental	Children and Mothers	245	Community-based nutrition education interventions effectively enhanced maternal knowledge, children's protein and calorie intake, and nutritional status. However, the limited weight gain observed suggests a requirement for additional longitudinal studies and support for complementary feeding.	Low 9/9
7	Bidira et al., 2022	Effect of nutritional education on anthropometric deficits among pre-school aged children in south West Ethiopia: quasi-experimental study	South west Ethiopia	Rural	Quasi-experimental study	Children and Mothers	588	Community-based nutrition education significantly decreased wasting, underweight, and overall undernutrition (CIAF) in preschool children; however, it did not produce a statistically significant effect on stunting.	Low 9/9
8	Perry et al., 2023	Reducing inequities in maternal and child health in rural Guatemala through the CBIO+ Approach of Curamericas: 4. Nutrition-related activities and changes in childhood	Guatemala	Rural	Quasi-Experimental	Children and Mothers	600	Intensive community-based nutrition interventions in Area A led to a significant reduction in stunting, enhancement of child feeding and health practices, and a decrease in maternal-child health	Low 9/9

		stunting, wasting, and underweight						disparities through a targeted, census-based, and sustained methodology.	
9	Beatty et al., 2024	Acluster randomized controlled trial of a community-based initiative to reduce stunting in rural Indonesia	Indonesia	Rural	Cluster Randomized Controlled Trial	Children and Mothers	9120	Community-based nutrition counseling enhanced supplement intake and feeding practices; however, its effect on stunting was limited by sanitation issues and delays in supplement distribution.	Low 10/13
10	Kang et al., 2017	Effectiveness of a community-based nutrition programme to improve child growth in rural Ethiopia: a cluster randomized trial	Ethiopia	Rural	Cluster Randomized Trial	Children and Mothers	1790	The participatory community-based intervention employing the Positive Deviance/Hearth approach markedly enhanced child growth and decreased the prevalence of stunting and underweight in rural Ethiopia over a 12-month period.	Medium 8/13
11	Waswa et al., 2015	Community-based educational intervention improved the diversity of complementary diets in western Kenya: results from a randomized controlled trial	Western Kenya	Rural	Randomized Controlled Trial	Children and Mothers	405	Community-based nutrition education, when paired with cooking demonstrations, enhanced children's dietary diversity and increased caregivers' nutrition knowledge; however, it did not significantly affect stunting rates.	Medium 9/13
12	Liang et al., 2018	Community health education improves child health care in Rural Western China	Western China	Rural	Quasi-experimental study	Children and Mothers	22822	A four-year community-based health education intervention in Western China significantly enhanced child care practices and decreased rates of stunting, underweight, and wasting among young children.	Low 9/9

Table 3. Critical appraisal summary using the JBI approach

	Sato et al., 2024	Yadav et al., 2014	Zhang et al., 2016	Pavithra et al., 2019	Bidira et al., 2022	Perry et al., 2023	Liang et al., 2018
Does the study clearly delineate the "cause" and the "effect," ensuring no ambiguity regarding the sequence of the variables?	✓	✓	✓	✓	✓	✓	✓
Was a control group utilized?	x	✓	✓	✓	✓	✓	✓
Were the participants included in any comparable comparisons?	✓	✓	✓	✓	✓	✓	✓
Were the participants included in any comparisons receiving comparable treatment or care, aside from the exposure or intervention of interest?	✓	✓	✓	✓	✓	✓	✓
Were multiple measurements of the outcome taken both before and after the intervention/exposure?	✓	✓	✓	✓	✓	✓	✓
Were the outcomes of participants included in comparisons assessed using consistent measurement methods?	✓	✓	✓	✓	✓	✓	✓
Were the outcomes assessed reliably?	✓	✓	✓	✓	✓	✓	✓
Was the follow-up comprehensive, and if not, were the differences between groups regarding their follow-up sufficiently described and analyzed?	✓	✓	✓	✓	✓	✓	✓
Was an appropriate statistical analysis employed?	✓	✓	✓	✓	✓	✓	✓

Quasi-Experimental Studies; Critical Appraisal Using JBI for Quasi-Experimental Studies.

Table 3. Critical appraisal summary using the JBI approach

	Nair et al., 2017	Soofi et al., 2022	Beatty et al., 2024	Kang et al., 2017	Waswa et al., 2015
Was true randomization employed for the allocation of participants to treatment groups?	✓	✓	✓	✓	✓
Was the allocation to treatment groups concealed?	✓	✓	✓	X	NA
Were the treatment groups comparable at baseline?	✓	✓	✓	X	✓
Were participants unaware of their treatment assignment?	x	X	x	X	x
Were the individuals administering the treatment unaware of the treatment assignment?	x	X	x	X	x
Were the treatment groups administered identical conditions apart from the intervention of interest?	✓	✓	✓	X	NA
Were outcome assessors blinded to treatment assignment?	✓	✓	x	✓	✓
Were outcomes assessed uniformly across treatment groups?	✓	✓	✓	✓	✓
Were outcomes assessed with reliability?	✓	✓	✓	✓	✓
Was the follow-up comprehensive, and if not, were the differences between groups regarding their follow-up sufficiently described and analyzed?	✓	✓	✓	✓	✓
Were participants analyzed according to their randomized groups?	✓	✓	✓	✓	✓
Was an appropriate statistical analysis employed?	✓	✓	✓	✓	✓
Was the trial design suitable, and were any deviations from the standard randomized controlled trial design (individual randomization, parallel groups) addressed in the trial's conduct and analysis?	✓	✓	✓	✓	✓

Randomized Controlled Trials Studies; Critical Appraisal Using JBI for Randomized Controlled Trials Studies.

Discussions

This study confirms that the label "community-based nutrition intervention" encompasses a broad spectrum of activities, where effectiveness in reducing stunting rates is highly dependent on the comprehensiveness and duration of the intervention components. These findings highlight four primary outcomes: reduction in wasting/underweight, improvement in dietary diversity, enhancement of sanitation/child survival, and a decrease in linear stunting prevalence.

Effectiveness of Education vs. Physical Intervention

A critical point in our findings is that standalone nutrition education is indeed effective in improving maternal knowledge, feeding practices, and dietary diversity. Based on the studies included in this review, this strategy often fails to significantly reduce stunting rates if implemented without supporting physical interventions, as observed in rural settings in Laos, Ethiopia, and India (Sato et al., 2024; Bidira et al., 2022; Nair et al., 2017). In line with other systematic reviews and trials not included in our primary analysis, while education improves nutritional scores, biological changes in a child's height-for-age are difficult to achieve without direct access to nutritious food (Teshome et al., 2020; Tessema et al., 2023). Our synthesis indicates that behavioral change must be coupled with food availability or nutritional supplementation to meaningfully alter linear growth status (HAZ/LAZ). Furthermore, external systematic analyses show that while home visits by community health workers (CHWs) effectively reduce wasting (OR 0.77), addressing stunting requires a more multilayered approach (Janmohamed et al., 2020).

Multicomponent Synergy in Stunting Reduction

Successful and significant stunting reduction in the studies we reviewed (ranging from 4.9% to 35%) was consistently found in long-term multicomponent programs. The integration of education, supplementary feeding, and sanitation improvements (WASH) creates a powerful synergistic effect. Consistent with broader literature, WASH interventions combined with nutritional counseling not only improve nutritional status but also reduce the incidence of diarrhea by 24% and enhance overall child survival (Lassi et al., 2020; Wright et al., 2023; Freeman et al., 2020). Reducing child morbidity due to infections is a vital prerequisite for optimal linear growth, as suggested by complementary evidence (Younes et al., 2015). This proves that stunting, as a multifactorial issue, cannot be resolved solely through educational modules but requires sensitive interventions such as clean water provision and direct supplementation (Chanani et al., 2018; Sharma et al., 2020).

Implications for Community Programs and Policy

These findings offer strong recommendations for policymakers to ensure that community-level programs do not rely solely on passive counseling. Evidence from our included studies shows that the involvement of local leaders, routine home visits, and visual educational media are effective in increasing maternal knowledge (Boynito et al., 2025; Kawarazuka et al., 2023). To achieve stunting reduction targets in resource-constrained regions, intervention models must be holistic and long-term (at least 2 years). As a comparison to findings from external intervention packages, similar comprehensive programs in Bangladesh were shown to reduce stunting risk by 73% by increasing LAZ scores by 0.37 (Ara et al., 2022). Strategies combining growth monitoring, supplementary feeding, and peer-led group education (Care Groups) represent the most recommended models for replication in Low- and Middle-Income Countries (LMICs).

Conclusions

This systematic review suggests that community-based nutrition interventions have the potential to improve child nutritional status, particularly by enhancing feeding practices and dietary diversity. However, the evidence for "effective stunting reduction" is more consistent in integrated, multicomponent programs that combine education with direct supplementation and are sustained over longer periods (at least 2 years). Therefore, community education should not be viewed as a definitive standalone solution for stunting, but rather as a key component of a broader intervention package. Due to the variation in study outcomes, the confidence in claiming that behavioral education alone reduces stunting remains limited and requires further standardized research. Future programs should prioritize holistic models that integrate behavioral change with physical access to nutrition to achieve measurable impacts on linear growth (HAZ/LAZ).

Furthermore, policy implications for rural nursing practice warrant significant attention, specifically in strengthening the role of community nurses as educators, behavioral change facilitators, and vital links between healthcare services and the community. Policy support that fosters continuous professional development, ensures adequate resource allocation, and integrates nutritional services into nursing practice in remote regions is paramount. Such measures are essential to enhancing intervention effectiveness and securing the long-term sustainability of stunting reduction programs

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