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Impact of Community-Based Nutrition Interventions on Children with Undernutrition Aged 6-23 Months: A Systematic Literature Review

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ABSTRACT

Introduction: Providing optimal nutritional interventions during critical ages can save children from the risk of malnutrition and long-term health effects such as growth disorders, cognitive disorders, illness, and death. Although the WHO has issued guidelines for community-based nutritional interventions, their implementation varies across regions. To explore the impact of community-based nutrition interventions on children with undernutrition aged 6–23 months.
Methods: This study used the reporting guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), which have been registered with PROSPERO with registration number CRD420251008033. The search strategy employed the Population-Intervention-Comparisons-Outcomes (PICO) framework. The search was conducted using databases from Scopus, PubMed, and ProQuest. Risk of bias assessment used the critical appraisal tool from the Joanna Briggs Institute (JBI).
Results: 13 articles were reviewed in this systematic review, consisting of 9 RCTs and four quasi-experimental studies. Community-based nutrition interventions identified in the literature review included nutrition education for parents or caregivers of children with malnutrition, such as stunting, wasting, underweight, or anemia, aged 6–23 months. Other interventions included behavior change communication, complementary feeding practices, or food supplementation, as well as integrated community health programs and cash transfer and economic-support models.
Conclusion: Community-based nutrition interventions, particularly nutrition education, can significantly improve mothers' knowledge and behavior in managing malnutrition. However, interventions will have a greater impact when combined with other interventions, such as behavior change communication, food supplementation, cash transfers, and integrated programs across various sectors. These findings can serve as a basis for policy formulation and implementing malnutrition prevention programs targeting vulnerable groups through targeted and sustainable community-based nutrition interventions.

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INTRODUCTION

Malnutrition is a nutritional health problem and remains a global challenge, including in Indonesia (1). Children under the age of two are particularly vulnerable to malnutrition (2). In addition, this age group is undergoing rapid physical and cognitive development, often referred to as the "window of opportunity" (3). Optimal nutritional interventions during this period can protect children from the risk of malnutrition and long-term health impacts such as growth disorders, cognitive impairments, illness, and death. The World Health Organization (WHO) reports that globally in 2022, 149 million children under the age of five suffered from stunting, 45 million from wasting, and 37 million from obesity (4). Nearly half of all deaths among children under five are caused by malnutrition, with the majority occurring in low- and middle-income countries (5). The 2024 Indonesian Nutrition Status Survey (SSGI) found a 1.7-fold increase in stunting cases during the transitional age of 6–24 months. Addressing malnutrition during the critical period of 6-24 months is crucial for survival and sustainable development (6).Addressing malnutrition in children under 2 years of age depends not only on changes in caregiver behavior but also on various interrelated factors (7). The social ecological model approach is used to develop a framework for understanding how determinants at the individual, family, community, health service organization, and policy levels shape feeding behavior and access to nutritional interventions (8).

Previous studies have shown that community-based nutrition interventions to address malnutrition have several advantages, including the ability to reach hard-to-reach populations, cost-effectiveness, and high program sustainability (9). Community-based interventions typically include nutrition education, behavior change communication, supplementary feeding, and the involvement of health workers, community leaders, and local volunteers (10). Previous research has shown that nutrition education programs can significantly improve mothers' understanding of malnutrition, including its definition, risks, and prevention strategies. This knowledge is crucial for mothers to recognize the signs of malnutrition and take appropriate actions to prevent it (11). The practice of complementary feeding is a key intervention for preventing malnutrition in children aged 6–23 (12). The key to the success of community-based complementary feeding interventions is the need to consider the acceptance of local foods, the active involvement of mothers or caregivers, and the frequency of counseling. Complementary feeding programs must consider the local cultural and economic context to increase sustainability (13). Additionally, behavior change communication approaches implemented by community actors significantly improved weight and height and reduced the risk of stunting and wasting in children aged 6–23 months; however, this intervention depends on the varying skills of volunteers (14). Integrated community health programs have the advantage of high program sustainability but require additional funding and cross-sectoral coordination. Recent systematic reviews published between 2022 and 2024 have highlighted the effectiveness of community-based nutrition programs in improving dietary practices and growth outcomes and effectively reducing undernutrition(15), (16).

Although the WHO has issued guidelines on this matter, their implementation varies across regions, and evidence of their effectiveness in addressing malnutrition in children aged 6–23 months remains inconsistent. Most existing systematic reviews combine the 0–59-month age group with a primary focus on stunted children. To strengthen the conceptual coherence of this review, the UNICEF Infant and Young Child Feeding (IYCF) Framework provides a useful lens by outlining how feeding practices, caregiver capacity, food environments, and health system support interact to shape nutritional outcomes in early childhood. This framework underscores the need for integrated community-based actions that address both immediate and underlying determinants of malnutrition, including dietary adequacy, caregiver behaviour, and community-level support systems. Guided by this theoretical foundation, this literature review focuses specifically on the critical period of 6–24 months and emphasizes community-based intervention strategies that are contextual and replicable, making them highly relevant for countries with limited resources.

METHOD

Research Type

This systematic review uses the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol guidelines (17). The use of checklists aims to improve transparency and comprehensive review (18). The research question is to explore the impact of community-based interventions on children aged 6–23 months who are experiencing malnutrition. This systematic review protocol has been registered with the International

Prospective Register of Systematic Reviews (PROSPERO) before conducting the study, with registration number CRD420251008033.

Search Strategy

The search strategy was developed using the Population-Intervention-Comparisons-Outcomes (PICO) framework as a guide. The population in this study was children aged 6–23 months; the intervention was nutrition education, complementary feeding practices, and nutrition interventions; there were no comparisons, and the outcome was malnutrition. Data searches were conducted using the Scopus, PubMed, and ProQuest databases. The keywords used in the search in each database were ("6–23 months" OR "children under two years" OR "infants and young children") AND ("nutrition education" OR "Complementary feeding practice" OR "nutrition* intervention") AND ("community-based" OR "community intervention") AND (malnutrition OR undernutrition). 512 articles were identified, and data management was performed using Mendeley Reference Manager, with duplicate articles automatically removed.

Study Criteria

Studies published between 2019 and 2024 in English, in the form of articles, interventions in children aged 6-23 months, and community-based interventions. Exclusion criteria include review articles or articles that are not fully accessible. Grey literature was excluded to ensure methodological rigor and comparability of included studies and grey literature is often not fully accessible.

Study Selection, Data Extraction, and Data Analysis

Initial screening involved assessment based on titles and abstracts of 512 articles by the first author (RW), with relevant studies discussed with the team (MIK, MZR, SAN). There were a total of 4 independent reviewers who consistently reviewed the inclusion and exclusion criteria. To maintain objectivity and minimize bias, any discrepancies or subjective judgments were resolved through consensus discussion. After removing eight duplicate articles, 504 articles were selected based on title, abstract, and full-text identification, with 13 articles undergoing synthesis. The selection process and reasons for excluding articles are detailed in the PRISMA diagram (Figure 1). Risk of bias assessment was conducted using the Joanna Briggs Institute (JBI) guidelines adapted to the study design used, specifically the guidelines for randomized controlled trials (19) and quasi-experimental studies (20). Data extraction was conducted using Microsoft Excel, which presented the title, authors, publication year, research method, study population, type and duration of intervention, variables, and key findings. Data synthesis employed a narrative approach, focusing on community-based nutrition interventions and integrating findings from various contexts and study designs.

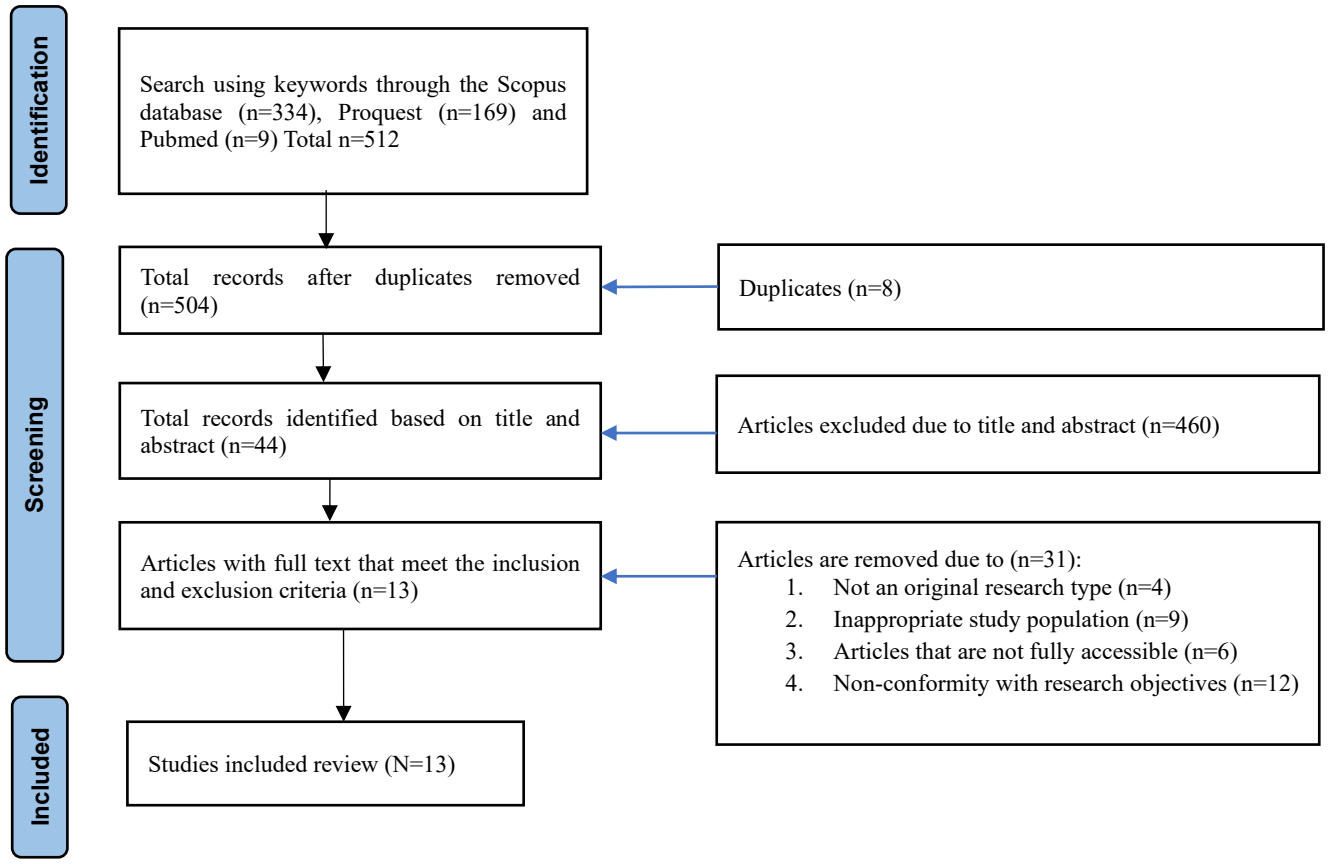

Figure 1. PRISMA Study Selection Flowchart

RESULTS

The initial search yielded 512 articles obtained from Scopus (n=334), Proquest (n=169), and Pubmed (n=9). After analyzing the abstracts and reviewing the full texts, 13 articles met the inclusion and exclusion criteria. The studies were conducted in various locations, including Indonesia (4), Liberia (1), Ethiopia (2), Burkina Faso (1), Pakistan (1), India (1), China (1), South Korea (1), and Ghana (1). The studies focused on health interventions for mothers with children under 2 years of age. The selected articles consisted of 9 articles with RCTs and four articles with quasi-experimental designs. Articles were selected based on relevance, high quality, and suitability for addressing the research question. Each included article was analyzed for bias and found to meet the inclusion criteria, be methodologically robust, and provide complete data for further analysis. Risk of bias assessment was conducted using the Joanna Briggs Institute (JBI) guidelines adapted to the study design used, with this study employing guidelines for randomized controlled trials and quasi-experimental studies. Each article was evaluated using 13 criteria for RCTs, nine criteria for quasi-experimental studies, and categorized as "Yes" (Y), "No" (N), 'Unclear' (UC), or "Not applicable" (N/A). The articles analyzed further revealed various community-based nutrition interventions to address malnutrition issues implemented in various countries, such as nutrition education, behavior change communication, complementary feeding programs, integrated community health programs, and cash transfer and economic-support models.

In this systematic literature review, the results of the methodological quality assessment using the Joanna Briggs Institute (JBI) instrument are not only presented descriptively but also systematically integrated into the evidence-weighting process at the synthesis stage. Studies scoring low to moderate risk of bias are considered more reliable sources of evidence and are given greater interpretive weight in shaping the overall conclusions. Conversely, studies with a high risk of bias are retained to maintain the scope of the evidence, but their contribution to the synthesis is limited and interpreted with appropriate caution.

Furthermore, variation in methodological quality across studies is used to evaluate the consistency, credibility, and stability of the findings. In cases of discrepancies between studies with a high risk of bias and studies demonstrating stronger methodological quality, the synthesis conclusions favor evidence from studies with higher methodological integrity. This approach ensures a transparent, logical, and traceable relationship between the methodological appraisal results, the evidence integration process, and the resulting inferences. Thus, the internal validity and reliability of the systematic literature review conclusions are substantially enhanced.

Table 1. JBI Critical Appraisal Tool for Assessment of Risk of Bias for Randomized Controlled Trials

Criteria	Mardani, et al.,	Onah, et al.,	Rees, et all.,	Ayalew, et al.,	Gizaw, et al.,	Lanau, et al.,	Beatty, et al.,	Ahmad, et al.,	Effendy, et al.,
1. Was true randomization used for the assignment of participants to treatment groups?	Y	Y	Y	Y	Y	Y	Y	Y	Y
2. Was allocation to treatment groups concealed?	Y	UC	UC	UC	UC	UC	N	N	N
3. Were treatment groups similar at the baseline?	Y	Y	Y	Y	Y	Y	Y	Y	Y
4. Were participants blind to treatment assignment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5. Were those delivering the treatment blind to treatment assignment?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6. Were treatment groups treated identically other than the intervention of interest?	Y	Y	Y	Y	Y	Y	Y	Y	Y
7. Were outcome assessors blind to treatment assignment?	Y	Y	UC	UC	Y	UC	UC	UC	UC
8. Were outcomes measured in the same way for treatment groups?	Y	Y	Y	Y	Y	Y	Y	Y	Y
9. Were outcomes measured in a reliable way	Y	Y	Y	Y	Y	Y	Y	Y	Y
10. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	Y	Y	UC	Y	Y	UC	UC	UC	UC

11. Were participants analysed in the groups to which they were randomized?	UC	UC	UC	Y	Y	UC	UC	UC	UC
12. Was appropriate statistical analysis used?	Y	Y	Y	Y	Y	Y	Y	Y	Y
13. Was the trial design appropriate and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Overall appraisal:	**I**	**I**	**I**	**I**	**I**	**I**	**I**	**I**	I

*) Y (Yes), N (No), UC (Unclear), N/A (Not Applicable), I (include)

Tabel 2. JBI Critical Appraisal Tool for Assessment of Risk of Bias for Quasi-experimental Studies

Criteria	Yao, et al.,	Shim, et al.,	Awuuh, et al	Scott et al.,
1. Is it clear in the study what is the "cause" and what is the "effect" (i.e. there is no confusion about which variable comes first)?	Y	Y	Y	Y
2. Was there a control group?	N	N	N	Y
3. Were participants included in any comparisons similar?	Y	Y	Y	Y
4. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Y	Y	Y	Y
5. Were there multiple measurements of the outcome, both pre- and post intervention/exposure?	Y	Y	Y	Y
6. Were the outcomes of participants included in any comparisons measured in the same way?	Y	Y	Y	Y
7. Were outcomes measured in a reliable way?	Y	Y	Y	Y
8. Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analyzed?	N/A	Y	Y	UN
9. Was appropriate statistical analysis used?	Y	Y	Y	Y
Overall appraisal:	**I**	**I**	**I**	**I**

*) Y (Yes), N (No), UC (Unclear), N/A (Not Applicable), I (include)

Items categorized as "Unclear" or "No" reflect insufficient methodological information, particularly regarding allocation concealment, blinding, and follow-up procedures, which restricted the ability to fully evaluate the underlying risk of bias. These limitations were explicitly considered in the evidentiary weighting process and in formulating the overall synthesis conclusions.

Table 3. The Summary of Included Studies (n = 13)

No	Author, Year	Methods	Study Population	Intervention	Key Finding
1	Mardani, et al., (2024) (11)	A Randomized Controlled Trial	80 mothers with children under 2 years of age who experienced One of the categories of malnutrition is defined as stunting, wasting, and in accordance with the WHO Child Growth Standards. Participants were divided into two groups, namely 40 intervention participants and 40 control participants.	Nutrition education includes the management of malnutrition and complementary feeding practices. Supportive telephone counseling was used to motivate participants and maintain their health behaviors. The intervention lasted for 24 weeks (evaluated twice, at 12 weeks and 24 weeks).	1. There was a significant increase in mothers' knowledge about undernutrition in the intervention group compared to the control group ($\beta = 4.77$, $p < 0.001$). 2. The intervention effectively increased knowledge about complementary feeding ($\beta = 2.13$, $p < 0.001$). 3. The intervention significantly increased self-efficacy ($\beta = 32.22$, $p < 0.001$) 4. There was a significant change in behavior regarding complementary feeding practices due to the intervention ($\beta = 5.70$, $p < 0.001$) 5. The average Z-score for stunting increased from -3.83 ± 0.4 at baseline to -3.10 ± 0.1 at week 24. 6. For wasting, there was an improvement in the Z-score from -3.32 ± 0.4 to -2.65 ± 0.4. There was a significant difference between the intervention and control groups ($p = 0.003$) as well as a time effect ($p < 0.001$) and a group × time interaction effect ($\beta = 0.36$ at week 12 and $\beta = 0.62$ at week 24; $p < 0.001$). 7. The Z-score for underweight increased from -3. 27 ± 0.3 to -2.66 ± 0.3, with significant effects on the group ($p = 0.005$) and time ($p < 0.001$), as well as significant group × time interaction effects at week 12 ($\beta = 0.29$) and week 24 ($\beta = 0.55$), with p values < 0.001.
2	Onah, et al., (2024) (21)	Community-based cluster randomized controlled trial	1,729 mothers with stunted children aged 6–23 months from poor families registered in the	1. Unconditional cash transfers (UCT) 2. Lipid-based nutritional	1. The 6-month UCT + LNS intervention resulted in an 8.3% reduction in stunting prevalence and prevented 34 cases of stunting, with

No	Author, Year	Methods	Study Population	Intervention	Key Finding
			Benazir Income Support Programme (BISP) were divided into four groups: unconditional cash transfers (UCT) = 434 participants, UCT + lipid-based nutrient supplement (UCT + LNS) = 430 participants UCT + social and behavioral change communication (SBCC) = 433 participants, and UCT + LNS + SBCC = 432 participants	supplements (LNS) 3. Social and behavioral change communication (SBCC) Interventions lasted 18 months and were evaluated at 6 and 18 months.	the lowest cost per case being $278.74 (unadjusted) and $306.61 (adjusted). If the intervention duration is extended to 18 months, only a slight increase in prevented cases (36 cases) is observed with a slightly lower prevalence reduction (7.6%), but the cost per case sharply increases to $897.15 (unadjusted) and $986.86 (adjusted). This indicates that extending the intervention duration is not commensurate with the increase in effectiveness, making it less cost-effective. 2. The combination of UCT + LNS + SBCC over 6 months resulted in the highest reduction in stunting prevalence of 10%, preventing 36 cases, with a cost per case of $846.48 (unadjusted) and $931.13 (adjusted). However, when the intervention duration was extended to 18 months, the prevalence reduction decreased to 7.5%, and although the number of stunting cases prevented increased to 41 cases, the cost per case increased sharply to $2,530.27 (adjusted).
3	Rees, et all., (2022) (22)	A cluster-randomized trial,	721 mothers with children aged 6-23 months divided into 3 groups control group = 241, cash transfer and nutrition education intervention = 240, cash transfer = 240	1. Cash transfers of USD 40 per month for 6 months 2. Nutrition education through community-based group sessions facilitated by community cadres (Materials cover child food diversity,	The proportion of children achieving Minimum Dietary Diversity (MDD) increased significantly in the groups that received cash interventions, both with and without nutrition education, compared to the control group ($p < 0.001$).

No	Author, Year	Methods	Study Population	Intervention	Key Finding
				the importance of animal-sourced foods, and age-appropriate feeding practices) provided for 6 months	
4	Ayalew, et al., (2021)(23).	A cluster-randomized controlled trial	612 mothers with children aged 6-18 months, divided into 306 intervention groups and 306 control groups	Behavior Change Communication (BCC) on good complementary feeding practices during the first 6 months	1. Weight gain was significantly higher in the intervention group (2.50 ± 0.68 kg) compared to the control group (2.04 ± 0.61 kg), Difference-in-differences (DiD): +0.46 kg (95% CI: 0.36–0.56) 2. Height gain was also higher in the intervention group (9.20 ± 2.80 cm) compared to the control group (8.22 ± 2.59 cm), DiD: +0.96 cm (95% CI: 0.56–1.36)
5	Gizaw, et al., (2023) (24)	a cluster randomized control trial	516 Mothers with children under 24 months of age (0–23 months) Intervention = 258 participants Control = 258 participants	The community-based Positive Deviance approach, which includes intensive training by exemplary mothers, group education, and home visits, was provided over a period of 6 months.	1. Children in the intervention group were significantly less likely to be underweight after participating in the Positive Deviance (PDA) program for 6 months (p = 0.004) 2. Breastfeeding knowledge increased significantly: MD = 6.47 (95% CI: 6.45–6.49) 3. Attitudes toward breastfeeding improved: MD = 12.68 (95% CI: 11.96–13.40) 4. Breastfeeding self-efficacy increased: MD = 3.13 (95% CI: 3.05–3.21) 5. Knowledge of complementary feeding increased: MD = 4.53 (95% CI: 4.31–4.75) 6. Attitudes toward complementary feeding improved: MD = 9.14 (95% CI: 8.52–9.75) 7. Self-efficacy regarding complementary feeding improved: MD = 11.64 (95% CI: 11.16–12.12)
6	Lanau, et al.,	A cluster	2,233 mothers or	Daily micronutrient	Hemoglobin levels increased

No	Author, Year	Methods	Study Population	Intervention	Key Finding
	(2019)(25)	randomized controlled trial	caregivers with children aged 6–23 months, divided into Intervention = 1,101 participants and control = 1,132 participants.	powder supplementation and community-based nutrition education for 5 months	significantly in the intervention group, accompanied by a significant decrease in the prevalence of anemia ($p < 0.01$) compared to the control group. Additionally, in the sub-cohort of children who were intensively monitored, there was a significant decrease in the adjusted relative risk (aRR) of diarrhea (0.88, $p = 0.026$) and malaria (0.78, $p = 0.007$).
7	Beatty, et al., (2024)(26)	A cluster randomized controlled trial	2.400 mothers/caregivers with children aged 6-23 months, divided into an intervention group = 1,200 participants and a control group = 1,200 participants. a	Group nutrition education and home visits for 6 months	1.Minimum Dietary Diversity (MDD) increased significantly in the intervention group compared to the control group ($p < 0.01$). 2.Minimum Meal Frequency (MMF) also increased ($p < 0.05$) 3.Minimum Acceptable Diet (MAD) showed a significant increase ($p < 0.01$), 4.There was a significant increase in Length-for-Age Z-score (LAZ) of +0.19 SD in the intervention group compared to the control group ($p < 0.05$).
8	Ahmad, et al., (2020)(27)	A cluster randomized control trial	121 mothers with children aged 6-24 months who were underweight. The NE (Nutrition Education) intervention group consisted of 30 participants, the MNB (Multi-Nutrient Biscuit) intervention group consisted of 31 participants, the NE + MNB (combination) intervention group consisted of 31 participants and the control group consisted of 29 participants.	Nutrition Education (NE) and Multi-Nutrient Biscuits (MNB) for 6 months	1.There was a decrease in the prevalence of underweight in the NE+MNB intervention group ($p<0.03$). 2.There was a decrease in the prevalence of iron deficiency after receiving the intervention ($p=0.003$).
9	Effendy., et al	A cluster	242 mothers with	Nutrition education and	1. Increase in MAD in the

No	Author, Year	Methods	Study Population	Intervention	Key Finding
	(2020)(28)	randomized controlled study	children aged 6-17 months. Intervention group = 126 participants Control group = 116 participants	monthly home visits by cadres for 6 months	intervention group: 69.8% (P-value: 0.001) 2. Increase in MAD in the intervention group: increased to 57.1% (P-value: <0.001) 3. Significant decrease in stunting prevalence (P-value: 0.004) 4. Significant decrease in underweight prevalence (P-value: 0.025)
10	Yao, et al., (2022) (13)	A pre-and post-comparison study	1,293 mothers with children aged 6-23 months	Community-based child health education intervention (monthly home visits)	1. The prevalence of stunting decreased significantly from 26.3% to 10.8% (P-value: <0.001). 2. The prevalence of underweight decreased from 13.4% to 8.7% (P-value: <0.001) 3. The prevalence of wasting decreased from 14.0% to 10.5% (P-value: 0.008) 4. The prevalence of anemia decreased from 52.1% to 43.9% (P-value: <0.001)
11	Shim, et al., (2020)(29)	a prospective multicenter study	82 children with growth disorders without medical causes	Nutritional supplement (Pediapowder® formula) 400 mL per day for 6 months	1. Good consumption group (≥60% of formula): higher weight gain than poor consumption group (P-value: 0.009) 2. Increase in Weight-for-Age Z-Score (WAZ) (P-value: 0.009) 3. Higher weight gain trend in the good consumption group (P-Value < 0.001)
12	Awuuh, et al (2019) (30)	a pre-post interventional study	153 parents who have children aged 6-23 months with underweight nutritional status	Nutrition education for mothers of malnourished children	The intervention in the form of nutrition education for 3 months succeeded in significantly improving the nutritional status of children, especially in terms of underweight (P-value = 0.001), wasting (P-value = 0.001), MUAC (P-value = 0.001), and Hb levels (P-value = 0.001).
13	Scott et al., (2022)(14)	A Quasi-Experimental	3,450 Mothers who have children aged 6-23 months	Behavior change communication	1. Significant increase in animal protein consumption in the intervention group compared to the control group (P-value 0.01)

No	Author, Year	Methods	Study Population	Intervention	Key Finding
					2. Increase in WHZ (weight-for-height) scores in the intervention group compared to the control group (p-value 0.03)

MDD = Minimum Dietary Diversity; MMF = Minimum Meal Frequency; MAD = Minimum Acceptable Diet; LAZ = Length-for-Age Z-score; WAZ = Weight-for-Age Z-score; WHZ = Weight-for-Height Z-score; MUAC = Mid-Upper Arm Circumference; Hb = Hemoglobin; LNS = Lipid-Based Nutrient Supplement; SBCC = Social and Behavior Change Communication; BCC = Behavior Change Communication; NE = Nutrition Education; MNB = Multi-Nutrient Biscuit; aRR = Adjusted Relative Risk.

DISCUSSION

The findings from the 13 included studies were organized into predefined intervention typologies, including nutrition education, behavior change communication (BCC), supplementary feeding, multicomponent integrated interventions, and cash transfer–based models. Each study's individual results remain presented in detail; however, the synthesis now explicitly positions them within these typological structures to facilitate clearer comparison across intervention categories. A new typological analysis was added to categorize the community-based nutrition interventions into five major types: (1) nutrition education, (2) behavior change communication (BCC/SBCC), (3) supplementary feeding and micronutrient-based interventions, (4) integrated multicomponent community health programs, and (5) cash transfer and economic-support models. This categorization improves interpretive clarity by grouping heterogeneous interventions into comparable clusters, thereby enhancing reader comprehension and analytical precision.

Subgroup analyses were introduced to explore variations in effectiveness across intervention categories, study designs, and primary outcomes. These analyses revealed consistent patterns: (a) nutrition education and BCC interventions were most effective for improving dietary practices (MDD, MMF, MAD), (b) supplementary feeding and micronutrient interventions showed the strongest effects on anemia and weight-based outcomes, (c) multicomponent programs produced the largest overall impact but required more resources, and (d) cash transfers demonstrated improvements primarily when combined with education or supplementation.

Theme 1: Nutrition education

Nutrition education plays an important role in community-based strategies aimed at preventing malnutrition in children, especially those aged 6–23 months(31). At this age, children are highly dependent on their caregivers, so caregivers' knowledge and practices are key factors in determining children's nutritional outcomes(32). Community-based nutrition education equips caregivers, especially mothers, with the knowledge to understand age-appropriate feeding, food safety, dietary diversity, and hygiene practices(33). This not only prevents malnutrition but also promotes healthy growth and development in the long term. Nutrition education programs significantly improve mothers' understanding of malnutrition, including its definition, risks, and prevention strategies(11),(24). This knowledge is essential for mothers to recognize the signs of malnutrition and take appropriate action to prevent it.

Nutrition education is a key component of community-based nutrition interventions to address malnutrition in children aged 6–23 months. This strategy aims to increase mothers' or caregivers' knowledge about child feeding practices, dietary diversity, food safety, and the importance of consuming micronutrients and macronutrients in preventing wasting and stunting. Various studies in this review show that nutrition education approaches are effective in improving caregivers' understanding and behavior regarding child feeding. Mardani et al. (2024), through an RCT study in Indonesia, showed that a nutrition education program based on the Health Belief Model (HBM) supplemented with telephone counseling improved mothers' knowledge, self-efficacy, and complementary feeding practices. The impact was seen in improved child nutritional status, including wasting, stunting, and underweight(11).

Ahmad et al. (2020) reported that intensive nutrition education through weekly home visits, combined with the provision of multinutrient biscuits, had a positive impact on increasing iron levels and improving children's nutritional status in Aceh(11). Meanwhile, Rees et al. (2022) in Liberia demonstrated that nutrition education

combined with cash assistance can increase dietary diversity and reduce the frequency of childhood illnesses(22). However, the effectiveness of nutrition education depends heavily on the delivery method, facilitator skills, and the social-cultural context of the community. Approaches based on local culture, involving community leaders, and using interactive visual media have proven to be more effective in increasing the adoption of nutrition messages(30). This shows that nutrition education is not only about conveying information but also shaping long-term behavior through the empowerment of caregivers. The observed improvements in maternal feeding knowledge and practices align with the UNICEF IYCF Framework, which emphasizes caregiver knowledge as a proximal determinant of optimal child feeding. These findings also reflect the Social Ecological Model, highlighting how individual-level learning can shift behaviors when supported by enabling community structures.

Theme 2: Behavior change communication (BBC)

Behavior change communication is an important approach in community-based nutrition interventions because it not only conveys information but also encourages practice change through motivation and social reinforcement(34). This strategy is generally carried out through group counseling, home visits, or the use of visual media by community cadres or health workers(35). A study by Ayalew et al. (2021) in Ethiopia found that a behavior change communication approach implemented by community actors significantly improved weight and height and reduced the risk of stunting and wasting in children aged 6–23 months(23). This approach targeted complementary feeding practices through structured counseling and regular feedback to mothers. Several studies explain that behavior change communication interventions will be effective if combined with other interventions to have a better impact, such as findings in Pakistan, where behavior change communication integrated into an intervention package with fat-based nutritional supplements and cash assistance had an impact on reducing malnutrition, although cost-effectiveness was limited compared to other components(21). Similar results were found in a study in Ethiopia, where behavioral change communication interventions combined with food vouchers showed better results than behavioral change communication interventions or only food vouchers (36).

The implementation of behavioral change communication often requires high costs, especially for training health workers. A study in Pakistan showed that the combination of unconditional cash transfers with behavioral change communication had higher costs than other interventions due to high training costs (21). The success of behavior change communication depends heavily on the quality of facilitator training and the intensity of contact. Scott et al. (2022) in India reported that although behavior change communication was conducted through women's self-help groups, its impact on children's nutritional status remained limited due to low volunteer skills and concurrent national campaigns(14). Additionally, the implementation of behavioral change communication interventions in some areas faces challenges such as lack of support from partners, high domestic workloads, and high travel costs to access counseling services(37). A study in Guatemala found that the lack of maternal autonomy in nutritional decision-making also poses a barrier to the implementation of behavioral change communication interventions(38). Overall, effective behavior change communication must be participatory, contextual, and consistently delivered to influence caregivers' behavior in the long term. To be effective, behavior change communication must consider local norms and culture and, if possible, involve community leaders or religious leaders to disseminate information about nutrition, which can ultimately address malnutrition issues(39). The effectiveness of BCC/SBCC interventions is consistent with the UNICEF IYCF Framework's focus on responsive feeding and communication as key behavioral drivers. Within the Social Ecological Model, these interventions operate across interpersonal and community layers, reinforcing social norms that enable sustained behavior change.

Theme 3: Complementary foods

Appropriate complementary feeding is a key component of nutritional interventions for children aged 6–23 months(40). These interventions include education on timing, frequency, texture, and food diversity and are often combined with the provision of supplementary foods such as multinutrient biscuits or powdered supplements(41). Several studies have shown that these interventions can improve children's nutrient intake and anthropometric status. A study conducted by Ahmad et al. (2020) in Aceh showed that a combination of nutrition education and the provision of multinutrient biscuits significantly improved iron levels and nutritional status(27). Meanwhile, Lanou et al. (2019) in Burkina Faso showed that micronutrient powder supplementation combined with nutrition education improved

child feeding practices without increasing morbidity such as fever and malaria(25). This aligns with research conducted by Intiyati et al. (2024) that appropriate complementary feeding significantly influences nutritional status, emphasizing the importance of complementary feeding in terms of timing, quantity, and food variety. The key to the success of community-based complementary feeding interventions is the acceptance of local foods, the frequency of counseling, and the active involvement of mothers. Complementary feeding programs must consider the local cultural and economic context to improve sustainability.

Theme 4: Integrated Public Health Programs

Integrated programs include multicomponent interventions involving basic health services, nutrition education, supplementation, growth monitoring, and cadre capacity building. These interventions are considered effective in creating long-term impact if implemented comprehensively and sustainably. Beatty et al. (2024) in Indonesia showed that two years of integrated interventions significantly reduced stunting, although implementation was challenging within the limited program timeframe (26). A study in China by Yao et al. (2022) also showed that community-based child counseling service packages, including education and supplements, had an impact on improving health-seeking behavior and children's nutritional status(13). However, the main challenges of integrated programs are cross-sector coordination, long-term funding, and adequate training of health workers. The success of implementation depends heavily on strong monitoring and supervision systems and adaptation to the local context.

Theme 5: Cash transfer and economic-support models

Subgroup analysis of cash-transfer and economic-support interventions indicates that financial assistance alone yielded modest nutritional improvements, with the strongest effects observed when cash transfers were combined with behavior change communication (BCC) or supplementary nutrition(21). Across the included studies, cash-only interventions produced limited changes in dietary indicators, whereas combinations such as cash + LNS or cash + SBCC generated larger reductions in stunting and greater gains in dietary diversity (22). These patterns are theoretically consistent with the Health Belief Model (HBM), which posits that behavior change requires shifts in perceived benefits, perceived barriers, and cues to action elements not directly influenced by financial inputs(42). The evidence suggests that cash transfer programs and economic-support models can play a significant role in reducing malnutrition, particularly when they are well-designed and consider local contexts(43). These programs not only improve food security and dietary diversity but also have broader economic benefits that contribute to the overall well-being of vulnerable populations(44). However, their effectiveness can be influenced by external factors such as market conditions and health issues, which need to be addressed to maximize their impact(45).

Limitations and Cautions

This review has several limitations, including variations in study design, sample size, intervention duration, and outcome indicators used in the included studies. Restricting the review to English-language articles may also introduce language bias, as relevant studies published in languages other than English may have been excluded. This bias can limit the representativeness of the findings and reduce the external validity of the review, particularly in non-English-speaking regions where community-based nutrition interventions are widely implemented. In addition, some community-based nutrition interventions are implemented as packages (multicomponent), making it difficult to isolate the influence of a single component, such as nutrition education or supplementary feeding. Heterogeneity in reporting and a lack of long-term data also limit the ability to assess the sustainable impact of these interventions. One of the main limitations of this study is the limited generalizability of its findings. The study focuses on a specific period (publications from the last five years, 2019–2024) and uses available data. As a result, the conclusions drawn from this study may not fully represent the diverse range of community-based nutrition interventions in all countries. Variations in cultural, economic, and educational contexts may influence the effectiveness and implementation of these programs in different countries. Therefore, these findings should be interpreted with caution and may not be directly applicable in every country. A significant limitation of this study is the language barrier, which may limit access to certain articles and sources. This study primarily relied on English-language databases, which may have excluded valuable studies published in local languages. Further research and data collection in each country are needed to develop more context-specific and appropriate interventions.

Recommendations for Future Research

Based on the results of this review, it is recommended that community-based nutrition interventions for children aged 6–23 months be designed specifically according to age and local conditions, with active involvement of caregivers in every stage of implementation. Strengthening the capacity of community health workers and health personnel needs to be a priority through intensive training on behavior change communication and practical nutrition counseling. Interventions that combine nutrition education with supplementary feeding are considered more effective, especially in areas with food insecurity. To ensure sustainability, programs need to be supported by a robust monitoring and evaluation system and backed by cross-sectoral policies. Going forward, further research is needed to assess the long-term effectiveness and cost-efficiency of these intervention strategies in various social and geographical contexts

CONCLUSION

Community-based nutrition interventions, particularly those focused on nutrition education, have demonstrated clear improvements in maternal knowledge and feeding practices for managing malnutrition. When combined with behavior change communication, supplementary foods, or cash-based support, their impact becomes substantially stronger, especially within integrated multisectoral programs. These empirical insights align with broader policy frameworks such as the UNICEF IYCF Guidelines, WHO Essential Nutrition Actions, and national community health strategies, underscoring their relevance for policy adoption. The effectiveness of these interventions also reflects core sustainability principles, including feasibility within existing community health platforms, reliance on local cadres, and the ability to operate with modest resources. Furthermore, evidence from diverse geographical settings suggests strong potential for scalability when interventions are adapted to local sociocultural and economic conditions. Collectively, these findings provide a robust foundation for developing targeted, sustainable, and scalable community-based nutrition policies that aim to prevent malnutrition among vulnerable populations.

AUTHOR'S CONTRIBUTION STATEMENT

Rahayu Widaryanti (RW) was the lead author and was responsible for developing the conceptual framework, methodology, literature search, and the initial manuscript draft. Martha Irene Kartasurya (MIK) contributed to the conceptual development, methodology development, academic supervision, and critical revision of the article's scientific content, as well as conducting a final review of the linguistic quality of the manuscript. Mohammad Zen Rahfiludin (MZR) contributed to developing the methodology, validating the analysis results, interpreting the findings in the context of public health, and assisting in preparing the discussion section. Sri Achadi Nugrahen (SAN) assisted in conducting the literature search, providing academic supervision, and performing a final academic quality review. All authors have read and agree to be accountable for all aspects of the work to ensure scientific accuracy and integrity.

CONFLICTS OF INTEREST

The authors declare that no financial, commercial, personal, or academic conflicts of interest could influence this article's results, interpretation, or writing. The entire research and writing process was conducted independently without any influence from external parties interested in the topic discussed.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

While writing this article, generative artificial intelligence technology (such as ChatGPT or similar tools) was not used to create, analyze, or structure the scientific content. The author used all the ideas, interpretations, and writings based entirely on manual analysis and literature review. However, some non-generative AI-based tools, such as reference management software (Mendeley) and grammar checking software (Grammarly), were used to a limited extent and then re-evaluated by the author, Martha Irene Kartasurya (MIK). All analysis results were validated and interpreted independently by the research team.

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