



# Public Health Interventions to Reduce Stunting in Toddlers: A Systematic Review

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## Abstract

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**BACKGROUND:** Handling stunting in toddlers is not only the responsibility of the government, but the most important thing is family and community responsibility. Public health interventions involving the family and community are important for stunting prevention because the family environment is one of the factors that determine the provision of adequate conditions for the nutritional status and development of children.

**AIM:** The purpose of this systematic review is to synthesize various public health interventions that are practice-based evidence derived from programs implemented to reduce stunting in toddlers.

**METHODS:** Initial steps doing this systematic review articles included in this study were retrieved from ProQuest, EBSCOhost, MEDLINE/CINAHL (Academic Search Complete) that were published within 2011–2019 and written in English. Study Quality Assessment was done using keywords and by assessing compatibility of the articles with the study context. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines was used to analyze the found articles.

**RESULTS:** After filtering process, there were 11 articles from 859 articles emphasize on using a combination of two or more Public Health Interventions to reduce stunting in toddlers. The most common public health interventions done to reduce stunting in toddlers are health teaching, counseling, collaboration, and community organizing.

**CONCLUSIONS:** Here, we show that public health interventions performed by public health nurses to reduce stunting require the involvement of the community itself, especially the family. Public health interventions can be combined with one or more other public health interventions to increase success in preventing stunting in children under five.

## Introduction

Malnutrition problem in toddlers might become a constraint in achieving the 2030 Sustainable Development Goals on ending all forms of malnutrition, namely stunting and wasting on children under 5 years old [1]. Approximately 21.3% or 144 million of children under 5 years old (toddlers) were suffering from stunting in 2020 and 45% of premature deaths in toddlers were caused by malnutrition [2]. Malnutrition problems in toddlers might lead to stunting. Stunting is an impairment of growth and development on children caused by malnutrition, multiple infections, and inadequate psychosocial stimuli. Children are called stunted if their height-for-age ratio is below 2 standard deviations (SD) from the median of WHO Child Growth Standards. Stunting in early life particularly within 1000 days from conception until 2 years old results in functional impairment consequences that will harm the child.

The negative consequences from stunting on children come in short-term, long-term, and even might lead to death. The short-term consequences are morbidity, mortality and disability while the long-term

consequences are cognitive development disorders, increased risk of diseases from multiple infections or metabolic disorder and less-than-optimal economic productivity [4]. Toddlers with stunting have significantly lower cognitive scores ( $-2.10$  (95% CI:  $-3.85, -0.35$ ) compared to children who have never experienced stunting [5]. Toddlers with stunting also have a low immune system, less-than-optimal brain function, and impaired development of various organs [6].

Stunting in toddlers is caused by several factors. One of the factors based on UNICEF Undernutrition Conceptual Framework is the family and household [1]. To reduce stunting, we need a multi-sectorial approach in integrated nutritional intervention during the critical period of the first 1000 days of life. Management of malnutrition is not only the responsibility of the government, but the most important thing is family responsibility. Family's role in managing malnutrition can be done with correct feeding of complementary food [7]. The activation of the family and community's role can be done through Public Health Interventions by public health nurse (PHN).

Public health interventions in stunting prevention strategies are needed to improve the

health and nutritional status of the community through community empowerment and family-based interventions. Community-based prevention of stunting can be done through education, counseling, and home visit to improve one's skill [8]. A study shows that there is a relationship between nutritional counseling on mothers with the decrease of stunting prevalence and the increase of feeding practice. The evidence is visible on the difference of stunting prevalence, where the intervention region has significantly lower prevalence than the control region (28.8% vs. 37.2%,  $p < 0.001$ ) [9]. Another study on family counseling through home visits for families with children under 3 years old in India proves that the intervention could prevent stunting on toddlers by as much as 27% [10].

Counseling and education are forms of health teaching, implemented with almost all other forms of interventions and commonly done simultaneously or in chronological order. Health teaching communicates facts, ideas and skills to change/improve knowledge, attitude, value, belief, behavior, and practice, as well as the skill to influence knowledge, attitude, value, belief, practice, skills, and behavior of individuals or families. The focus of the counseling is the emotional component inherent in the change process [20].

Study results suggest that advances in nutrition require nutrition-sensitive programs that increase the scope and effectiveness of direct nutrition interventions [30]. Direct nutrition interventions are also included in public health interventions. Until now, various types of public health interventions have not been carried out by PHNs to overcome stunting. There is a critical need to summarize the various studies focused on how to provide community-based nutrition interventions that can be carried out by PHN. The purpose of this systematic review is to synthesize various public health interventions that are practice-based evidence derived from programs implemented to reduce stunting in toddlers around the globe.

## Methods

The study was systematically reviewed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.

### Search strategy

The articles from initial search, used in this study, were obtained from the following electronic databases; ProQuest, EBSCOhost, MEDLINE/CINAHL (academic research completed). Articles were written in English and published between 2011 and 2020 on stunt reduction interventions that can be carried out in the community (Table 2).

The first step done in searching articles was to identify the title using keywords and determine compatibility with the study context and fulfillment of either inclusion or exclusion criteria. The inclusion criteria were: (1) A primary study result with a quantitative design, (2) review of community-based interventions to reduce growth retardation, and (3) written in English. Articles were excluded if: (1) With systematic review, meta-analysis or qualitative design, (2) only the program analysis was discussed, and (3) it was carried out outside of developing countries.

Population, intervention, comparators, outcomes, and study type (PICOS) format used as the basis to conduct the systematic review (Table 1). The choosing of keywords as follows: "Under 5 years" or *toddler\** or *preschool* or "early childhood" AND *stunting* or *malnutrition* or *undernourished* AND "Community intervention" or "interventions" or "strategies" or "best practices." The authors filtered all articles' titles and abstracts identified from six databases. In the next step, the authors read all articles from the abstract to full text to determine compatibility of the context and criteria to be included in the systematic review. Methodology quality was determined by examining the compatibility of the objectives with the components of the research methodology, as the ones included in the study were generally observational or simple descriptive study.

**Table 1: Inclusion and exclusion criteria (PICOS format)**

Criteria (PICOS)	Inclusion	Exclusion
Population	Under 5 years "or toddler" or preschool or "early childhood" AND stunting or malnutrition or undernourished	Children above 5 years
Intervention	Public health intervention	-
Comparators	Public policy, government program, (standard intervention)	-
Outcomes	Reduced stunting, malnutrition, undernourished	-
Study Design and publication type	Quasi experimental studies, randomized control and trial	systematic review, meta-analysis, cross sectional and qualitative design
Publication years	2011-2020	Pre 2011
Language	English	Language other English

PICOS: Population, intervention, comparators, outcomes, and study type.

### Selection process

Selection process was done in three phases. During the first phase authors pooled 859 articles to identify the relevant ones. The authors independently filtered out all articles to determine exclusion with approval, and then found 813 articles after clearing out duplicate articles. In the second phase, relevant articles were coded to reflect the abstracts (e.g., study, population, and sample). Furthermore, authors filtered full-text study from 135 articles left to do abstract inclusion. In the past phase, 31 full-text articles which discuss findings on public health intervention for malnutrition/stunting in toddlers were chosen for full text reviewed (Figure 1).

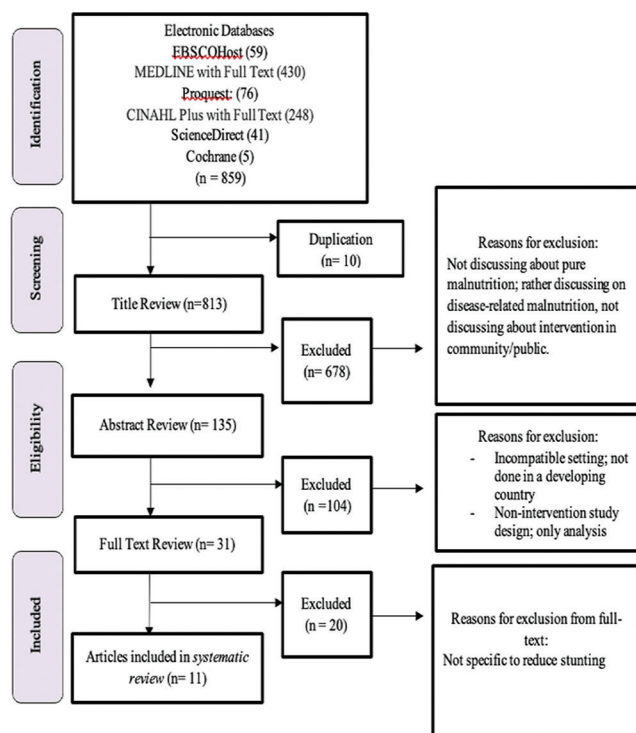


Figure 1: Searching strategy and reasons for exclusion using Preferred Reporting Items for Systematic Reviews and Meta-Analyses

### Data extraction

The authors extracted data from 31 studies in a systematic and standardized manner, summarizing study characteristics and general findings on the abstraction sheet (available on request). Relevant articles using quantitative design were assessed using a comprehensive coding framework. Two information categories extracted during the coding phase were methodology and study conclusion. All studies were coded and analyzed for the relationship between the stunting and the public health intervention variables.

Publication year, journal, and database were noted along with methodology characteristics such as design (Randomized Controlled Trials [RCT]), measurement used, and study sample (size and demography). Moreover, measurement units used, and statistical analysis characteristics (interdependence of data reported by many respondents) were evaluated. We excluded 20 studies because the intervention not specific to reduce stunting (Table 3). Following data extraction by breaking down the PICOS of each study, finally the authors found 11 most compatible articles to be compared. The findings extracted by summarizing result in a few lines.

### Quality appraisal

All articles selected for inclusion in the systematic review (11 articles) (i.e., those that met the inclusion criteria outlined in the protocol) were reviewed by two critical reviewers using the Joanna Briggs Institute

(JBI) Critical Appraisal tools for use in JBI Systematic Reviews Checklist for RCT. The JBI Assessment Tool checklist was rated at least 10 (75%) out of a total score of 13. The results of this assessment can then be used to inform the synthesis and interpretation of research results.

## Results

From article search to data extraction, 11 articles were found most compatible with the search criteria. The articles included in the systematic review [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19]. All used randomized control and experimental design (RCT) and described interventions to reduce growth retardation. Interventions in this case are measures taken as a community, system, individual, or family to improve or protect the health condition [26]. Therefore, public health interventions are actions that public health professionals undertake on behalf of individuals, families, communities, and systems to improve or protect health [20].

Intervention strategies in public healthcare include group processes, health education, empowerment and partnership [25], [26]. Health education aims to create behaviors that promote health. The most important change that emerges from health education is commitment and awareness of a healthy lifestyle [25], [26]. The Wheel of Intervention Model [27] describes how to improve health of a population through a range of community, individual and family interventions that create a community and system that affects public health.

The Wheel of Interventions framework defines the scope of care practice in the public health system with the type of intervention and level of practice (individual/family/community/system) (Figure 2) [20]. According to the Minnesota Department of Health (2019), the intervention is an act of PHNs on behalf of the individual/family, community, and system to improve and protect health conditions. The interventions wheel model has three elements: Population based, includes three practice levels and 17 interventions. The intervention council describes various public health practice interventions that focus on a population.

Public health interventions in the intervention wheel are also identified in the Nursing Interventions Classification [29], including: Surveillance, screening, referral, and observation, case management, function delegation, health education, counseling, consultation, coalition building, social marketing, development and enforcement of policies, even though there are differences in the naming such as health screening, referral, delegation, health education, community health

development, and health policy monitoring. From the search result to data extraction, it is evident that there are four most common health interventions done to reduce stunting, which are health teaching, counseling, collaboration, and community organizing.

## Discussion

### Health teaching

This study summarized the available evidence on the effectiveness of public health interventions in stunting prevention, one of which is Health Teaching. Teaching involves the exchange of information and experiences through educational activities aimed at improving health knowledge, attitudes, behaviors, and skills [21]. Health education is often used together or sequentially with outreach and/or consultation.

**Table 2: Database searching**

Search date	Database	Publication year	Studies found	Total
March 2, 2020	EBSCO	2011–2020	59	859
March 2, 2020	MEDLINE	2011–2020	430	
August 5, 2020	ProQuest	2011–2020	76	
August 5, 2020	CINAHL	2011–2020	248	
August 5, 2020	ScienceDirect	2011–2020	41	
August 5, 2020	Cochrane	2011–2020	5	

**Table 3: Data extraction result (n=11)**

S. No.	Journal	Design and sampling	Data collection/intervention	Study result	Public health interventions			
					Health teaching	Counselling	Collaboration	Community organizing
1	2-year impact of community-based health screening and parenting groups on child development in Zambia: Follow-up to a cluster-randomized controlled trial. (Rockers et al., 2018)	A non-masked cluster-randomized controlled trial. A total of 268 foster children aged 6–12 months in the intervention group and 258 foster children in the control group took part in this study	In the intervention group, the families were visited every 2 weeks by Child Development Agents (CDAs) and invited to parent group meetings. The toddler care group elects a co-supervisor trained by the CDAs. Boards facilitate meetings and provide teaching material for each meeting. While the control group received no treatment	This intervention significantly reduced stunting (56/195 versus 72/182; adjusted odds ratio 0.45, 95% CI 0.22–0.92; $P=0.028$ ), and also had a more positive impact on language development	✓ ✓ □	✓ ✓ □	✓ ✓ □	✓
2	Home- and community-based growth monitoring to reduce early life growth faltering: An open-label, cluster-randomized controlled trial. (Fink et al., 2017)	Using a random sample. A total of 547 toddlers with a mean age of 13 months were included in the study	The intervention consisted of two interventions and 1 control group. The primary intervention became home-based growth monitoring (HBGM), the second intervention became community-based growth monitoring including dietary supplementation for youngsters with stunting (CBGM+NS), and the control group	Each the primary and 2 <sup>nd</sup> interventions had a more impact on stunting below-fives with estimated interaction effects of 0.503 (95% CI: 0.160, 0.846) and 0.582 (95% CI: 0.134, 1.030) for CBGM+NS and HBGM, respectively. HBGM improved mean WAZ [ $b=0.183$ (95% CI: 0.037, 0.328)]. This intervention also increases protein intake in infants	✓ ✓ □		✓ ✓ □	
3	Maternal nutrition counseling is associated with reduced stunting prevalence and improved feeding practices in early childhood: A post-program comparison study. (Mistry et al., 2019)	A two-stage cluster random sampling procedure. A total of 3009 pairs of mothers and children	Nutrition counseling intervention based on essential health care (EHC) package. The first region as the control group was given EHC packages as much as $n=1452$ . While in the second region as the intervention group, they were given the EHC package plus nutritional counseling. The Chi square test was carried out to compare the control and intervention groups	The results of this study proved that the prevalence of stunting in the intervention area was significantly lower than in the control area (29% vs. 37%, $P<0.001$ ). The risk of stunting was 25% lower in the intervention area compared to the intervention area, control area (OR: 0.75, 95% CI: 0.60–0.94; $P=0.012$ )	✓ ✓ □	✓ ✓ □	✓ ✓ □	

(contd...)

The health education intervention was implemented in the second article on home growth monitoring and community-based growth monitoring. This intervention was combined with a collaboration in which parents measured their children's height and monitored the children's physical growth at home [10]. Health education in this study was conducted through three community meetings in selected villages [10]. Community meetings are held by trained health workers who remind health workers of the principles and importance of healthy eating at each session [10]. Both interventions had a greater positive effect on stunted children at baseline.

Health teaching is also found in the ninth article, labeled Educational Intervention on Caregiver Nutritional Practices and Child Growth. Interventions include: home-made recipes, food preparation and hygiene through group training, counseling, and home visits by local health services [17].

The results of this study show that the children in the intervention group had higher Z-scores for weight-for-age and weight-for-height than the control group (0.18 vs. 0.01 and 0.49 vs. 0.19) and were less likely to have stunting [17]. The results show how education about appropriate complementary nutrition practices and counseling (communication strategies) has a positive impact on children's growth outcomes [17].

Table 3: (Continued)

S. No.	Journal	Design and sampling	Data collection/intervention	Study result	Public health interventions			
					Health teaching	Counselling	Collaboration	Community organizing
4	Effects of participatory learning and action with women's groups, counseling through home visits and crèches on undernutrition among children under 3 years in eastern India: a quasi-experimental study. (Gope <i>et al.</i> , 2019)	A non-randomized controlled study with a cross-sectional survey. A total of 4668 children aged 6 months to 3 years were randomly assigned to be included in the study	Toddlers were measured anthropometrically and mothers of toddlers were interviewed at the beginning and end of the study. The study was divided into 3 areas where area 1 functions as a control, area 2 as an intervention group carried out by trained female workers to facilitate Participatory Learning and Action (PLA) meetings and provide counseling to mothers of children under five. While area 3 is given PLA intervention, home visits and crches with food and growth monitoring	In location 2 (PLA and home visits), wasting in youngsters below five become decreased via 34% (Adjusted Odds Ratio [aOR]: 66%, 96%: 0.51–0.88) and underweight by using 25% (aOR: 0.75, 95% CI: 0, 59–0.95), without a exchange in stunting (aOR: 1.23, 95% CI: 0.96–1.57). In location 3, (PLA, home visits, crèches), wasting was reduced by way of 27% (aOR: 0.73, 95% CI: 0.55–0.97), underweight by 40% (aOR: 0.60, 95% CI: 0.47–0.75), and stunting by 27% (aOR: 0.73, 95% CI: 0.57–0.93)	✓ ✓ □	✓ ✓ □	✓ ✓ □	
5	The potential effectiveness of the nutrition improvement program on infant and young child feeding and nutritional status in the Northwest and Southwest regions of Cameroon, Central Africa. (Reinsma <i>et al.</i> , 2016)	Using systematic random sampling, caregivers have been recruited from NIP (nutrients improvement program) sites (n=359) and non-NIP sites (n=415) from infant Welfare Clinics (IWCs) within the Northwest (NWA) and Southwest areas (SWA)	The intervention consisted of counseling by cadres to toddler caregivers about infant feeding which consisted of exclusive breastfeeding (EBF), complementary feeding (MPASI), and counselling about child growth	In the control group (non-NIP locations) children were 5 times more likely to experience stunting (OR: 5.5; CI: 3.37, 9.02; = 1.71) compared to toddlers from the NIP (Nutrition Improvement Program) group	✓ ✓ □	✓ ✓ □		
6	Effects of nutritional supplementation and home visiting on growth and development in young children in Madagascar: a cluster-randomized controlled trial. (Galasso <i>et al.</i> , 2019)	Randomly selected. A total of 3738 mothers under five and 1248 pregnant women were divided into 250 mothers in each intervention group, and as many as 2490 children aged 0–11 months and evaluated at intervals of 1 and 2 years	There are 5 intervention groups, among others; standard care program with nutrition education and monthly growth monitoring (T0), the second group received T0 plus intensive nutrition counseling by community workers and home visits (T1), the third group received T1 intervention plus lipid-based nutritional supplementation (LNS) for children aged 6–18 months (T2), the fourth group received the T2 intervention plus LNS for pregnant and lactating mothers (T3), and the fifth group received the T1 intervention plus home visits every 2 weeks to encourage early stimulation	The primary effects of this observation have been growth (length-for-age and weight-for-length Z-scores) and development of youngsters aged 18–30 months. growth (length-for-age Z scores) within the intervention groups T2 and T3 exposed to the LNS dose confirmed an extensive impact from 0.210 SD [95% CI–0.004–0.424] for T2 and a borderline impact of 0.216 SD [0.043–0.389] for T3, another end result became a lower prevalence of stunting inside the T2 group (–9.0% [95% CI–16.7––1.2]) and in the T3 group (–8.2% [–15.6––0.7])	✓ ✓ □	✓ ✓ □	✓ ✓ □	
7	Effectiveness of a community-based nutrition program to improve child growth in rural Ethiopia: a cluster randomized trial. (Kang <i>et al.</i> , 2017)	A cluster randomized trial of a community-based participatory nutrition promotion intervention (CPNP). A total of 1790 children aged 6–12 months were divided into 875 children in the intervention group and 914 children in the control group	The community-based participatory nutrition promotion program (CPNP) intervention that uses a positive deviance approach involves mothers of children under five. This intervention was carried out for 2 weeks using the principle of learning while doing related to child feeding. Anthropometry was assessed every 3 months for 1 year	There was a lower prevalence of stunting in the intervention group 8.1% (p=0.02), compared to 6.3% (p=0.046) in the control group at the end of 12 months after follow-up	✓			✓
8	A mixed methods study to assess the effectiveness of food-based interventions to prevent stunting among children under-5 years in Districts Thatta and Sujawal, Sindh Province, Pakistan: Study protocol. (Kureishy <i>et al.</i> , 2017)	A mixed methods study design. Respondents in this study were pregnant women, breastfeeding mothers and children under five as many as 5000 participants	Anthropometric measurements and hemoglobin levels can be measured at baseline, quarterly and at end line. The interventions will include locally produced lipid-based totally nutrient supplement (Wawamum) for kids 6–23 months, micronutrient powders for kids 24–59 months, and wheat soya blends for pregnant and lactating mothers government woman health workers will deliver interventions to participants	The effectiveness of the project will be measured in terms of the effect of the proposed interventions on stunting, dietary status, micronutrient deficiencies, and different key indicators of the participants. The procedure evaluation will determine the acceptability, feasibility and potential obstacles of project implementation via awareness group discussions, key informant interviews and household surveys. statistics analysis could be carried out the use of STATA version 12	✓ ✓ □	✓ ✓ □		✓

(contd...)

Table 3: (Continued)

S. No.	Journal	Design and sampling	Data collection/intervention	Study result	Public health interventions			
					Health teaching	Counselling	Collaboration	Community organizing
9	Effectiveness of an educational intervention to improve child feeding practices and growth in rural China: Updated results at 18 months of age. (Zhang et al., 2013)	8 townships were randomly assigned to the intervention or control. 5 hundred 90-nine healthful infants have been enrolled at 2–4 months old, and were accompanied up at ages 6, 9, 12, 15 and 18 months	The intervention group acquired information on better home-prepared recipes and food coaching and hygiene through group education, counseling and home visit	children in the intervention group completed higher z-scores for weight-for-age (WAZ) and weight-for-height (WHZ) than the control (0.18 vs. 0.01 and 0.49 vs. 0.19, respectively) at 18 months old, and have been less possibly to have stunted growth (odds ratio=0.71, 95% self-belief interval: 0.53–0.94). mixed model showed that the intervention group finished extensively higher linear growth over time, such as WAZ (p=0.016), WHZ (p=0.030) and HAZ (p=0.078)	✓ ✓ □	✓ ✓ □	✓ ✓ □	
10	Nutrition education in Southeast Sulawesi Province, Indonesia: A cluster randomized controlled study. (Effendy et al., 2020)	The usage of a randomized controlled trial, an intervention for 6 months among caregivers with children aged 6? 17 months in two sub districts of Kendari, SE Sulawesi Province, Indonesia	Participants in the intervention group attended four nutrition lessons and received a month-to-month home visit by means of cadres (community volunteers), whereas participants in the control group handiest received standard month-to-month health care on the health post	The study showed the educational intervention had a big impact on children's DDS. youngsters within the intervention group had a larger DDS compared with children inside the control group (Beta [mean difference] = 0.34, 95% CI: 0.02–0.66, P=0.038). The intervention effect on top-for-age z-score (HAZ) couldn't be shown (Beta=0.24, 95% CI: 0.06–0.56, P=0.112). however, stunting prevalence remained stable within the intervention group however extended within the control group	✓ ✓ □	✓ ✓ □	✓ ✓ □	
11	Behavior Change Interventions Delivered through Interpersonal Communication, Agricultural Activities, Community Mobilization (CM), and Mass Media (MM) Increase Complementary Feeding Practices and Reduce Child Stunting in Ethiopia (Kim et al., 2019)	A cluster-randomized evaluation design with cross-sectional. Children aged 6–23. Nine mo [n=2646 at baseline (2015) and n=2720 at endline (2017)].	Alive and Thrive (A and T) provided extensive conduct change interventions through four platforms: interpersonal communication (IPC), nutrition-touchy agricultural activities (AG), community mobilization (CM), and mass media (MM).	At end line, publicity to IPC was 17.8–32.3%, publicity to AG became 22.7–36.0%, publicity to CM became 18.6–54.3%, and publicity to MM turned into 35.4% inside the intensive group. minimum dietary variety and minimal suited weight loss program multiplied notably inside the in depth group however remained low at endline (24.9% and 18.2%, respectively). sizable differential declines in stunting occurrence were determined (DDE: -5.6 percentage points; P<0.05) in children elderly 6–23. Nine mo, decreasing from 36.3% to 22.8% in the in depth group. Dose-response analyses confirmed higher odds of minimum nutritional diversity (OR: 3.3; 95% CI: 2.2, 4.8) and minimal meal frequency (OR: 1.1; 95% CI: 1.4, 2.6) and higher height-for-age z rating (HAZ) (β: 0.24; 95% CI: 0.04, 0.4) among women exposed to a few or four platforms	✓ ✓ □	✓ ✓ □		



Figure 2: Intervention Wheel model [27], [28]

Another study on nutrition education interventions was conducted in Indonesia. Nursing staff for infants aged 6–17 months were randomly assigned to a nutritional intervention on the nutritional practices and nutritional status of the children combined with regular home visits by managers. The study showed that the pedagogical intervention had a significant impact on the children's food diversity dietary diversity score (DDS) scores. The children in the intervention group had a higher DDS than the children in the control group (beta [mean difference] = 0.34, 95% CI: 0.02–0.66, p = 0.038). The result of this study was that the prevalence of stunting increased in the control group, but remained stable in the intervention group. The nutrition education intervention has great potential to integrate other nutrition programs into community health centers [18].

Community-based nutritional education interventions delivered by routine health services to malnourished children resulted in significant weight gain in the infants of the intervention group and a decrease

in the percentage of malnourished children (10% vs. 18.8%, OR = 0.47,  $p = 0.01$ ). Nutritional interventions can be effective in improving supplemental nutrition and growth in babies from 6 months to a year old [31]. Family health education on child nutrition and various research findings that we have found have been shown to be effective in improving the nutritional status of children to prevent stunting. The mother as the main actor plays a huge role in determining the health of her dress, including its development. A mother's nutritional ability is a major factor affecting her ability to choose low-nutrient foods to feed her children and affecting her ability to manage the resources available for food delivery. Nutritional education has been shown to be effective in empowering the mother in assessing inappropriate nutritional practices [24].

### Counseling

Counseling focuses on the emotional component that inhabits every change attempt, while counseling attempts to generate alternative problem solving [20]. Health education and counseling can take place on an individual, systemic, or communal level. PHN needs to have the ability to build a supportive and trusting relationship with the client/family because it can support the effectiveness of counseling. There are differences in the use of counseling skills between PHN and consultants or psychotherapists. PHN is not a consultant or psychotherapist, but PHN can take additional training to conduct counseling. PHN must be able to be a good listener to perform counseling skills [20]. Collaboration can only take place at the individual/family level when PHN conducts home visits [20]. PHN, together with the family, create a plan to increase the growth of infants.

Counseling interventions are also presented in the third article, where a nutrition counseling intervention was implemented with their Essential Health Care (EHC). This study places health workers at the forefront. They are trained to provide advice and education to mothers on proper nutrition during pregnancy, iron folate, and calcium supplementation during pregnancy and lactation, the importance of breastfeeding and age-specific dietary supplementation, and promote EHC activities for prenatal and postnatal health services [11]. The study found that the prevalence of stunted growth in the areas where the intervention was carried out was significantly lower compared to the control areas [11].

The fourth article also looks at counseling and home visits with mothers of young children. Trained local workers enabled participatory learning and action meetings, offered advice to mothers and made home visits [12]. The result of this study was that growth inhibition was reduced by 27% (aOR: 0.73, 95% CI: 0.57–0.93) [12]. Child nutrition counseling by health-care professionals (most counseling is mainly provided

by nurses or volunteers) increases caregiver knowledge and improves breastfeeding, supplemental nutrition, and linear growth in children [13]. Additional nutritional information is valuable, as breastfeeding promotion must be combined with information on suitable complementary foods to prevent malnutrition [23].

Health cadres can also be trained as nutritional cadres to provide health education and counseling to improve local human skills and reduce dependence on external technical assistance [13]. The development of health cadres, working in hospitals and health-center dedicated solely to nutritional counseling and education, is essential to contribute to the WHO priority actions to increase human resources for the delivery of nutritional interventions. The dietician's advice has been effective in increasing exclusive breastfeeding and reducing the risk of stunted growth in infants 6–8 months of age [13].

The sixth article employs a community health worker who is fully involved in home visits and provides children between the ages of 6 and 30 months with nutritional counseling and early childhood education [14]. Home visits for intensive nutritional counseling on lipid-based dietary supplementation show significant effects of a lower prevalence of stunting [14]. Home visit programs in infancy and early childhood have generally shown consistent benefits for children's growth and development [14]. The 23% reduction was found in the likelihood of <5 wasting due to combined home visits, and the group program encouraged and demonstrated that education/behavior modification interventions had a greater impact on stunting than dietary supplementation.

Finally, Nair *et al.* reported that 80% of mothers have received a home visit and 56% of mothers have attended a child rearing group meeting in Jharkhand, Odisha, India, in the past 3 months [35]. The lack of an observed effect of both platforms on stunting and underweight in children, as the effects of behavioral interventions on anthropometric outcomes are generally small, is due to insufficient time periods to influence changes in infant growth [34]. A study of families with children aged 6–23.9 months in Bangladesh also provided counseling through interpersonal communication (IPC) during visits to health-center and home visits with additional food demonstrations [19]. The study intervention was called Alive and Thrive and offered intensive behavior change interventions on four platforms: IPC, Food Sensitive Agriculture, Community Mobilization, and Mass Media [19]. The result of this intervention was that the prevalence of stunting in children decreased significantly from 36.3% to 22.8% in the intensive care group [19]. Peer counseling among mothers of young children and nutritional counseling for mothers had positive effects on infant growth [32], [33]. Counseling in combination with home visits may reduce the risk of disrupted growth in young children, as several study results show [11], [12], [13], [14], [19], [32], [33].

### **Collaboration**

Collaboration is a commitment between two or more individuals or organizations to achieve a common goal through enhancing the ability to promote and protect their health [20]. Collaboration occurs at the individual or family level in public health interventions by PHNs. The relationship between the client and the PHN is called a “partnership” [20] and is generally combined with other public health interventions, one of which is counseling.

### **Community organizing**

Community organization is “the process by which people come together to identify common problems or goals, mobilize resources, and develop and implement strategies to achieve the goals they want to achieve” [22]. The basic phases of the community organization are; Engaging people in community efforts, identifying community members, developing strategies, developing specific tactics, selecting specific actions, setting goals and celebrating victories, and ultimately planning sustainability [20].

Community organization can be seen in the first article where different PHN activities work side by side with the community to achieve a common goal. Nursing staff working with children in the community were visited at home for 1 year to monitor health and invited to semi-annual community-based group meetings over a 2-year period, where they studied a diverse parenting curriculum that included pacing, cognitive, and play practice, infant feeding and cooking and self-care practices for good mental health [9]. The effect of community-based parenting groups on the development of children in the southern province of Zambia, after 2 years, significantly reduces the likelihood of stunting and improves children’s speech development. The intervention had a positive effect on the parent-child interaction, which lasted for a 5 month break in the intervention [9].

In the sixth journal, the community organization was combined with other public health activities such as health counseling and health teaching for infants and mothers of young children. Community health workers provide health and nutrition services every month, including monitoring the growth and development of infants and toddlers, cooking demonstrations, community mobilization, nutrition, and hygiene training [14]. In Ethiopia, in addition to two types of community-based nutrition programs, a new program model, called Community-based participatory nutrition promotion (CPNP), has been implemented. CPNP includes a nutritional supplement program and counseling adapted from Positive Deviance practices in nutrition, care, hygiene, and health promotion.

Child-mother pairs participated in each feeding. Mothers provided various food ingredients

and matching materials such as firewood, prepared complementary foods prepared according to recipes developed by nutritionists as part of a local market survey, and fed their children on-site during the 12 days. Mothers discussed nutrition, care, hygiene, and health-promoting messages and were advised by the operators (operators hired and trained for this program) [15]. Children in the intervention area had an 8.1% (95% CI: 1.1%; 15.1%;  $p = 0.02$ ) greater decrease in the prevalence of stunting compared to the control area [15].

A comprehensive package of community-based interventions consists of dietary supplements and non-food-based interventions provided by Lady Health Workers (LHWs) in article 7. Behavioral changes, including messages on health education, use and benefits of product, infant and young child feeding practices, and maternal feeding, were transmitted via LHW through group sessions and home visits. This intervention package was implemented to combat stunting in children (6–59 months) [16]. The results of the study provide sufficient evidence for the development of strategies and programs to prevent stunting in children (6–59 months) [16].

### **Further research advice**

Based on the findings, most of the research in this systematic review has only discussed a small number of public health interventions to overcome stunting. The result of this systematic review indicates the need for further research on other public health interventions to overcome stunting.

### **Implications for practice**

The results of this systematic review are expected to provide recommendations to PHNs to choose what public health interventions are appropriate to overcome stunting.

### **Limitation**

The limitation of this review is limiting by year from 2011 until 2020 were used to get more recent intervention on the topic and the current review is an update.

## **Conclusions**

In general, public health intervention in stunting requires reducing the involvement of the community itself, particularly families with children. The intervention also requires that public health professionals or health



volunteers connect public health care workers and the community. Public health interventions can be combined with one or more other public health interventions to successfully reduce stunting in young children.

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