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

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Abstract

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 6 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            | English 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).
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 demographics). 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.

| S. No. | Journal Design and sampling Data collection/Intervention Study result | Public health interventions   |
|-------|-------------------------------------------------|------------------------------|
| 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 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 elected a co-supervisor trained by the CDAs. Boards facilitate meetings and provide teaching material for each meeting. While the control group received no treatment. 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 young childers with stunting (CBGM+NS), and 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. Each the primary and 2nd 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 | Health teaching, Counseling, Collaboration, Community organizing |
| 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 | | |
| 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: 0.63–0.84; P<0.001) | Health teaching, Counseling, Collaboration, Community organizing |

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]. This study demonstrated how education about appropriate complementary nutrition practices and counseling (communication strategies) has a positive impact on children's growth outcomes [17].
| S. No. | Journal | Design and sampling | Data collection/Intervention | Study result | Public health interventions |
|-------|---------|---------------------|-----------------------------|-------------|-----------------------------|
| 4     | et al | 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 chores 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%, 95% CI: 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, chores), 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     | et al | 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     | et al | 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 (TO), the second group received TO 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 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. | 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 [95% CI: 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     | et al | 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. A mixed methods study design. | The effectiveness of a community-based nutrition program to improve child growth in rural Ethiopia: a cluster randomized controlled trial. Galasso et al, 2019. | 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     | et al | | 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 et al, 2017. | 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 | ✔️ ✔️ ✔️ ✔️ |

Table 3: (Continued)
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

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

References

1. World Health Organization. Childhood Stunting: Context, Causes and Consequences, WHO Conceptual Framework. Geneva: World Health Organization; 2013.

2. World Health Organization; UNICEF, Bank TW. Levels and Trends in Child malnutrition. World Bank Group Joint Child Malnutrition Estimates Key Findings of the 2020 Edition. Geneva: World Health Organization; 2020.

3. Health Research and Development Agency, Ministry of Health, R.I. RISKEDSAS 2018 National Health Report. Jakarta: Health Research and Development; 2019.

4. Alam MA, Richard SA, Fahim SM, Mahfuz M, Nahar B, Das JS, Onis D, Prangthip P, Soonthornworasiri N, Winichagoon P, Van Noordende AT, Kuipers P, Pereira ZB. Strengthening Minnesota Department of Health. Public Health Interventions: Center for Community Health and Development at the Galasso E, Weber AM, Stewart CP, Ratsifandrihamanana L, Beal T, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM. World Health Organization; UNICEF, Bank TW. Levels and Trends in Child malnutrition. World Bank Group Joint Child Malnutrition Estimates Key Findings of the 2020 Edition. Geneva: World Health Organization; 2020.

5. Alam MA, Richard SA, Fahim SM, Mahfuz M, Nahar B, Das S, et al. Impact of early-onset persistent stunting on cognitive development at 5 years of age: Results from a multi-country cohort study. PLoS One. 2020;15(1):e0227839. https://doi.org/10.1371/journal.pone.0227839
PMId:31978156

6. Bea L, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM. A Review of Child Stunting Determinants in Indonesia. Vol. 14. Maternal and Child Nutrition. Hoboken, New Jersey: Blackwell Publishing Ltd.; 2018.

7. Friedman MM, Bowden VR, Jones EG. Family Nursing. 5th ed. New Jersey: Julie Levin Alexander; 2003.

8. Van Noordende AT, Kuipers P, Pereira ZB. Strengthening personal and family resilience: A literature review for the leprosy context. Leprosy Rev. 2019;90(1):88-104.

9. Rockers PC, Zanolini A, Banda B, Chipili MM, Hughes RC, Hamer DH, et al. Two-year impact of community-based health screening and parenting groups on child development in Zambia: Follow-up to a cluster-randomized controlled trial. PLoS Med. 2018;15(4):e1002555. https://doi.org/10.1371/journal.pmed.1002555
PMId:29689045

10. Fink G, Levenson R, Tembo S, Rockers PC. Home and community-based growth monitoring to reduce early life growth faltering: An open-label, cluster-randomized controlled trial. Am J Clin Nutr. 2017;106(4):1070-7. https://doi.org/10.3945/ajcn.117.157545
PMId:28835364

11. Mistry SK, Hossain MB, Arora A. Maternal nutrition counselling is associated with reduced stunting prevalence and improved feeding practices in early childhood: A post-program comparison study. Nutr J. 2019;18(1):47. https://doi.org/10.1186/s12881-019-0473-z
PMId:31455363

12. Gope RK, Tripathy P, Prasad V, Pradhan H, Sinha RK, Panda R, et al. Effects of participatory learning and action with women's groups, counselling through home visits and creches on undernutrition among children under three years in Eastern India: A quasi-experimental study. BMC Public Health. 2019;19(1):962. https://doi.org/10.1186/s12889-019-7274-3
PMId:31319828

13. Reinsma K, Nkouh G, Nashom E. 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. BMC Health Serv Res. 2016;16(1):854. https://doi.org/10.1186/s12913-016-1899-z
PMId:27846628

14. Galasso E, Weber AM, Stewart CP, Ratsifandrihamanana L, Fernald LC. Effects of nutritional supplementation and home visiting on growth and development in young children in Madagascar: A cluster-randomised controlled trial. Lancet Glob Health. 2019;7(9):e1257-68.

15. Kang Y, Kim S, Sinanno S, Christian P. Effectiveness of a community-based nutrition programme to improve child growth in rural Ethiopia: A cluster randomized trial. Matern Child Nutr. 2017;13(1):1-15. https://doi.org/10.1111/mcn.12349
PMId:27549570

16. Kureishy S, Khan GN, Arrif S, Ashraf K, Cespedes A, Habib MA, et al. A mixed methods study to assess the effectiveness of food-based interventions to prevent stunting among children under-five years in Districts Thatta and Sujawal, Sindh Province, Pakistan: Study protocol. BMC Public Health. 2017;17(1):24. https://doi.org/10.1186/s12889-016-3976-y
PMId:28056945

17. Zhang J, Shi L, Chen DF, Wang J, Wang Y. Effectiveness of an educational intervention to improve child feeding practices and growth in rural China: Updated results at 18 months of age. Matern Child Nutr. 2019;15(1):e00447.x
PMId:32030102

18. Effendy DS, Prangthip P, Soontumworasiri N, Winchagpoon P, Kwanbunjan K. Nutrition education in Southeast Sulawesi Province, Indonesia: A cluster randomized controlled study. Matern Child Nutr. 2020;16:e13030. https://doi.org/10.1111/mcn.13030
PMId:32468867

19. Kim SS, Nguyen PH, Yohannes Y, Abebe Y, Tharaney M, Drummond E, et al. Behavior change interventions delivered through interpersonal communication, agricultural activities, community mobilization, and mass media increase complementary feeding practices and reduce child stunting in Ethiopia. J Nutr. 2019;149(8):1470-81. https://doi.org/10.1093/jn/nxz087
PMId:31165869

20. Minnesota Department of Health. Public Health Interventions: Applications for Public Health Nursing Practice. 2nd ed. Minneapolis: Minnesota Department of Health; 2019.

21. Friedman AJ, Cosby R, Boyko S, Hatton-Bauer J, Turnbull G. Effective teaching strategies and methods of delivery for patient education: A systematic review and practice guideline recommendations. J Cancer Educ. 2011;26:12-21. https://doi.org/10.1007/s13187-010-0183-x

22. Center for Community Health and Development at the University of Kansas. Community Toolbox: Strategies for Community Change and Improvement: An Overview. Available from: https://ctb.ku.edu/en/table-of-contents/assessment- promotion-strategies/overview/main. [Last accessed on 2020 Sep 30]

23. Haroon S, Das JK, Salam RA, Imdad A, Bhutta ZA. Breastfeeding promotion interventions and breastfeeding practices: A systematic review. BMC Public Health. 2013;13(Suppl 3):S20. https://doi.org/10.1186/1471-2458-13-S3-S20
PMId:21161465

24. Kuchenbecker J, Reinbott A, Mitmuni B, Krawinkel MB, Jordan I. Nutrition education improves dietary diversity of children 6-23 months at community-level: Results from a
cluster randomized controlled trial in Malawi. PLoS One. 2017;12(4):e0175216.

25. Allender JA, Rector C, Warner KD. Community and Public Health Nursing Promoting the Public’s Health. 8th ed. United States: Wolters Kluwer Health Lippincott Williams and Wilkins; 2014.

26. Stanhope M, Lancaster J. editors. Public Health Nursing: Population-Centered Health Care in the Community. 9th ed. Maryland Height, Missouri: Mosby; 2016.

27. Keller LO, Strohschein S, Lia-Hoagberg B, Schaffer MA. Population-based public health interventions. Public Health Nurs. 1998;21(5):453-68. https://doi.org/10.1111/j.0737-1209.2004.21509.x PMid:15363026

28. Keller LO, Strohschein S, Schaffer MA, Lia-Hoagberg B. Population-based public health interventions: Innovations in practice, teaching, and management. Part II. Public Health Nurs. 2004;21(5):469-87. https://doi.org/10.1111/j.0737-1209.2004.21510.x PMid:15363027

29. Bulechek GM, Butcher HK, Dochterman JM, Wagner CM. Nursing interventions classification (NIC). J Chem Inf Modeling. 2013;8(Pt 2):1689-99. PMid:8591448

30. Ruel MT, Alderman H, Maternal and Child Nutrition Study Group. Nutrition-sensitive interventions and programmes: How can they help to accelerate progress in improving maternal and child nutrition? Lancet. 2013;382(9891):536-51. https://doi.org/10.1016/S0140-6736(13)60843-0 PMid:23746780

31. Sharma N, Gupta M, Aggarwal AK, Gorle M. Effectiveness of a culturally appropriate nutrition educational intervention delivered through health services to improve growth and complementary feeding of infants: A quasi-experimental study from Chandigarh, India. PLoS One. 2020;15(3):e0229755. https://doi.org/10.1371/journal.pone.0229755 PMid:32182241

32. Ara G, Khanam M, Papri N, Nahar B, Kabir I, Sanin KI, et al. Peer counselling promotes appropriate infant feeding practices and improves infant growth and development in an Urban Slum in Bangladesh: A community-based cluster randomized controlled trial. Curr Dev Nutr. 2019;3(7):nzz072. https://doi.org/10.1093/cdn/nzz072 PMid:31334480

33. Nikièma L, Huybregts L, Martin-Prevel Y, Donnen P, Lanou H, Grosemans J, et al. Effectiveness of facility-based personalized maternal nutrition counselling in improving child growth and morbidity up to 18 months: A cluster-randomized controlled trial in rural Burkina Faso. PLoS One. 2017;12(5):e0177839. https://doi.org/10.1371/journal.pone.0177839 PMid:28542391

34. Janmohamed A, Sohani N, Lassi ZS, Bhutta ZA. The effects of community home visit and peer group nutrition intervention delivery platforms on nutrition outcomes in low and middle-income countries: A systematic review and meta-analysis. Nutrients. 2020;12:440. https://doi.org/10.3390/nu12020440 PMid:32050577

35. Nair N, Tripathy P, Sachdev HS, Pradhan H, Bhattacharyya S, Gope R, et al. 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. Lancet Glob Health. 2017;5(10):e1004-16. PMid:28911749