

## STUNTING PREVENTION STRATEGY BY IMPROVING THE NUTRITIONAL STATUS OF TODDLER : A SYSTEMATIC REVIEW

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### ABSTRACT

**Background:** Globally, there has been progress in lowering the rates of linear growth stunting and chronic undernutrition in children under five years old, however many areas still have high rates.

**Aims :** This systematic review is to review stunting prevention strategy with improving status of nutrition in toddler.

**Methods:** This study demonstrated compliance with all requirements by means of a comparison with the standards established by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020. Thus, the specialists were able to guarantee that the research was as current as feasible. Publications released between 2014 and 2024 were considered for this search strategy. This was accomplished by utilizing a number of distinct online reference sites, including Pubmed, ScienceDirect, and SagePub. It was determined that reviews, previously published works, and partially completed works would not be included.

**Result:** In the PubMed database, the results of our search brought up 691 articles, whereas the results of our search on SAGEPUB brought up 2026 articles, our search on SCIENCE DIRECT brought up 4136 articles. The results of the search conducted for the last year of 2014 yielded a total 430 articles for PubMed, 776 articles for SAGEPUB and 2307 articles for SCIENCE DIRECT. In the end, we compiled a total of 8 papers, 6 of which came from PubMed, 1 of which came from SAGEPUB and 1 of which came from SCIENCE DIRECT. We included eight research that met the criteria.

**Conclusion:** In summary, stunting must be managed in order to protect children from its harmful effects. To do this, a variety of linked parties must contribute to the effort. Improving the mother's responsive stimulation and health education might be the first step in improving the nutritional and cognitive state of the kid.

**Keyword:** Stunting, nutrition, prevention

## INTRODUCTION

Particularly in underprivileged groups, malnutrition may be associated with severe and repeated illnesses or an inadequate diet. Stunting is the most prevalent nutritional issue that toddlers face globally, out of the three types of malnutrition—wasting, overweight, and stunting. Roughly 149 million children suffer from stunting worldwide. In 2018, Asia accounted for 81.7 million instances of the world's stunted toddler population, with over a third living in Africa (58.8 million cases). With an average incidence of 36.4% from 2005 to 2017, Indonesia has the third-highest prevalence of stunting in Southeast Asia, according to data from the World Health Organization (WHO). Stunting prevalence has declined, however not all areas and sub-regions have had the same rate of reduction in stunting.<sup>1</sup>

According to the World Health Organization, stunting is a disease in which children have stunted development as a result of malnutrition or recurrent illnesses, placing them at a high risk of sickness or death. According to WHO child development standards, a child is considered stunted if their length or height falls short of what is predicted for their age, which is less than  $-2$  standard deviations. Stunting in toddlers can make it harder for them to reach their full potential in terms of both physical and cognitive development. Stunting can also cause harm that lasts a lifetime and impacts future generations.<sup>2</sup>

A height-for-age z score (HAZ) of less than two standard deviations is considered stunted. HAZ is computed by taking a standard population's age- and sex-appropriate median value and dividing the result by the standard population's standard deviation. The suggested standard is the WHO growth standards from 2006. About 2.5% of children in a healthy population have a HAZ  $<-2SD$ . An inadequate growing environment is indicated by a larger proportion  $<-2SD$ . A subgroup of children with linear growth retardation is stunted.<sup>3</sup>

The attention that undernutrition is currently receiving on a worldwide scale offers an unparalleled chance to enhance billions of people's lives, with benefits to their health, development, education, and income. The movement against stunting and linear growth retardation has given nutrition a tremendous boost, but concentrating only on these effects may have negative long-term effects. It is unnecessary to ignore other significant outcomes and treatments to enhance these conditions when program failure is equated with lack of impact on stunting or linear growth retardation. Focusing on stunting and linear growth retardation is not always essential to enhance children's well-being; in other situations, it is insufficient to achieve that aim; and for some results, encouraging linear development is not the most economical course of action. Accelerating progress towards the well-being of children in disadvantaged areas can be achieved by sharply focusing nutrition investments, policies, and programs on outcomes that really matter, in order to preserve the momentum for global nutrition.<sup>3</sup>

## METHODS

### Protocol

The author of this study ensured that it complied with the standards by adhering to Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guidelines. This is done to guarantee the accuracy of the results that are derived from the investigation. Thus, the specialists were able to guarantee that the research was as current as feasible. Publications released between 2014 and 2024 were considered for this search strategy. This was accomplished by utilizing a number of distinct online reference sites, including Pubmed, ScienceDirect, and SagePub. It was determined that reviews, previously published works, and partially completed works would not be included.

### Search Strategy

We used "stunting prevention", "prevention" and "nutritional status" as keywords. The search for studies to be included in the systematic review was carried out using the PubMed and SAGEPUB databases by inputting the words: (("growth disorders"[MeSH Terms] OR ("growth"[All Fields] AND "disorders"[All Fields]) OR "growth disorders"[All Fields] OR "stunting"[All Fields] OR "stunted"[All Fields]) AND ("prevent"[All Fields] OR "preventability"[All Fields] OR "preventable"[All Fields] OR "preventative"[All Fields] OR "preventatively"[All Fields] OR "preventatives"[All Fields] OR "prevented"[All Fields] OR "preventing"[All Fields] OR "prevention and control"[MeSH Subheading] OR ("prevention"[All Fields] AND "control"[All Fields]) OR "prevention and control"[All Fields] OR "prevention"[All Fields] OR "prevention s"[All Fields] OR "preventions"[All Fields] OR "preventive"[All Fields] OR "preventively"[All Fields] OR "preventives"[All Fields] OR "prevents"[All Fields]) AND ("nutritional status"[MeSH Terms] OR ("nutritional"[All Fields] AND "status"[All Fields]) OR "nutritional status"[All Fields] OR ("nutrition"[All Fields] AND "status"[All Fields]) OR "nutrition status"[All Fields]) AND ("improve"[All Fields] OR "improved"[All Fields] OR "improvement"[All Fields] OR "improvements"[All Fields] OR "improves"[All Fields] OR "improving"[All Fields] OR "improvement"[All Fields])) AND ((clinicalstudy[Filter]) AND (2014:2024[pdat])) used in searching the literature.

### Data retrieval

After reading the abstract and the title of each study, the writers performed an examination to determine whether or not the study satisfied the inclusion criteria. The writers then decided which previous research they wanted to utilise as sources for their article and selected those studies. After looking at a number of different research, which all seemed to point to

the same trend, this conclusion was drawn. All submissions need to be written in English and can't have been seen anywhere else.

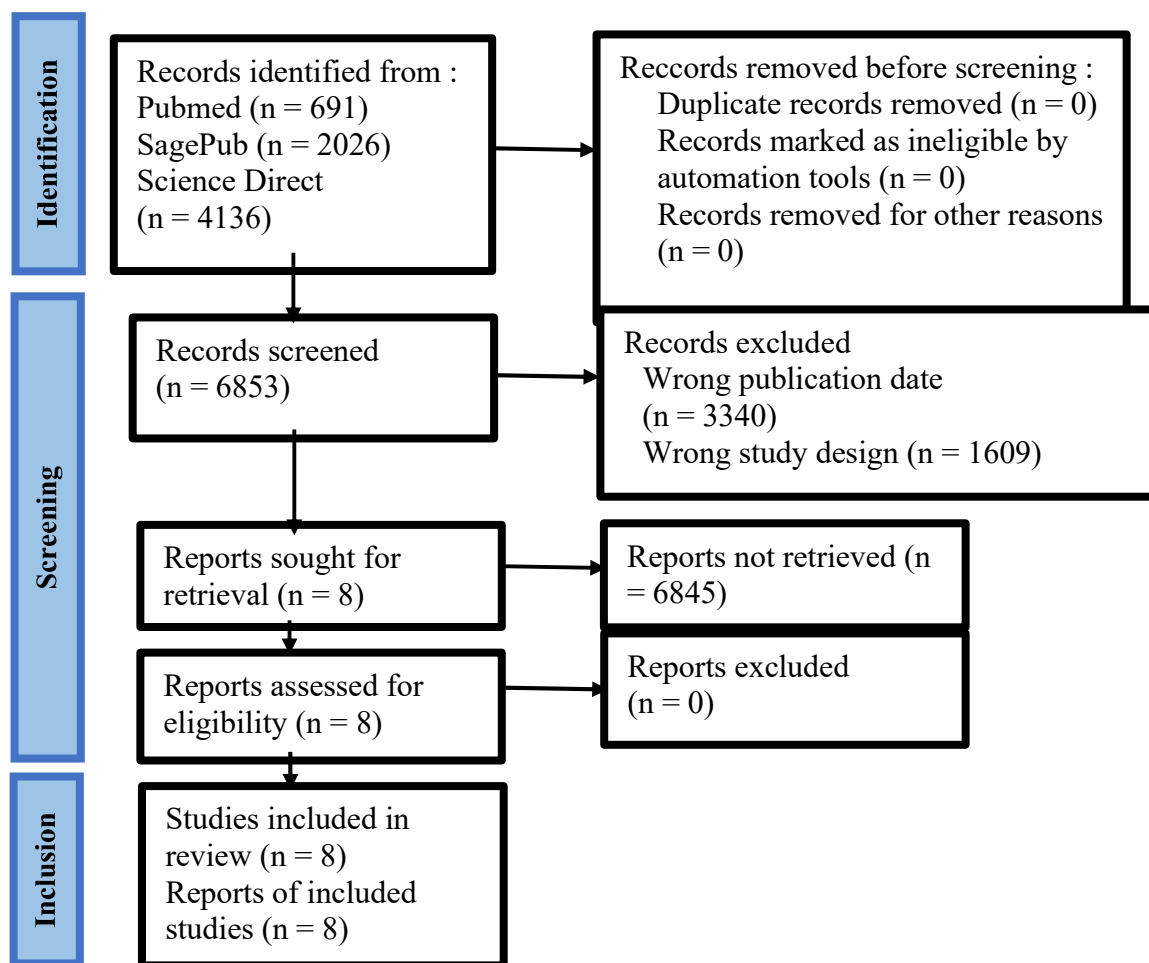


Figure 1. Prisma Flow Diagram

Only those papers that were able to satisfy all of the inclusion criteria were taken into consideration for the systematic review. This reduces the number of results to only those that are pertinent to the search. We do not take into consideration the conclusions of any study that does not satisfy our requirements. After this, the findings of the research will be analysed in great detail. The following pieces of information were uncovered as a result of the inquiry that was carried out for the purpose of this study: names, authors, publication dates, location, study activities, and parameters.

**Quality Assessment and Data Synthesis**

Each author did their own study on the research that was included in the publication's title and abstract before making a decision about which publications to explore further. The next step will be to evaluate all of the articles that are suitable for inclusion in the review because they match the criteria set forth for that purpose in the review. After that, we'll determine which articles to include in the review depending on the findings that we've uncovered. This criteria is utilised in the process of selecting papers for further assessment. In order to simplify the process as much as feasible when selecting papers to evaluate. Which earlier investigations were carried out, and what elements of those studies made it appropriate to include them in the review, are being discussed here.

**RESULT**

In the PubMed database, the results of our search brought up 691 articles, whereas the results of our search on SAGEPUB brought up 2026 articles, our search on SCIENCE DIRECT brought up 4136 articles. The results of the search conducted for the last year of 2014 yielded a total 430 articles for PubMed, 776 articles for SAGEPUB and 2307 articles for SCIENCE DIRECT. In the end, we compiled a total of 8 papers, 6 of which came from PubMed, 1 of which came from SAGEPUB and 1 of which came from SCIENCE DIRECT. We included eight research that met the criteria.

Mayen, et al<sup>4</sup> (2022) showed that the groups did not vary in terms of morbidity, and there was no correlation between HAZ and micronutrient status. It is unclear if widespread micronutrient supplementation is beneficial since long-term micronutrient supplementation through a culturally appropriate diet had no effect on stunting or morbidity.

Sk, et al<sup>5</sup> (2021) showed that particular focus should be given to the modifiable risk factors associated with stunting in children. Community health workers should be instructed by policy interventions to urge women and their male partners to use various family planning methods to increase the interval between births and to give particular care to babies born with low birth weights, since this can help prevent childhood stunting.

Muhoozi, et al<sup>6</sup> (2018) showed that the early development domains of cognitive, linguistic, and motor development were enhanced, but not the linear growth of young children in Uganda's rural disadvantaged areas, according to the intervention education given to mothers. Enhancing child development might be possible with a very inexpensive intervention approach.

Olney, et al<sup>7</sup> (2018) showed that food-assisted maternal and child health and nutrition (FA-MCHN) programs can lower stunting within the first 1000 days, even in populations that are comparatively energy and food secure. The influence increases with age, underscoring the need of acting for the whole first 1000 days.

**Table 1. The literature include in this study**

Author	Origin	Method	Sample	Result
Mayen et al, 2022 <sup>4</sup>	United Kingdom	Randomized controlled study	971 patients	73% of the kids in the atole + MN group met at least half of their daily iron and zinc requirements, according to a monthly adherence check. Growth [mean change in HAZ -0.02 (95% CI -0.12, 0.08)] and stunting [atole + MN 41%, milk 41%; RR 0.99 (95% CI 0.84, 1.19)] did not vary across the treatments at 18 months. Zinc, ferritin, and hemoglobin (HB) levels were all the same. At the time of the study, there were no children with iron deficiency anemia (IDA), although zinc deficiency was still as common in both groups (35% in milk and 35% in atole + MN) [RR 1.02 (95% CI 0.83, 1.24)].
Sk et al, 2021 <sup>5</sup>	India	Cross sectional study	731 patients	The multilevel analysis's findings showed that the following variables are linked to stunting risk: mother's age at birth, occupation, low birth weight, length of nursing, and prior birth interval. The two most significant risk variables for stunting are low birth weight (OR 2.22, 95% CI: 1.44-3.41) and the mother's profession as a bidi worker (OR 1.92, 95% CI: 1.18-3.12). Furthermore, the community and child/household levels account for roughly 14 and 86% of the variance in stunting, respectively.
Muhoozi et al, 2018 <sup>6</sup>	Uganda	Randomized cluster study	511 patients	Between the two research groups, there was no indication of a difference in the mean

				length-for-age z-score at 20–24 months. On the Bayley Scales of Infant and Toddler Development-III, the intervention group outperformed the controls in terms of mean composite development scores. For the cognitive, language, and motor composite scores, the mean differences were, respectively, 15.6, 95% CI [10.9, 20.2], p =.0001; 9.9, 95% CI [6.4, 13.2], p =.0001; and 14.6, 95% CI [10.9, 18.2], p =.0001. For communication, gross motor, fine motor, problem solving, and personal-social development, the mean differences in scores from the Ages and Stages Questionnaire were 7.0, 95% CI [2.9, 11.3], p =.001; 5.9, 95% CI [1.2, 10.3], p =.01; 4.2, 95% CI [1.7, 6.7], p =.001; and 8.9, 95% CI [5.3, 12.3], p =.0001; and 4.4, 95% CI [0.0, 8.8], p =.05, respectively.
<b>Olney et al, 2018<sup>7</sup></b>	USA	Randomized controlled study	574 patients	When compared to the control group, PROCOMIDA dramatically decreased stunting at age 1 month in the FFR + CSB, RFR + CSB, and FFR + MNP groups [5.05, 4.06, and 3.82 percentage points (pp), respectively]. In comparison to the control, the stunting impact increased by age 24 months in FFR + CSB and FFR + MNP (impact = 11.1 and 6.5 pp at age 24 months, respectively). The FFR considerably decreased stunting in CSB recipients as compared to RFR or NFR (6.47-9.68 pp). At 24 months of age, CSB considerably reduced stunting more than LNS (8.12 pp).
<b>Gelli et al, 2018<sup>8</sup></b>	USA	Randomized cluster study	1552 patients	Anthropometric measurements in preschoolers showed no effects. In comparison to children in the control group, younger siblings in the intervention group showed larger gains in height-for-age z scores (DID: 0.44; P < 0.05) and bigger decreases in the prevalence of stunting (DID: -17 percentage points; P < 0.05). The production of nutritious meals, caregiver

				knowledge, and dietary diversity were among the impacts along program impact pathways that provided evidence for the plausibility of the influence on younger siblings' growth.
<b>Galasso et al, 2019<sup>9</sup></b>	USA	Randomized controlled study	3738 patients	In the entire sample, there were no major effects of any of the intervention groups on any anthropometry measure or child development outcome. The T2 and T3 intervention groups' youngest children (less than 6 months at baseline) who received the full child LNS dose, however, showed longer length-for-age Z scores (a significant effect of 0.210 SD [95% CI -0.004 to 0.424] for T2 and a borderline effect of 0.216 SD [0.043 to 0.389] for T3) and lower rates of stunting (-9.0% [95% CI -16.7 to -1.2] for T2 and -8.2% [-15.6 to -0.7] for T3); supplementing mothers did not yield any additional benefits.
<b>Shafique et al, 2016<sup>10</sup></b>	Canada	Randomized cluster study	467 patients	When administered in conjunction with NHHE, the use of an HS showed no extra advantage in lowering indications of infection in the early or second half of infancy or the chance of stunting at 12 mo postpartum. Stunting at 12 months was much less common in FT-LBW babies who received the MNP (with or without the HS) than in controls (OR: 0.35; 95% CI: 0.15, 0.84; P = 0.017).
<b>Leroy et al, 2018<sup>11</sup></b>	USA	Randomized controlled study	218 patients	Tubaramure had a significant (P < 0.05) beneficial effect in the T24 [7.4 percentage points (pp); P < 0.05], T18 (5.7 pp; P < 0.05), and TNFP (4.6; P = 0.09) arms; the differences in effect across arms were not significant (P > 0.01). Stunting (height-for-age z score <2 SDs) increased significantly from baseline to follow-up. Secondary analysis revealed that the effect was restricted to children living in homes with assets above the median and whose mother and head of household had completed some elementary school.

Gelli, et al<sup>8</sup> (2018) showed that by using an ECD platform to implement an integrated agricultural and nutrition intervention, stunting among younger siblings of preschoolers who were the target population was decreased and children's diets improved.

Galasso, et al<sup>9</sup> (2019) showed that for kids for a full year only helped with development when started early, indicating that in extremely low-income settings, babies as young as six months old should start receiving supplements. The low uptake of behavior-change messages and the difficulties community health professionals have in delivering them might be the reason for the early stimulation messages' and home visits' lack of impact.

Shafique, et al<sup>10</sup> (2016) showed that stunting at 12 months was decreased in infants born FT-LBW in rural Bangladesh when daily home fortification of supplemental meals with an MNP containing 22 micronutrients was implemented. The decreased stunting was probably caused by the better availability of nutrients needed for linear development in the second half of infancy. Further study is necessary to corroborate these findings because there were no safety concerns linked to the novel micronutrient formulation and because there was only a slight cost difference between MNP formulations of 22 and 15 elements. The study found no proof that encouraging handwashing with soap and water in this situation was more successful in enhancing FT-LBW baby length gain than the guided use of a water-based HS.

Leroy, et al<sup>11</sup> (2018) showed that in fragile nations like Burundi, FA-MCHN programs can shield children from political and economic shocks and are an efficient development strategy for enhancing children's linear growth. It's necessary to have a deeper comprehension of how to raise the nutritional status of kids from the poorest homes.

## DISCUSSION

Mayen, et al in their study of 971 children with age 6-72 months showed in their study changes in the length/height-for-age (HAZ) score and the prevalence of stunting at the 18-month follow-up were the main outcomes. 73% of the kids in the atole + MN group met at least half of their daily iron and zinc requirements, according to a monthly adherence check. The groups did not vary in terms of morbidity, and there was no correlation between HAZ and micronutrient status.<sup>4</sup>

In every state in India in 2017, malnutrition was the leading cause of mortality for children under five years old. India leads the world in children who are stunted, which is concerning because the government of India has undertaken a number of flagship projects and schemes. This was noted in the most recent edition of the Global Nutrition Report 2018. Therefore, a micro-level research was created to determine the nutritional status and investigate it at different levels of disaggregation. It also looked at the risk variables associated with stunting in Malda among preschoolers between the ages of 36 and 59 months. Community health workers should be instructed by policy interventions to urge women and their male partners to use various family planning methods to increase the interval between births and to give particular care to babies born with low birth weights, since this can help prevent childhood stunting.<sup>5</sup>

The impact of an education intervention given to poor women in Uganda, which included nutrition, stimulation, sanitation, and cleanliness, on the growth and cognitive, linguistic, and motor development of the children was evaluated. The mothers in Uganda's impoverished rural areas received intervention education that supported early development domains in cognitive, linguistic, and motor development, but did not increase small children's linear growth.<sup>6</sup>

There is no evidence to support the hypothesis that food-assisted maternal and child health and nutrition (FA-MCHN) programs promote child growth throughout the first 1000 days of pregnancy and the first two years of a child's life. Study by Olney, et al in longitudinal cluster trial showed that FA-MCHN programs can lower stunting within the first 1000 days, even in populations that are comparatively energy and food secure. The most successful rations were large family meals with individual CSB or MNP portions. The influence grows as children become older, which emphasizes how crucial it is to intervene for the whole first 1000 days.<sup>7</sup>

Gelli, et al in their randomized study of 60 community based childcare centers that covers 1248 preschool children with age 36-72 patients and 304 younger siblings with age 6-24 months old showed that preschoolers in the intervention group increased their nutrient intakes and dietary diversification more than those in the control group. Anthropometric measurements in preschoolers showed no effects. Compared to children in the control group, younger siblings in the intervention group showed larger gains in height-for-age Z scores and bigger decreases in the incidence of stunting.<sup>8</sup>

## CONCLUSION

In summary, stunting must be managed in order to protect children from its harmful effects. To do this, a variety of linked parties must contribute to the effort. Improving the mother's responsive stimulation and health education might be the first step in improving the nutritional and cognitive state of the kid.

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