Seminars in Medical Writing and Education. 2025; 4:446
doi: 10.56294/mw2025446

REVIEW

Stunting Prevention: Bibliometric Analysis

Prevención del Retraso del Crecimiento: Análisis Bibliométrico

Oktaria Safitri[1], Shanti Riskiyani[2], Stang[3], Abdul Salam[4], Mardiana Ahmad[5], Hasnawati Amqam[6], Anto[7], Anwar Mallongi[6]

[1]Doctoral Student of Faculty of Public Health, Hasanuddin University, Department of Public Health. Makassar, Indonesia.
[2]Doctorate in Health Promotion Science, Hasanuddin University, Department of Health Promotion. Makassar, Indonesia.
[3]Faculty of Public Health, Hasanuddin University, Department of Biostatistics Health. Makassar, Indonesia.
[4]Department of Health Nutrition, Faculty of Public Health, Hasanuddin University. Makassar, Indonesia.
[5]Faculty of Midwifery, Hasanuddin University, Department of Midwifery. Makassar, Indonesia.
[6]Faculty of Public Health, Hasanuddin University, Department of Environmental Health. Makassar, Indonesia.
[7]Aufa Royhan University, Departement of Public Health Padang Sidempuan. Indonesia.

Cite as: Safitri O, Riskiyani S, Stang, Salam A, Ahmad M, Amqam H, et al. Stunting Prevention: Bibliometric Analysis. Seminars in Medical Writing and Education. 2025; 4:446. https://doi.org/10.56294/mw2025446

Submitted: 03-08-2024 **Revised:** 30-01-2025 **Accepted:** 19-07-2025 **Published:** 20-07-2025

Editor: PhD. Prof. Estela Morales Peralta

Corresponding Author: Anwar Mallongi

ABSTRACT

Objective: this study analyzes trends in stunting prevention research through a bibliometric approach to identify developments, international collaborations, and the most effective interventions.
Method: analysis was conducted on 959 articles from the Scopus database (1972–2025) using VOSviewer and Microsoft Excel. The keywords "Stunting" AND "Prevention" were used for data extraction, with the inclusion criteria being English-language articles from 2013–2023.
Results: the number of studies increased significantly, peaking in 2024 (176 articles).
Collaboration: Indonesia contributed 16 articles (20,5 %), but only 18,8 % involved international collaboration, compared to the US (62,5 %).
Effective Interventions: a combination of nutritional supplementation, improved sanitation, and behavioral education.
Determinants: maternal education, family income, and access to clean water play a crucial role.
Conclusions: stunting prevention requires a multisectoral approach that is adaptive to local contexts, with global research collaboration to strengthen policy implementation. Integration of nutrition-specific and sensitive interventions (sanitation, education) has proven to be most effective, especially in the First 1000 Days of Life.

Keywords: Stunting; Prevention; Effective Interventions; Bibliometrics.

RESUMEN

Objetivo: este estudio analiza las tendencias en la investigación sobre la prevención del retraso del crecimiento (stunting) mediante un enfoque bibliométrico para identificar desarrollos, colaboraciones internacionales y las intervenciones más eficaces.
Método: se realizó un análisis de 959 artículos de la base de datos Scopus (1972–2025) utilizando VOSviewer y Microsoft Excel. Se utilizaron las palabras clave "Stunting" Y "Prevention" para la extracción de datos, con criterios de inclusión de artículos en inglés entre 2013–2023.
Resultados: el número de estudios aumentó significativamente, alcanzando su punto máximo en 2024 (176 artículos).

Colaboración: Indonesia contribuyó con 16 artículos (20,5 %), pero solo el 18,8 % incluyó colaboración internacional, en comparación con EE. UU. (62,5 %).
Intervenciones eficaces: combinación de suplementación nutricional, mejora del saneamiento y educación conductual.
Determinantes: la educación materna, el ingreso familiar y el acceso a agua potable desempeñan un papel crucial.
Conclusiones: la prevención del retraso del crecimiento requiere un enfoque multisectorial adaptado a los contextos locales, con colaboración global en la investigación para fortalecer la implementación de políticas. la integración de intervenciones específicas de nutrición y sensibles (saneamiento, educación) ha demostrado ser la más eficaz, especialmente en los primeros 1000 días de vida.

Palabras clave: Retraso del Crecimiento; Prevención; Intervenciones Eficaces; Bibliometría.

INTRODUCTION

Stunting is Wrong One problem health And nutrition child school in a way global, which due to by lack nutrition, Good micro and also macro, in term time Which old.[1] Children Which not enough develop No reach height optimal, And Work brain No Once fully develop potential cognitive. In 2016, the prevalence of stunting in the world was 22,9 % and wasting was 7,2 %.[2]

In Asia alone, there are 87 million children who experience stunting, 59 million in Africa and 6 million in Latin America and the Caribbean. Five sub-regions have child stunting rates exceeding 30 %, namely West Africa (31,4 %), Central Africa (32,5 %), East Africa (36,7 %), South Asia (34,1 %) and Oceania (38,3 %; excluding Australia and New Zealand). Accelerating the reduction of stunting in Indonesia with a target of 14 % in 2024, the government has a role as a director, regulator, and implementer. The success of reducing stunting by 70 % is determined by sensitive interventions and 30 % by specific interventions.[3]

Children who experience long-term or chronic malnutrition, especially those that occur before the age of two, will have stunted physical growth so that they become short (stunting). If this is left without intervention, it will have an impact on illness, death, impaired physical growth, impaired mental development, cognitive and impaired motor development so that stunted children will have less intelligence which will affect suboptimal learning achievement. Long-term effects are also associated with decreased fat oxidation ability, causing the risk of obesity and degenerative diseases including hypertension, type 2 diabetes mellitus, and cardiovascular diseases.[4]

The causes of stunting consist of many factors that influence each other, one of which is infectious diseases due to environmental health with inadequate coverage of clean water and sanitation, providing sensitive food especially for children can prevent a decline in the nutritional status of children and prevent growth retardation,[5] Suboptimal parenting patterns, which can cause the prevalence of stunting.[6] Parental opinions and work are one of the causes of stunting.[7] Poor parental education and low household income are the causes of socio-economic factors that contribute to the use of solid fuels that cause stunting.[8]

The impact of stunting on children who experience long-term or chronic malnutrition, especially those that occur before the age of two, will be hampered by their physical growth so that they become short (stunting). If this is left without intervention, it will have an impact on illness, death, impaired physical growth, impaired mental development, cognitive and impaired motor development so that stunted children will have less intelligence which affects suboptimal learning achievement. Long-term effects are also related to decreased fat oxidation ability, causing the risk of obesity and degenerative diseases including hypertension, type 2 diabetes mellitus, and cardiovascular diseases.[9]

Stunting, defined by length/height-for-age z score (LAZ/HAZ) < –2 SD , is a chronic public health problem because most affected countries have not made significant progress in reducing or eliminating it. Its impact is highly correlated with adverse short-term and long-term health outcomes for affected children. Stunting inhibits optimal growth and development and inhibits maximal brain development, leading to poor cognitive abilities later in life.[10]

Efforts that have been implemented by the government to improve the behavior of its people in preventing stunting are arranged in a national strategy consisting of 5 pillars of accelerating stunting prevention, specifically in pillar 2 which states national campaign and communication of behavior change.[9] The strategy to achieve this pillar is to improve interpersonal communication through the development of messages that are tailored to the needs of the target group, namely 1,000 HPK Households, WUS, and adolescent girls. Various communication channels such as integrated health posts, parenting classes, pregnant women classes, and adolescent reproductive counseling have been used in delivering this message.[11]

The family-risk approach in efforts to accelerate stunting reduction has at least 5 priority activities as follows: 1) provision of data on families at risk of stunting, 2) assistance to families at risk of stunting, 3) assistance to all prospective brides/prospective couples of fertile age (PUS), 4) surveillance of families at risk of stunting; and 5) audit of stunting cases. By carrying out at least 5 family-risk approach schemes, it is believed to have a large and significant impact on accelerating stunting reduction.[3] Model parenting child come true in Lots matter like giving breast milk And complementary feeding, stimulation psychosocial, practice cleanliness And cleanliness environment, maintenance House For child Sick And pattern utilization service health. Habit family in the form of pattern Eat, stimulation psychosocial, practice cleanliness/ hygiene , cleanliness environment, And use service health relate significant with stunting on Child . Service health centered on the Community Health Center, especially in the field of nutrition aims to improve the nutritional quality of individuals and communities with priority on group vulnerable, that is child age school. Family behavior and family care related to nutrition is one of the problems that has moment This Still faced sector health public, Because the solution No can done only with approach medical And health services.[11]

METHOD

This exploratory review examined research on Prevention AND Stunting , utilizing data from the Scopus database covering the years 1972 to 2025. The search methodology involved extracting relevant information using the terms Stunting AND Prevention. The search targeted article titles, abstracts and keywords with results limited to English language publications within the specified time period. The refined dataset consisted of 959. It involved retrieving relevant information from the Scopus database using specified keywords. The 959 publications were then filtered using Open Refine in Microsoft Excel (Microsoft Corp., Redmond, WA, USA). The refined dataset was then subjected to further analysis using VOSviewer for visual representation and interpretation. This multi-stage approach provides a comprehensive understanding of the current state of research on stunting prevention through to 2025.

Bibliometric Analysis

Bibliometric analysis is used to examine the development and trends of research in a field, evaluate the impact of articles and authors, and assess the prospects for future research. The results of this analysis can help researchers identify potential areas of study and find potential collaborators.

Metrics used in current bibliometric analysis include examining the number of publications, the number of citations, and the h-index. The number of citations reflects the frequency with which an author's work is cited by peers. The h-index considers the quantity of an author's publications and the number of citations each receives. Overall, bibliometric analysis offers valuable information for researchers, policymakers, and stakeholders involved in the advancement of a scientific domain.

After conducting bibliometric analysis, a literature review was conducted Scopus database search Identification Filtering Including Using keywords "Prevention" AND "stunting'' Filtered data (n=959) Journal articles (n=76) Full-text review (n=18) Prevention Initially, the titles and abstracts in the search results were checked against pre-determined eligibility criteria. Next, the full articles selected during the title/ abstract screening stage were evaluated to ensure compliance with the eligibility criteria. These criteria were established impartially and independently.[1] The inclusion criteria were as follows: articles or reviews, with a study period between 2013 and 2023, in the final publication stage, and available in English.[2] The exclusion criteria were as follows: publications in languages other than English; theses, dissertations, books, book chapters, and conference papers; and grey literature. A flowchart illustrating the article selection process for the literature review is presented in figure 1.

Systematic Review Analysis

Systematic review analysis is a systematic method used to collect or synthesize data from previous studies to answer a specific research question. Systematic review analysis involves several stages, including developing research results, assessing the quality of evidence, and evaluating to determine conclusions.

Ethics Statement

This article is a review article using bibliometric analysis, not original research, and therefore does not require ethical approval.

RESULTS

Visualization of bibliometric analysis presented in figure 2. Describes the increasing annual trend in literature on stunting prevention. in 1992 to 2025, the number of documents published was 959 articles. Every year the published articles are growing which in early 1972 was only 1, every year it has experienced good progress and in 2024 the highest publication was 176 articles published. Research on this topic is very interesting and

is anticipated to continue to grow, in line with the increasing number of stunting in Indonesia so that many researchers are interested in researching stunting prevention.

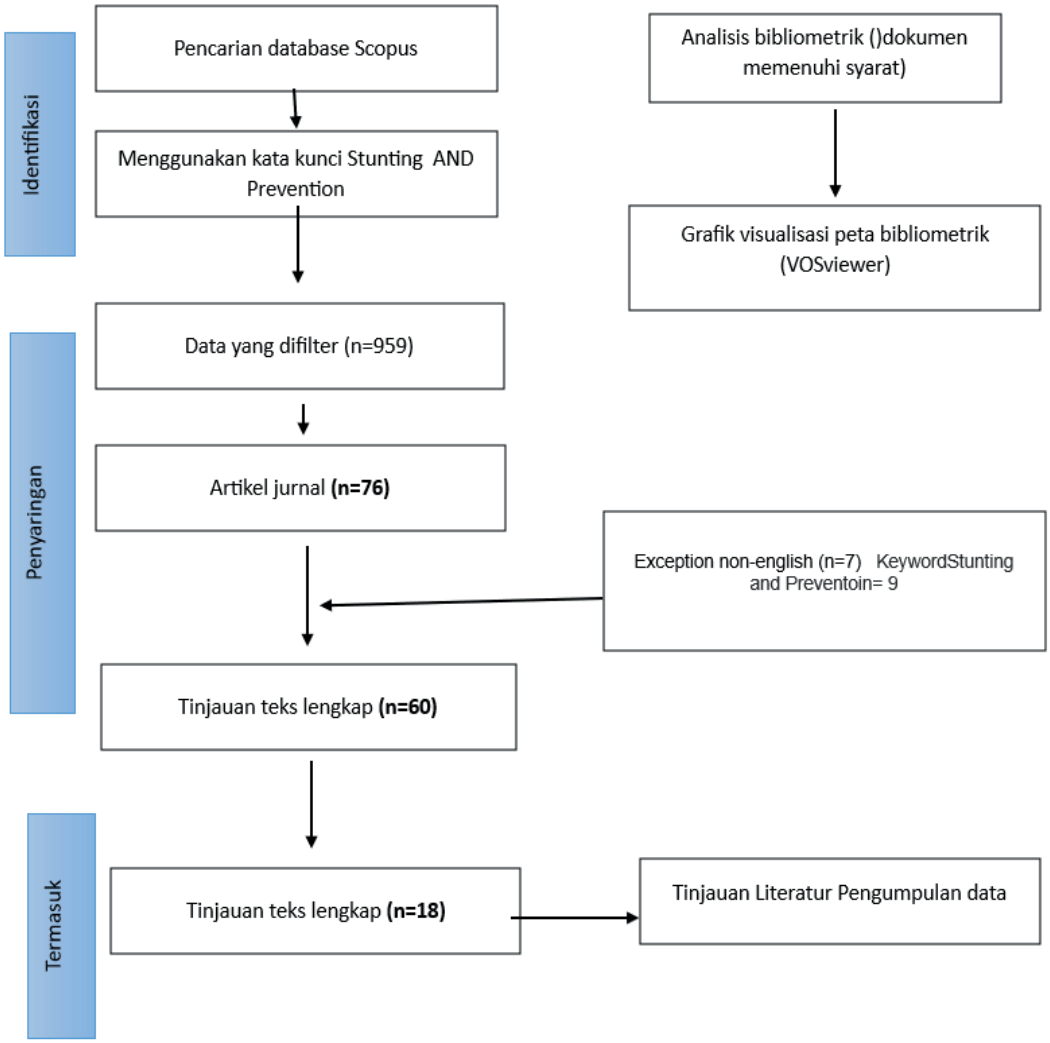

Figure 1. Data Processing Flowchart

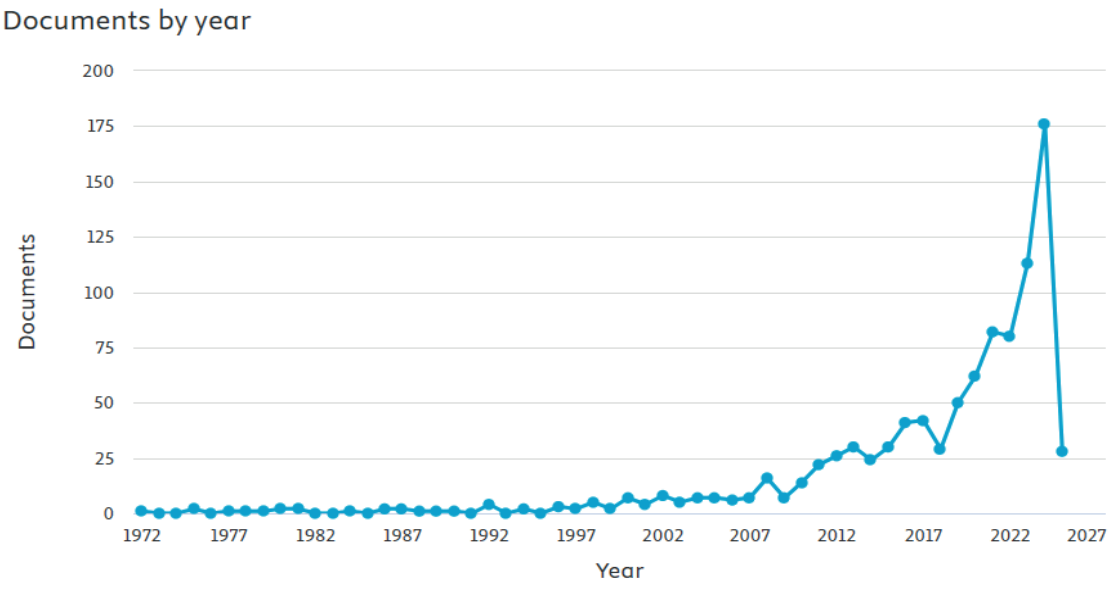

Figure 2. Journal Publications on stunting from 1972-2025

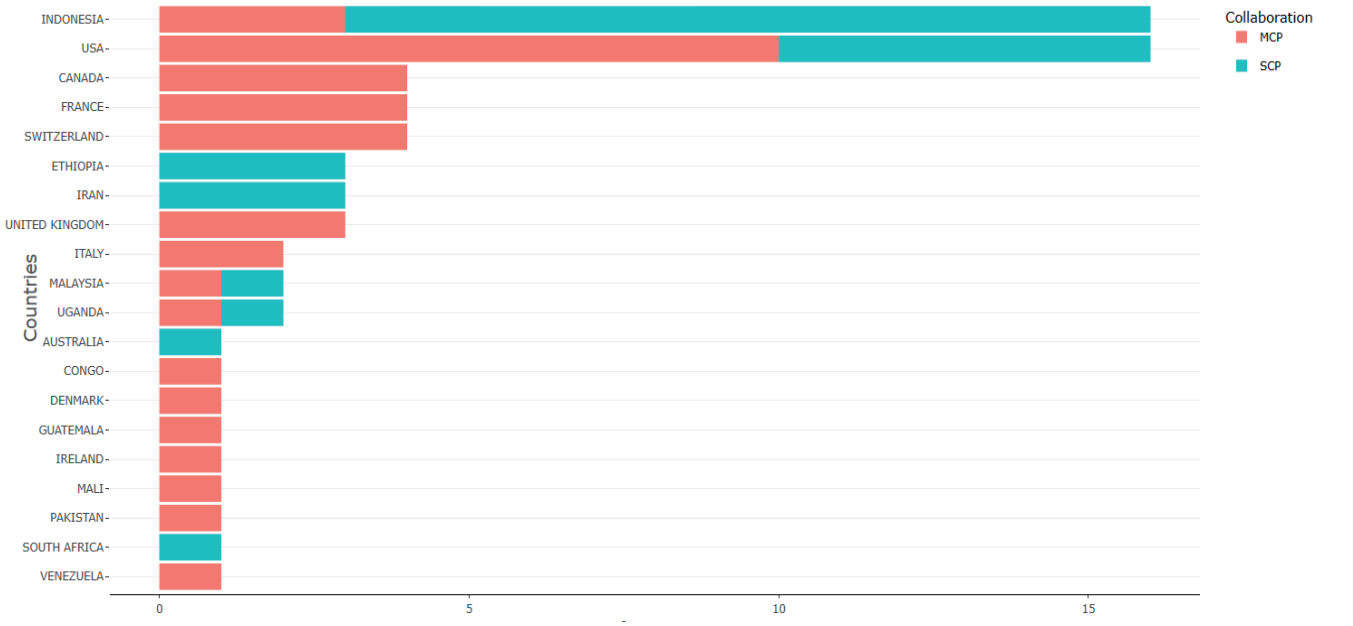

Figure 3. Related countries

Indonesia and USA: these two countries have the highest number of articles (16 articles each) with a contribution percentage of 20,5 %. However, the pattern his collaboration different:

Indonesia: majority the article is SCP (13 articles), which shows that part big stunting research in Indonesia was conducted by researchers local without collaboration international. Only 18,8 % of articles involved international collaboration (MCP).

USA: in contrast, the USA has more articles involving international collaboration (MCP = 10 articles, 62,5 %). This shows that stunting research in the USA involves more collaboration with researchers from other countries.

Countries with High International Collaboration: several countries such as Canada, France, Switzerland, and the UK have 100 % of their articles as MCP. This shows that stunting research in these countries relies heavily on international collaboration.

Countries with Low International Collaboration: countries such as Ethiopia, Iran, and Australia have 0 % MCP, meaning all stunting research in these countries was conducted independently without international collaboration.

Countries with Mixed Collaboration: Malaysia and Uganda have a balanced collaboration pattern between SCP and MCP (50 % each).

Paper	DOI	Total Citations	TC per Year	Normalized TC
STEWART CP, 2013, MATERN CHILD NUTR	10.1111/mcn.12088	452	34.77	2.84
HODDINOTT J, 2013, MATERN CHILD NUTR	10.1111/mcn.12080	305	23.46	1.92
OLNEY DK, 2015, J NUTR	10.3945/jn.114.203539	170	15.45	3.74
POH BK, 2013, BR J NUTR	10.1017/S0007114513002092	155	11.92	0.97
KEUSCH GT, 2013, FOOD NUTR BULL	10.1177/156482651303400308	142	10.92	0.89
MENON P, 2018, MATERN CHILD NUTR	10.1111/mcn.12620	86	10.75	2.95
ICKES SB, 2015, J NUTR	10.3945/jn.115.214346	54	4.91	1.19
MICHAELSEN KF, 2017, MATERN CHILD NUTR	10.1111/mcn.12444	50	5.56	2.98
HASAN MT, 2016, MATERN CHILD NUTR	10.1111/mcn.12178	49	4.90	2.08
SOLOMONS NW, 2015, PUBLIC HEALTH NUTR	10.1017/S136898001400264X	39	3.55	0.86

Figure 4. 10 influential articles based on citations

Most Cited Article: Stewart CP et al.[12]: this article has the highest total citations (452 citations) and a high average citations per year (34,77). This article discusses nutritional interventions to prevent stunting, which is in line with the focus of your article on stunting prevention efforts.

Hoddinott J et al.[13]: this article also has a high total citations (305 citations) and a significant average citations per year (23,46). This article may discuss the impact of nutritional interventions on child growth, which is relevant to your discussion of specific and sensitive interventions in stunting prevention.

Articles with High Normalized Citations

Olney DK et al.[14]: although its total citations are not as high as the first two articles, this article has the highest normalized citations (3,74), indicating that this article is very influential in its field. This article may discuss effective nutritional interventions in preventing stunting, which can be an important reference for your article.

This article also has a high normalized citation (2,98), indicating its significant influence in stunting research. This article may discuss optimal feeding practices to prevent stunting, which is relevant to your discussion of parenting and supplementary feeding.

Articles with Low Normalized Citations

Poh BK et al.[15] articles have normalized citations below 1, indicating that they are less influential than the average article in the same field. However, these articles may still provide insights into nutrition and nutrition interventions that may be relevant to the local context, as discussed in your article.

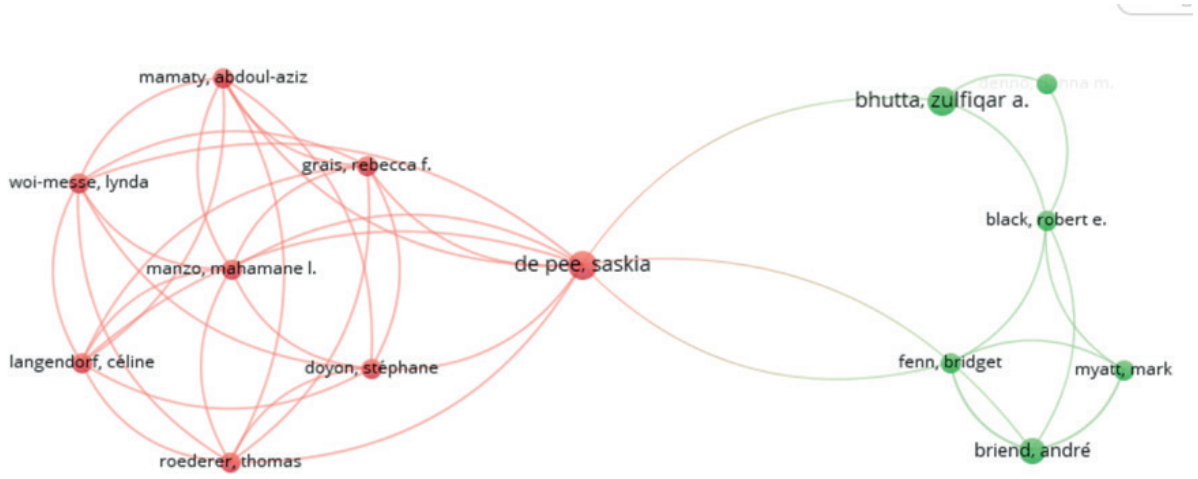

Figure 5. Co-authorship by author

Profile Researcher

Bhutta, Zulfiqar A: leading nutrition and child health expert from Pakistan, known for his research on community-based nutrition interventions. Briend, André: french emergency nutritionist, focusing on food therapy for acute malnutrition. Grais, Rebecca F: epidemiologist specializing in health crisis response, especially in the African context. Langendorf, Céline: researcher of nutrition interventions in the Sahel region of Africa.

Context Collaboration

Names like Marzo, Mahamane L. (possible from West Africa) and De Pee, Saskia (expert nutrition from the Netherlands) shows Network research cross continents (Africa- Europe -Asia) Wol-Messe, Lynda and Doyon, Stephane may involved in project maternal/child health in the region conflict or endemic stunting.

Specialization

Nutrition and Nutrition: Bhutta, Briend, De Pee. Epidemiology and Global Health: Grais, Langendorf, Roederer. Program Implementation: Mamaty, Fern, Myat (presumably working in the field in Asia/Africa). Implications for Stunting Research: Collaboration with researchers such as Bhutta or Briend could strengthen the evidence for nutrition interventions in your article. Grais and Langendorf are relevant For analysis determinant social stunting in the region crisis.

The image displays a list of frequently used keywords appear in study related to stunting, reflects focus main in literature about Topic this. Keywords such as breastfeeding, child nutrition, and linear growth show importance intervention nutrition and nutrition in prevention of stunting, which is in line with with discussion your article about the Giving Program Food Additional (PMT) and patterns optimal care. Keywords such as growth velocity and children under 5 indicate focus on growth children , especially in groups age vulnerable . In addition, keywords such as sanitation, knowledge, and education reflect the role of environmental and behavioral factors in prevention stunting, which is also discussed in your article. Countries such as Malawi, India, and Indonesia emerge as research sites, indicating that stunting is a global problem with different local contexts. The keyword cost-effectiveness emphasizes the importance of cost evaluation in stunting prevention

interventions.

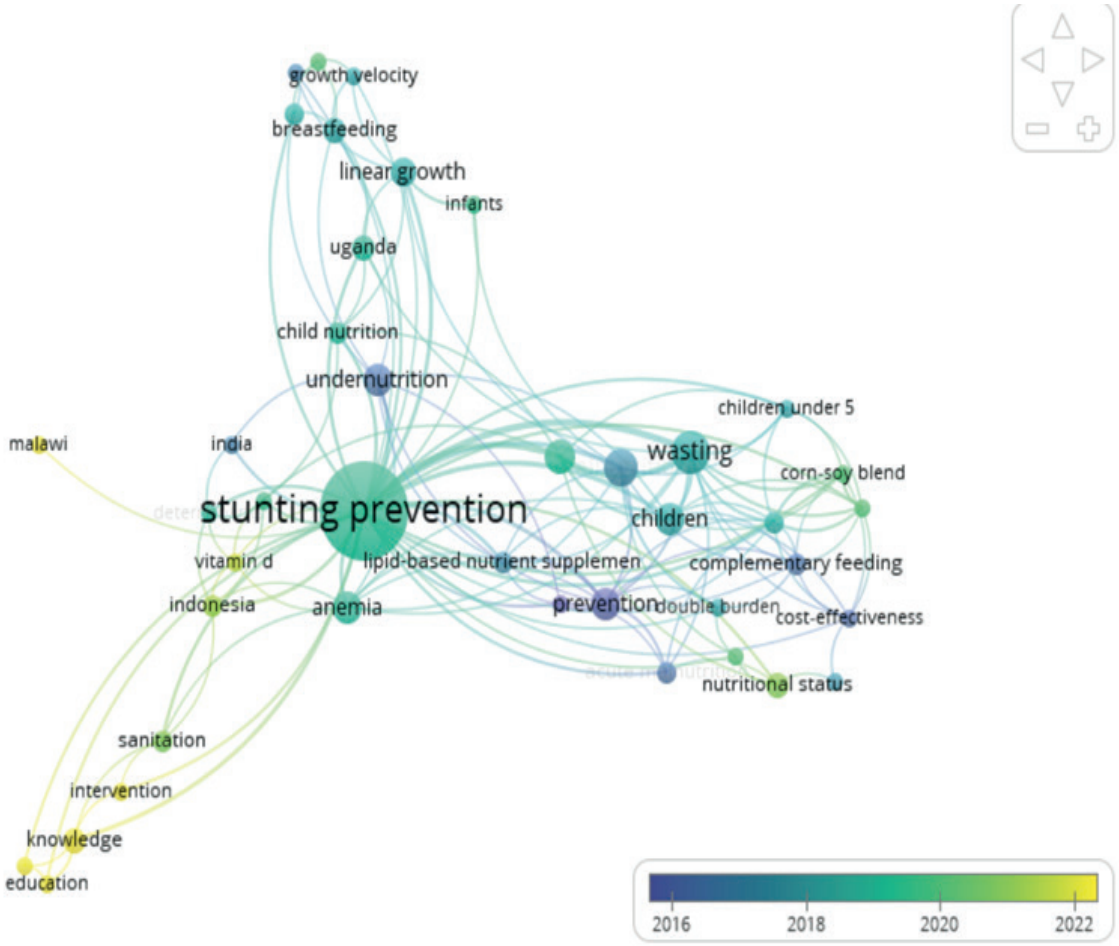

Figure 6. Outher keyword co-occurrence

DISCUSSION

Interpretation of Key Findings

This bibliometric analysis reveals a trend of increasing research on stunting prevention from 1972 to 2025, with a peak in publications in 2024 (176 articles). This reflects the increasing global awareness of the impact of stunting on children's quality of life, especially in developing countries such as Indonesia, India, and Malawi. The dominance of topics such as breastfeeding, child nutrition, and sanitation (figure 6) shows that nutrition and environmental interventions are still the main focus in the literature. This finding is in line with Indonesia's national strategy which emphasizes specific (nutrition) and sensitive (sanitation, education) interventions in preventing stunting.[3]

Research Collaboration and Policy Implications

International Collaboration: although Indonesia is among the countries with the highest publications (16 articles), only 18,8 % involved international collaboration (figure 3). This shows the potential to expand research networks with countries such as the US or UK that have high levels of collaboration (MCP >60 %). Such collaborations can enrich perspectives, especially in adapting evidence-based interventions from a global to a local context.

Policy Role: the finding that cost-effectiveness emerged as a keyword (figure 6) indicating the importance of economic evaluation in stunting prevention programs. The government needs to prioritize affordable evidence-based interventions, such as the integration of local wisdom (e.g., Mee Bu culture in Aceh) with community-based nutrition programs. 4. Local vs. Global Context The finding that Indonesia is one of the countries with the highest publications (figure 3) reflects the seriousness in addressing stunting, but the still high prevalence (21,6 % in 2022) requires a more innovative approach. Successful examples such as local wisdom-based nutrition education in Cirebon or the integration of nutrition messages through traditional media (posyandu) need to be adopted more widely, with adaptation to the socio-cultural context of other regions.

Table 1. 10 Most Influential Articles on Stunting Prevention

Paper	Country	Sample	Method	Variables	Key Results
Stewart CP[12]	Malawi	2400 children 6-23 months	RCT cluster	Intake food Environment Growth	Fortified porridge intervention (lipid-based) increased: • Linear growth rate (+0,33 cm/month, p=0,002) • Reduction in stunting by 12 % (RR 0,88, 95 % CI 0,80–0,96).[12]
Hoddinott J[13]	Guatemala	1500 children 0-36 months	40-year longitudinal study	Protein supplementation Family income Adult cognitive	Childhood protein intervention: • Increased adult height (+2,5 cm, p<0,05) • Increased income by 46 % (p=0,03) via cognitive effects.[13]
Olney DK[14]	Burkina Faso	1800 mothers & children <2 years	Intervention community	Nutrition education Food access Parenting patterns	Combination of education + food vouchers: • Reduced stunting by 15 % (p=0,03) • Increased food diversification (OR 1,8, 95 % CI 1,2–2,7).[14]
Poh BX[15]	Malaysia	600 preschool children	Cross-sectional	Zinc status Height Infection	Zinc deficiency: • Correlated with stunting (OR 2,1, 95 % CI 1,3–3,4) • Children with low zinc were 3x more likely to be sick (p<0,01).[15]
GT[16]	Global (10 countries)	12 RCTs (n=8000)	Meta-analysis	Multi- nutrients vs. intervention single	Multi- nutrient interventions: • More effective For growth (ES 0,45, 95 % CI 0,30–0,60) • Effect largest in children <2 years.[16]
Menon P[17]	India	3200 children 6-23 months	Cluster-RCT	Feeding behavior Morbidity	Behavior change program: • Increased meal frequency (4,2 → 5,1x/ day, p<0,001) • Reduced diarrhea by 25 % (RR 0,75, 95 % CI 0,60–0,90).[17]
Ickes SB[18]	Uganda	1000 teenagers daughter	Intervention school	Knowledge nutrition Anemia Growth	Education nutrition : • Increase knowledge 40 % (p<0,001) • Not significant against stunting (p=0,12) in 1 year.[18]
Michaelsen KF[19]	Global (Review)	50 studies (n=100 000)	Systematic review	Breast milk/ complementary food Growth	The right MP-ASI time (6–8 months): • Reduce stunting by 30 % (RR 0,70, 95 % CI 0,55–0,89) • Exclusive breastfeeding reduced wasting (RR 0,85, 95 % CI 0,76–0,95).[19]
Hasan MT[20]	Bangladesh	5000 children 6-59 months	Cohort prospective	Sanitation Clean water Stunting	Poor sanitation: • Increased risk of stunting 1,5x (OR 1,52, 95 % CI 1,20–1,93) • Significant interaction with iron deficiency (p<0,05).[20]
Solomons NW[21]	Latin America	6 countries (n=15 000)	Policy analysis	Food fortification Prevalence of stunting	Fortification of flour with iron/zinc: • Reduced stunting by 12 % in 5 years (p=0,04) • Greater effect in urban areas (RR 0,82 vs. rural 0,91).[21]

Based on the synthesis of 10 of the most influential studies, a clear pattern is seen regarding the effectiveness of various stunting prevention interventions. Studies by Stewart[12] and Hoddinott[13] consistently show that specific nutritional interventions such as fortified foods and protein supplementation have a significant impact on children's linear growth, with a reduction in stunting prevalence of 12,20 %. This finding is reinforced by a study meta-analysis which proves that a multi-nutrient approach is more effective than a single intervention.

Environmental and behavioral aspects are just as crucial as nutritional factors. Hasan's[20] study revealed that poor sanitation increases the risk of stunting by 1,5 times, while Menon's[17] study showed that changes in eating behavior can reduce diarrhea rates by 25 %. These findings underscore the importance of an integrated approach that combines nutritional interventions with improved sanitation and education.

The effectiveness of interventions varies widely by context. Analysis found that food fortification programs were more successful in urban than rural areas, while Ickes'[18] study of adolescent girls showed that nutrition

education alone was not enough to significantly change nutritional status. This underscores the need for approaches tailored to the characteristics of the target population.

From the comparative analysis, it is clear that long-term interventions that combine nutritional and behavioral aspects such as those in Olney[14] and Hoddinott[13] provide the most optimal results. These findings also highlight the challenges of implementation in the field, including socio-cultural factors and the need for ongoing monitoring.

The policy implications of these findings are the need to:

1. Intervention priorities in the first 1000 days of life.
2. Integration of nutrition, sanitation and education programs.
3. Local adaptation based on context-specific evidence.
4. Strengthening the long-term monitoring and evaluation system.

CONCLUSIONS

This bibliometric analysis reveals that research on stunting prevention continues to grow, with a major focus on nutrition, sanitation, and education interventions. Multimodal interventions such as a combination of food supplementation, improved sanitation, and behavioral change have proven to be the most effective in reducing stunting prevalence, especially in children under two years of age. However, a major challenge lies in adapting global solutions to local contexts, given that socio-cultural and environmental factors play a major role in program success.

International research collaboration is still limited, even though countries with a high burden of stunting, such as Indonesia, need knowledge exchange to develop evidence-based strategies. In the future, technology integration, community participatory approaches, and sustainable policies are key to achieving the target of reducing stunting. These findings emphasize that stunting prevention is not only the responsibility of the health sector, but It does not require a multi-sectoral commitment to build a stunting-free generation.

BIBLIOGRAPHIC REFERENCES

1. Wright B, Spyridonidis D, Russell D, Vasilopoulou E, Fitzpatrick E, Swanepoel D, et al. A systematic scoping review of early interventions for parents of deaf infants. BMC Pediatrics. 2021;21(1):1–13. doi:10.1186/s12887-021-02893-9.

2. World Health Organization. Reducing stunting in children: equity considerations for achieving the Global Nutrition Targets 2025. Geneva: World Health Organization; 2018.

3. BKKBN. BKKBN Policy and Strategy for Accelerating Stunting Reduction in Indonesia. Jakarta: BKKBN; 2021.

4. Ministry of Health. Results of the 2022 Indonesian Nutritional Status Survey (SSGI). Jakarta: Ministry of Health; 2022. p. 1–7.

5. Keats EC, Ngugi A, Macharia W, Akseer N, Rizvi A, Bhatti Z, et al. Accelerating Kenya's progress to 2030: Understanding the determinants of under-five mortality from 1990 to 2015. BMJ Global Health. 2018;3(3):1–15. doi:10.1136/bmjgh-2017-000655.

6. Peñalvo JL, Mertens E, Segal RB, Martinez-Steele E, O'Flaherty M, Capewell S, et al. Effectiveness of workplace wellness programs for dietary habits, overweight, and cardiometabolic health: a systematic review and meta-analysis. The Lancet Public Health. 2021;6(9)\:e648–e660. doi:10.1016/S2468-2667(21)00140-7.

7. Rahayuwati L, Widianti E, Nurmalasari H, Budiarti T, Hardian D, Maharani D. The influence of mother's employment, family income, and expenditure on stunting among children under five: a cross-sectional study in Indonesia. Journal of Multidisciplinary Healthcare. 2023;16(August):2271–2278. doi:10.2147/JMDH.S417749.

8. Batool M, Sadiq M, Ijaz A, Chaudhry A, Altaf S, Hussain A. Relationship of stunting with water, sanitation, and hygiene (WASH) practices among children under the age of five: a cross-sectional study in Southern Punjab, Pakistan. BMC Public Health. 2023;23(1):1–7. doi:10.1186/s12889-023-17135-z.

9. Ministry of Health of the Republic of Indonesia. Indonesian Health Profile 2021. Jakarta: Ministry of Health; 2022.

10. Nyamasege CK, Kimani-Murage EW, Wanjohi M, Kaindi DWM, Wagatsuma Y. Effect of maternal nutritional

education and counseling on children's stunting prevalence in urban informal settlements in Nairobi, Kenya. Public Health Nutrition. 2021;24(12):3740–3752. doi:10.1017/S1368980020001962.

11. National Team for the Acceleration of Poverty Reduction (TNP2K). TNP2K Series. Jakarta: TNP2K; 2020. Vol. 01, No. 01.

12. Stewart CP, Iannotti L, Dewey KG, Michaelsen KF, Onyango AW. Contextualising complementary feeding in a broader framework for stunting prevention. Maternal and Child Nutrition. 2013;9(S2):27–45. doi:10.1111/mcn.12088.

13. Hoddinott J, Behrman JR, Maluccio JA, Melgar P, Quisumbing AR, Ramirez-Zea M, et al. Adult consequences of growth failure in early childhood. American Journal of Clinical Nutrition. 2013;98(5):1170–1178. doi:10.3945/ajcn.113.064584.

14. Olney DK, Bliznashka L, Pedehombga A, Dillon A, Ruel MT, Heckert J. A 2-year integrated agriculture and nutrition program targeted to mothers of young children in Burkina Faso reduces underweight among mothers and increases their empowerment: a cluster-randomized controlled trial. Journal of Nutrition. 2016;146(5):1109–1117. doi:10.3945/jn.115.224261.

15. Poh BK, Ng BK, Siti Haslinda MD, Nik Shanita S, Wong JE, Budin SB, et al. Nutritional status and dietary intakes of children aged 6 months to 12 years: findings of the Nutrition Survey of Malaysian Children (SEANUTS Malaysia). British Journal of Nutrition. 2013;110(Suppl.3). doi:10.1017/S0007114513002092.

16. Krebs NF, Mazariegos M, Tshefu A, Bose C, Sami N, Chomba E, et al. Meat consumption is associated with less stunting among toddlers in four diverse low-income settings. Food and Nutrition Bulletin. 2011;32(3):185–191. doi:10.1177/156482651103200301.

17. Menon P, Headey D, Avula R, Nguyen PH. Understanding the geographical burden of stunting in India: a regression-decomposition analysis of district-level data from 2015–16. Maternal and Child Nutrition. 2018;14(4):1–10. doi:10.1111/mcn.12620.

18. Ickes SB, Baguma C, Brahe CA, Myhre JA, Luwedde F, Kusiima J, et al. Maternal participation in a nutrition education program in Uganda is associated with improved infant and young child feeding practices and feeding knowledge: a post-program comparison study. BMC Nutrition. 2017;3(1):1–10. doi:10.1186/s40795-017-0140-8.

19. Michaelsen KF, Grummer-Strawn L, Bégin F. Emerging issues in complementary feeding: global aspects. Maternal and Child Nutrition. 2017;13(January):1–7. doi:10.1111/mcn.12444.

20. Hasan MT, Soares Magalhaes RJ, Williams GM, Mamun AA. The role of maternal education in the 15-year trajectory of malnutrition in children under 5 years of age in Bangladesh. Maternal and Child Nutrition. 2016;12(4):929–939. doi:10.1111/mcn.12178.

21. Ofori KF, Antoniello S, English MM, Aryee ANA. Improving nutrition through biofortification–a systematic review. Frontiers in Nutrition. 2022;9(December):1–20. doi:10.3389/fnut.2022.1043655.

FINANCING

None.

CONFLICT OF INTEREST

The authors have no conflicts of interest related to the material presented in this paper.

AUTHORSHIP CONTRIBUTION

Conceptualization: Oktaria Safitri, Shanti Riskiyani, Stang, Abdul Salam, Mardiana Ahmad, Hasnawati Amqam, Anto, Anwar Mallongi.

Data curation: Oktaria Safitri.

Formal analysis: Oktaria Safitri.

Research: Shanti Riskiyan.

Methodology: Stang.

Project management: Shanti Riskiyani.

Resources: Mardiana Ahmad.
Software: Stang.
Supervision: Anto.
Validation: Abdul Salam.
Display: Anwar Mallongi.
Drafting - original draft: Oktaria Safitri.
Writing - proofreading and editing: Anwar Mallongi.